UNIVERSITY OF
BIRMINGHAM

School of Computer Science

MSc in Human Computer Interaction

Handbook
2013/14
This handbook has been prepared as a convenient summary of information you may need during your degree programme. The School has endeavoured to ensure that it is correct at the time of preparation. However, if there are discrepancies, University Regulations always take precedence over the Handbook.

This handbook is prepared well in advance and there may be alterations to modules or facilities. You are strongly advised to consult the School’s WWW server for the latest information.
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Welcome message

I’d like to welcome you to the Masters in Human-Computer Interaction. Digital technologies have transformed the world in which we live, and will continue to do so. In order to understand that change, and to harness the potential of interactive systems to assist humankind, we need to understand how people and technology interact and react, and how to take this understanding and turn it into useful, exciting, engaging, entertaining, and supportive experiences. The study of Human-Computer Interaction is a study in human nature, in designing the future, in addressing the problems of now, in understanding and mastering technology: it is the widest of challenges, and a fascinating one. The course you have joined will give you many of the skills you will need to become more adept at understanding, creating and evaluating interactive systems. In it you will also learn how to work in groups, how to undertake research, how to present ideas and communicate them to others. The course is designed to expand your technical and personal skills, and give you fundamental, transferrable knowledge that will serve you well into the future. We hope that we achieve this in an interesting, challenging, supportive and enjoyable manner, and look forward to working with you.

With best wishes for your studies,

Russell.

Professor Russell Beale
MSc HCI Course Director.
Director, HCI Centre.
Important Dates

Academic Year 2013/14

26th September 2013
- Registration, 10:00-12:00, Atrium
- Computer account setup, 12:00-14:00, UG04
- Presentations on Modules, 14:00-17:00, Haworth, room 101
- Reception for postgraduate students, 17.30-19.00, Atrium

27th September 2013
- Induction talks, 09:00-11:00, Law, Lecture Theatre 1
- Meeting with programme director, 11:00-12:00, (see timetable)
- Computer account setup, 12:00-14:00, UG04

30th September 2013
- Autumn Term starts

2nd October 2013
- International students meeting, 16:00-17:00, Learning Centre LG10

4th October 2013
- Last date for changing first term modules

17th October 2013
- Declaration of 1st semester mini-project, by 12.00 noon

13th December 2013
- Autumn Term ends

13th January 2014
- Spring Term starts

13th January 2014
- Hand in two copies of 1st semester mini-project report to the Teaching Support Office, by 12.00 noon

17th January 2014
- Last date for changing second term modules

24th January 2014
- Declaration of 2nd semester mini-project, by 12.00 noon

w/c 27th January 2014
- Meeting with academic advisor – 1st semester mini-project review

28th March 2014
- Spring Term ends

28th April 2014
- Summer Term starts; Revision Period starts

28th April 2014
- Hand in two copies of 2nd semester mini-project report to the Teaching Support Office, by 12.00 noon

5th May 2014
- Examinations start

6th June 2014
- Examinations end

16th June 2014
- June MSc Examination Board

w/c 16th June 2014
- Meeting with academic advisor – 2nd semester mini-project review
20th June 2014  Declaration of summer project, by 12.00 noon
20th June 2014  Summer Term ends
26th August 2014  Supplementary (resit) Examinations start
1 September 2014*  Submit summer project poster, by 12.00 noon
5th September 2014  Supplementary (resit) Examinations end
w/c 7 September 2014*  Summer project poster presentations
11th September 2014*  Hand in two copies of summer project report to the Teaching Support Office, by 12.00 noon; end of programme
18th September 2014*  Final cut-off date for MSc project reports, 12.00 noon
Mid-October 2014*  Final MSc Examination Board
Mid December 2014*  Degree Congregation

Please note: You may choose to only take one of the two mini-projects, in which case the dates will only apply for the mini-project that you have chosen.

* Provisional date to be confirmed.
Vital and useful sources of information and URLs

Programme Descriptions
The Programme Description for your programme includes a list of all modules, core and optional, and any conditions on progression, for instance any module you may have to pass before progressing to the summer project. The Programme Description can be found on the School Intranet page: [http://www.cs.bham.ac.uk/internal/programmes/index13.html](http://www.cs.bham.ac.uk/internal/programmes/index13.html)

Registration
The University requires you to register online. You can access the web registration pages via the student portal at: [www.my.bham.ac.uk](http://www.my.bham.ac.uk)  
Also see: [www.birmingham.ac.uk/welcome/registration/](http://www.birmingham.ac.uk/welcome/registration/)

Regulations
Your Degree Programme is governed by regulations that specify the requirements to pass, to pass with Merit and to pass with Distinction, amongst other things. You should read section 7.3.2 of the regulations so that you know what is required of you.  

General guidance on assessment criteria can be found in the Code of Practice on Taught Programme and Module Assessment:  
[www.as.bham.ac.uk/code/tpma.pdf](http://www.as.bham.ac.uk/code/tpma.pdf)

School of Computer Science Student Handbook
[www.cs.bham.ac.uk/internal/students/handbook.html](http://www.cs.bham.ac.uk/internal/students/handbook.html)

Timetables
The School’s timetables are at:  
[www.cs.bham.ac.uk/internal/timetables/](http://www.cs.bham.ac.uk/internal/timetables/)

Transcripts
The University’s page for official and unofficial transcripts is at:  
[https://intranet.birmingham.ac.uk/as/studentservices/enquiries/transcripts.aspx](https://intranet.birmingham.ac.uk/as/studentservices/enquiries/transcripts.aspx)

University Policies

*University Student Charter*  
[www.birmingham.ac.uk/students/birmingham/student-charter.aspx](http://www.birmingham.ac.uk/students/birmingham/student-charter.aspx)

*Harassment and bullying policy*  
[intranet.birmingham.ac.uk/as/studentservices/conduct/harassment/index.aspx](http://intranet.birmingham.ac.uk/as/studentservices/conduct/harassment/index.aspx)

*Equality and diversity policies*  
[www.equality.bham.ac.uk/policy/](http://www.equality.bham.ac.uk/policy/)

*Students with disabilities and specific learning difficulties support information*  
[www.as.bham.ac.uk/studentlife/disability/](http://www.as.bham.ac.uk/studentlife/disability/)
Health and safety policy and guidance
https://intranet.birmingham.ac.uk/hr/wellbeing/worksafe/index.aspx

Data Protection Act
https://intranet.birmingham.ac.uk/legal-services/index.aspx
Key staff

Head of School
Professor Jon Rowe

Head of Academic Programmes
Dr Manfred Kerber

Head of Student Development and Support
Dr Mark Lee

Director of Postgraduate Studies
Mr Alan Sexton
Room 239
Availability: www.cs.bham.ac.uk/~aps/timetable.html
Email: a.p.sexton@cs.bham.ac.uk

Programme Director: MSc in Human Computer Interaction
Professor Russell Beale
Room UG37
Availability: www.cs.bham.ac.uk/~rxb/timetable.html
Email: R.Beale@cs.bham.ac.uk
Welfare Team

We use the term `welfare matters' to cover all extenuating circumstances of a non-academic nature that interfere with your academic work, for example, illness, bereavement, family crises or financial problems. The School has a team of trained Welfare Tutors to give advice in such cases. It is important to note that only very rarely will they be able to address the cause of a welfare problem (they are not medical doctors, for example); instead their role is to recommend professional help services and, most importantly, to limit the damage that the problem could have on your studies. Thus they can arrange for a deadline to be extended for you, or for a particularly serious issue to be brought to the attention of the examination board.

It is your responsibility to inform the Welfare Team in a timely fashion of any welfare matter that might affect your studies. The Welfare Tutors will generally not be able to help you if informed too late.

The Senior Welfare Officer is Dr Iain Styles, and the Deputy Welfare Officers are Professor Ela Claridge and Dr Ata Kaban.

To contact the Welfare Team begin by sending an e-mail to welfare@cs.bham.ac.uk. Alternatively, attend the Welfare Hour of a member of the Welfare Team, which you will find on their office door. Up-to-date information is available at http://www.cs.bham.ac.uk/internal/students/welfare/

Our School's Welfare Team follows the University's Code of Practice on Extenuating Circumstances and Fit to Sit Procedure: http://www.birmingham.ac.uk/Documents/university/legal/extenuating-circumstances.pdf

Absences from the University must be reported to the Teaching Support Office. We do need to know where you are, whether you are unwell, and so forth. If you are not able to attend the University due to illness, you must inform us as soon as possible. We are required to monitor your attendance and so we need to know if you are absent for good reason.

The School’s International Student Tutor (currently Dr Hamid Dehghani) acts on a more informal basis as an additional Academic Advisor to international students in relation to academic and related issues. Students from Overseas have further support within the School, see http://www.cs.bham.ac.uk/~dehghanh/overseas.php

The English For International Students Unit (EISU) provides free English Language support to all registered students and staff at the University of Birmingham whose first language is not English, see http://www.birmingham.ac.uk/students/eisu/index.aspx

A detailed summary of the student support services offered by the University can be found at: http://www.as.bham.ac.uk/support/index.shtml
Requesting a deadline extension

This has to be authorised by a member of the Welfare Team. Inform the Welfare Team either by email or by seeing one of the Welfare Tutors. In general, to be granted a deadline extension you need to present contemporaneous supporting evidence from an independent third party, such as a note by a GP, a letter from a counsellor, or a death certificate. However, we allow for one self-certified illness per term, provided the illness only lasts up to 5 consecutive days and no major assessment is affected. You need to fill in and submit a medical self-certification. Please see the University guidelines for medical certificates. Please see: https://intranet.birmingham.ac.uk/as/registry/policy/extcircs/index.aspx

The Welfare Team will advise relevant members of staff whether or not your claim can be accepted. The final decision on what action to take - whether to grant an extension up to a specified length of time or whether to take some other action - will be taken by the module lecturer, since it depends on further factors such as whether solutions have already been published.

All required supporting evidence or medical self-certification has to be received within 2 working days of a given extension, unless otherwise specified by a Welfare Tutor. We will not issue a reminder if no evidence has been submitted in time. We can also not make enquiries to obtain evidence on your behalf.

Some circumstances that will not normally be considered as Extenuating Circumstances and are therefore not welfare matters include:

1. minor illnesses (such as coughs and colds);
2. computer problems (we expect you to make adequate provisions for backing up your work) or inadequate planning preventing completion or submission of coursework;
3. stress and panic attacks caused by examinations that are not diagnosed as an illness or documented in a Student Support Agreement;
4. assessments or examinations scheduled close together;
5. personal or domestic events, such as moving house or attending a wedding;
6. holidays or travel arrangements;
7. consequences of paid employment;
8. sports activities.

See also the University's code of practice for more detail: http://www.birmingham.ac.uk/Documents/university/legal/extenuating-circumstances.pdf

Extensions or deferral of projects

Final year or summer projects can only be extended or deferred in very exceptional circumstances. Your project plan should be flexible enough to allow for short periods that keep you from working due to welfare matters. Should you nevertheless have a welfare matter that seriously interferes with your project, it is your responsibility to inform the Welfare Team as soon as possible and provide appropriate evidence. The Welfare Team will generally not extend or defer a project if informed retrospectively only.
Serious conditions that may interfere with your exam performance

In serious cases you may ask **before the exams take place** to postpone exams to the next possible resit opportunity. These requests have to be received by a nominated member of the Welfare Team either in person or in writing **before the exams take place** together with contemporaneous supporting evidence from an independent third party. The School's welfare tutor will then make a decision whether to accept or reject your application, or if additional evidence is required.

By being present at an examination you declare yourself ‘Fit to Sit’. A subsequent request for deferral or other action by reason of Extenuating Circumstances will not normally be accepted.

Only in exceptional circumstances can you submit a case for consideration by the Extenuating Circumstances Panel. You must then provide reasoning for not applying for an extension during the term or a deferral of your exam at the appropriate time. The submission must be made known to the School **in writing**. A form for this purpose is available which you should submit to the School together with any supporting documentation: https://intranet.birmingham.ac.uk/as/registry/policy/extcircs/index.aspx

Note that it is not enough to have spoken to someone (be it your academic advisor or a member of the Welfare Team). The deadline for the submission to Extenuating Circumstances Panel will be announced via email and on the School's welfare pages: http://www.cs.bham.ac.uk/internal/students/welfare/

The Extenuating Circumstances Panel will decide whether your application can be accepted. If accepted the panel will make a suggestion to the exam board how to handle your application and it is at the discretion of the exam board whether or not to follow this suggestion. It is also at the discretion of the exam board to allow you to take an examination again but as a ‘first sit’ (rather than a resit). For deriving the degree classification it is at the discretion of the exam board to disregard some results. However, please note that marks themselves will not be adjusted on the basis of extenuating circumstances.

After the examiners meeting has taken place, the School cannot take into consideration any additional new evidence that you may have. The only possibility then is to appeal against a decision: http://www.cs.bham.ac.uk/internal/students/handbook/2011/#appeal

However, be advised that the regulations only allow truly exceptional circumstances to be admitted in an appeal. The message is that if you think that extenuating circumstances apply to you, you must not wait until the exam results are out, but have to submit them to the School before the examiners meeting.

More information on the University's extenuating circumstances and fit to sit procedure can be found at https://intranet.birmingham.ac.uk/as/registry/policy/extcircs/index.aspx
Special Needs

Students with certain special needs such as a disability or a learning difficulty are able to access a variety of support within the school and within the wider University. For example, you may be entitled to extra time (or other special arrangements) for examinations, or extra support during your studies. If you believe you have special needs of any kind, then you should contact both the Reasonable Adjustments Coordinator, Dr Iain Styles, and the University's student support team:
https://intranet.birmingham.ac.uk/as/studentservices/index.aspx

The normal process is that you will be assessed by student support, in conjunction with appropriate health professionals, and they will write a Student Support Agreement that describes what special measures should be taken to support you in your studies. The Reasonable Adjustments Coordinator is then responsible for implementing this, in conjunction with the staff in the school.

You should let us know of any special needs as soon as possible (and certainly well before the exams) so that we can make sure the appropriate measures are in place in good time. Ideally, you will inform us as soon as you arrive. This is particularly important if your situation means that you may need support during your studies as well as during the exam period. We are not able to help you if we do not know!

Student Attendance

The University has a Code of Practice on Student Attendance and Reasonable Diligence: www.as.bham.ac.uk/code/rd.pdf

The School must check that every single student shows reasonable diligence. You are obliged to:

- Submit all your coursework. (If you can't finish it, submit what you have finished by the deadline. If you have not finished anything, submit a note saying so.)
- Attend all compulsory tutorials and laboratory sessions, etc.
- Attend all meetings with your project supervisor (at least every second week in person, other meetings may be replaced by other forms of contact such as email or phone call).
- Attend all other compulsory events.
- Register with the School Teaching Support Office at the start of the autumn and the spring term. There will be a tight deadline for doing so. This will be specified at the Office and it will be only a few days after the first day of term.

The School has mechanisms in place to monitor your attendance. This includes taking registers of attendance at advisory sessions, meetings with your project supervisor, and certain modules. As part of this, we will also monitor your attendance at 10 contact points over the academic year, as part of the University’s obligations to monitor the attendance of non-EEA students in accordance with the Points-Based System.
If you do not show reasonable diligence as outlined in the Code of Practice, we will initiate the procedures set out in the Code of Practice, which might result in your being required to withdraw from your programme. For this reason, please:

- If you miss an assignment deadline or a compulsory event with good reason, then contact the school’s welfare team for advice. If possible, please do this in advance so that alternative arrangements can be made for you. If you are ill, then please contact the welfare team as soon as you are able to do so. For more information, please refer to the information about student welfare on page 6.
- Read your email on a daily basis and make sure that your postal address details are up to date on the student portal (my.bham.ac.uk).

For international students, the UK Border Agency stipulates that all educational institutions who are licensed to sponsor students that require a visa must monitor their students' engagement with their programmes of study. As such, the University has a legal duty to report international students with a visa who do not fully engage with their programme of study. Being reported to the UK Border Agency would have serious implications for a student’s immigration status and their ability to remain in the UK. It is therefore essential that regular attendance and active engagement (as outlined above) is maintained throughout your programme of study.

If you are an international student, you are strongly advised to contact the International Students Advisory Service (ISAS) in the Aston Webb Building if you have any concerns about your visa or your immigration status. ISAS can be contacted at +44 (0)121 414 8464, or by email to isas@contacts.bham.ac.uk.

**Complaints**

If things go wrong, you have the right to complain. If possible this should be done at an informal level as early as possible before things create a big problem. For instance, if it is about a particular lecture, contact the lecturer; if about a module, then contact the Module Examiner. If your complaint is about the Programme in general, then you should complain to the Programme Director.

If you are not satisfied by the action taken or if the nature of the problem is broader, then you still have a number of options within the School. You can contact your representative on the Staff/Student Consultative Committee, discuss it with either your academic advisor or contact the Director of Postgraduate Studies.

If you remain unsatisfied, your next step should be to contact the Head of Academic Programmes or the Head of School.

If you still remain unsatisfied, then you have exhausted the complaints procedure within the School and you should follow the University’s formal complaints procedure. The full procedure as well as pointers to the forms to be filled in can be found at: www.as.bham.ac.uk/legislation/complaints.shtml
**Plagiarism**

Plagiarism is taking someone else’s thoughts or words and presenting them as your own. Weaker students are often tempted to copy one or more sentences from books or web pages into their project reports and essays. Occasionally students will use an author’s words and change them to disguise that they have copied the author’s ideas. Very occasionally, students try to copy programs from books and the web and pretend they have written the programs themselves.

Plagiarism – the copying of other people’s ideas or words and pretending they are your own – is unacceptable. You must always reference your sources and place quotation marks when you copy other people’s words. The key rule is: the reader should always be able to see what are your ideas and what are other people’s ideas.

The School of Computer Science and the University take plagiarism very seriously. In previous years, a small number of students have attempted to deceive by copying from books or the web without referencing the source. When a student has plagiarised a small amount of text (for instance less than 50 words), they have had their mark reduced for the module. Where a student has copied larger amounts, the range of discipline measures have been from the failure of a whole module (with the student paying to repeat the module in the next academic year and receiving their degree late) to the student being required to leave the course with no degree and no return of fees.

The simple message is: if it is not your idea, add a reference; if they are not your words, use quotation marks and add the reference.

The University’s rules on plagiarism and cheating in exams can be found at:
https://intranet.birmingham.ac.uk/as/studentservices/conduct/plagiarism/index.aspx and www.as.bham.ac.uk/code/exams.pdf

**Communication**

It is important that you stay informed. For this you must check your School email account at least once every day. If we send out an announcement via email, we assume that all students concerned have been informed. For last-minute announcements we use a notice board in the lobby of the Computer Science building. From time to time, the University will also contact you via your University email account, but all messages sent there are automatically forwarded to the School account.

Note also that members of staff will not send messages to a private email account that you may also have; make sure, therefore, that you only use the School account to contact staff, so that they know who you are and how to reply to your message. Please provide your University ID number if you are enquiring about any aspect of your academic record. Not all communications from the University or the School are sent out electronically. To make sure such crucial letters reach you, update your changes of address (term time and permanent) on the student portal without delay.
**Student representation**

The Staff/Student Consultative Committee provides a forum for consultation and discussion between student representatives and staff responsible for programme provision on all relevant matters affecting taught students within the School. Further information, including current membership, can be found at:

http://www.cs.bham.ac.uk/internal/staff/handbook/Management.php#Heading25 and http://www.cs.bham.ac.uk/internal/staff/handbook/Posts.php#sscc

On each module you will be asked to complete, anonymously, a standard questionnaire twice in each semester. The primary purpose of these is to enable the School to monitor the quality of module delivery. The questionnaire responses will be displayed on the web at: http://www.cs.bham.ac.uk/internal/courses/questionnaires

**External examiners**

An External Examiner is normally a senior academic from another university whose role it is to assist in monitoring the quality of the education we provide to you. They help to ensure that the awards you receive at Birmingham are comparable to similar awards at other universities.

Details regarding the External Examiners for your programmes are available from the Teaching Support Office. You should note that External Examiners are required to remain impartial at all times and they do not participate in determining marks for individual students. Our School is required to publish their names, but students should not attempt to contact any External Examiner, and External Examiners are not permitted to respond to contacts made by students or anyone on behalf of a student.
Key words and phrases

**Academic Advisor**
Each member of a postgraduate course is assigned to an Academic Advisor. Your Advisor will review your academic progress and give you feedback at designated times during the year. Your Advisor is normally your programme director, but for programmes with a large number of students, an alternative member of staff may be assigned as your Advisor.

**Advisor**
Within the School, this usually means your Academic Advisor.

**Atrium**
In the School of Computer Science, not the central courtyard of a Roman house nor a covered portico, but the large open space inside the Computer Science building’s main doors.

**Corequisite**
A specification usually of another module that has to be taken at the same time. Corequisites are specified in Module Descriptions.

**Credit**
Each module has an associated “credit value” which is a measure of how much time and work is involved in studying for that module. Each MSc programme consists of 180 credits, of which the summer project is 60 credits and the autumn and spring terms are each of 60 credits. Credits are used to weight marks when calculating a student’s average for a programme, so a 20 credit module will contribute twice as much to a programme mark as a 10 credit module.

**Degree Programme**
A group of modules which, together, make a coherent study package with sufficient credit to be awarded a qualification. An MSc, a Postgraduate Diploma and a Postgraduate Certificate are all examples of programmes.

**Level**
Each module is designed to reach a certain intellectual level. For postgraduate programmes, modules will be mostly Level M with a minority at Level 3/H or Level 2/I. Levels are important because it is necessary to pass enough Level M modules to be awarded a postgraduate degree, diploma or certificate.

**Module**
The smallest unit from which a programme is constructed. Modules can be thought of as being about sub-parts of subjects, so Natural Language Processing is a sub-part of Artificial Intelligence or Cognitive Science.

**Module Description**
A standard description of a module. These are best accessed from your programme’s Programme Description.
Module Examiner
The person who is primarily responsible for a module. This is the person to contact if you need to find out about the content of a module, its availability etc. Module Descriptions give the name of module examiners.

Prerequisite
A specification of knowledge that is required before a module can be studied. Prerequisites are specified in Module Descriptions.

Programme
The better name for what is usually referred to as a Degree Programme (see above).

Programme Description
A description of a Degree Programme consisting mainly of the modules of which the programme consists. Programme Descriptions include essential information, such as special rules on progression, for instance by specifying that a particular module has to be passed before a project can be attempted.

Project Co-ordinator
The person responsible for the management of a project module. This is the person to contact to resolve problems about supervisor allocation and topic issues.

Reception and Teaching Support Office
The office at the west end of the Atrium in the Computer Science building. Usual opening hours are:
- Term Time: 8.45am to 4:30pm, Monday to Thursday and 8.45am to 4:00pm on Fridays.
- During vacation periods only: 10am to 4pm Monday to Friday.

Restriction
A specification of some limitation on the study of a module, for instance that it cannot be studied together with another named module. Restrictions are specified in Module Descriptions.

Supervisor
A member of academic staff who supervises you during your summer project.
Frequently (and less-frequently) asked questions about the start of the year

How do I register?
You need to register with the University before you start your studies. This is now online and you can (and should) register before the first day of term. See:
http://www.as.bham.ac.uk/registration/ and
http://my.bham.ac.uk
You will need your username and password that has been sent with your registration details. If you do not have this information, you should contact the University’s Student Services: www.birmingham.ac.uk/welcome/registration/contact.aspx

When is the induction meeting for my programme?
You should receive a letter from the School of Computer Science informing you of this information. If you have not received a letter (perhaps because you have changed addresses recently or have only very recently accepted the University’s offer of a place on a programme), you should arrive in the School of Computer Science by 9.00 on the first day of term. Information about induction meetings will be in the Atrium.

I have arrived after the induction meetings on the first day of term. What do I do?
Assuming you have already registered online, you need to report to the Teaching Support Office in Computer Science. You will be given some paperwork and asked to see your Programme Director.

How do I get my timetable?
Timetables are published on the School’s WWW site: www.cs.bham.ac.uk/internal/timetables

I did not get my username and password to use the School’s computer facilities. What do I do?
The School has its own separate computing facilities and you need to have a username and password before you can use them. Usernames and passwords are distributed during induction on the first day. If you miss the induction meeting and do not have your username and password, you should visit the Computer Support office (room UG46).

Do I have to take the online academic English assessment (STAR) for international students?
Briefly the answer is yes if you had to provide an English language certificate as part of your admissions process.

What happens if I fail the online academic English assessment (STAR) for international students?
This is not an examination so you do not fail: it is a test designed to find out your strengths and weaknesses in using English for studying. If you have weaknesses that could be improved, you will be asked to take some free English classes. The results of the assessment should be available within a week of taking the test.
Frequently (and less-frequently) asked questions about programmes

How do I get a transcript?
The University WWW pages allow you to order official and unofficial transcripts. See: http://www.as.bham.ac.uk/faq/transcripts.shtml.

The School will also issue you with an unofficial transcript after the final MSc Examination Board in the autumn after you have finished your project. Transcripts will be available for collection in person from the Teaching Support Office at the earliest the day after the autumn meeting of the MSc Examination Board. Transcripts that remain uncollected after a week will be posted on to students. It is wise to ensure that the School and University have your up-to-date postal address.

Do I have to attend meetings with my Academic Advisor or Programme Director?
You will have the opportunity to attend formal meetings to discuss your progress, for instance after the summer examinations. You are expected to attend these meetings; however, if you do not wish to attend, you are expected to notify your Academic Advisor or Programme Director by email of your decision not to attend.

You are welcome to meet with your Academic Advisor or Programme Director at other times. Each member of academic staff has one or more office hours each week when they are available to meet students on a drop-in basis. Office hours are given on the member of staff’s personal timetable both on their door and on their WWW page.

When do I find out if I have passed a module or the whole programme?
You can find out if you have passed the first and second term modules after the June MSc Examination Board has met (see page 1). You can find out if you have passed the whole programme after the Autumn MSc Examination Board has met (see page 1). Results are posted on the notice board in the student common room (lower ground floor). Results are also made available on the School’s WWW pages.

Can I transfer from my programme to another programme?
It is possible to change between some degree programmes, but there are restrictions. You need to check the following:

1. Do you have the entry requirements for your chosen programme?
   For instance, if you have a UK Lower Second Class degree (or its international equivalent) and you want to change to a degree that requires a UK Upper Second Class degree (or higher), then you will not be able to change. To find entry requirements, look on the WWW pages of the School’s postgraduate prospectus where they are listed.

2. Does your chosen programme have any space for you?
   It may not be possible to move to another degree programme if there is not enough space for you. For instance, if there are no more spaces available in your chosen programme’s workshop tutorials, then there will not be enough space for you. To find out if there is space, contact the Programme Director of the programme you want to transfer to.
3. *Is it too late in the year to transfer?*
   It is not usually possible to move between degree programmes after the first week of the first term. However, a Programme Director may agree to a move to another programme if it is still possible for you to catch up on the work you have missed, for instance because your current study plan includes a substantial number of the modules to be studied in your new programme. The Programme Director must also be certain you can still satisfy the requirements of your new degree programme. (For instance, a summer project for a degree programme may require that you have completed a specific workshop module.)
   To find out if it is still possible to transfer, contact the Programme Director of the programme you want to transfer to.

4. *Does your scholarship allow you to transfer?*
   Many scholarships have attached conditions that require the holders to study for a specific degree programme. You will have to check your scholarship offer letter to see what are its conditions and perhaps also contact your sponsor. (It may still be possible to transfer to another programme but you might have to give up your scholarship.)

If all the answers to the above questions are positive, then you can start the process of changing your degree programme.

*How do I change my degree programme?*
   The process differs depending upon whether you want to transfer to a programme inside or outside the School of Computer Science.

If you want to transfer to another programme *within* the School of Computer Science, you need to use a *Transfer of Programme* form (available from the Teaching Support Office). You must get in writing (eg an email or a note on the *Transfer of Programme* form) evidence that the Programme Director of the programme you wish to move to is willing to accept you. You then need to see the Director of Postgraduate Studies bringing your evidence with you. The Director of Postgraduate Studies will agree to the transfer if you are able to satisfy the criteria set out above. Should the Director of Postgraduate Studies not be available, the School’s Head of Academic Programmes may act on his behalf.

If you want to transfer to another programme *outside* the School of Computer Science, you need to use the University *Transfer of Degree Programme* form for transfer between programmes (available from the URL below). Again, the signature of the Director of Postgraduate Studies is required. Should the Director of Postgraduate Studies not be available, the School’s Head of Academic Programmes may act on his behalf.

URL of University *Transfer of Degree Programme* form:
https://intranet.birmingham.ac.uk/as/studentservices/enquiries/programme-changes.aspx

*I am registered for an MSc but wish to be awarded a Postgraduate Diploma or Postgraduate Certificate. How do I apply for an alternative qualification?*
   Any student registered for a Master’s programme can choose not to undertake the dissertation/project element and to request either the PG Certificate or the PG Diploma (whichever is appropriate) as a voluntary alternative qualification. (The difference between the Certificate and the Diploma is mainly the number of credits that is required: for further information see regulations for your Programme.)
You need to write to the Chair of the MSc Examination Board and request the Board to consider you for the alternative award. Your letter should be handed in to the School’s Teaching Support Office. If the Examination Board decides to recommend the change of qualification, this is communicated to the University’s Student Records as part of end–of–session processing.

*I am registered for a Postgraduate Diploma but wish to register for an MSc. How do I apply for this alternative qualification?*

Any student registered for a Postgraduate Diploma may decide to undertake the dissertation/project element and to request to be transferred to the MSc as a voluntary alternative qualification.

You need to write to the Chair of the MSc Examination Board and request the Board to consider you for the alternative award. Your letter should be handed in to the School’s Teaching Support Office. If the Examination Board decides to recommend the change of qualification, this is communicated to the University’s Student Records as part of end–of–session processing.

*When does the programme finish?*

The project hand-in date (see page 1) is the last date on which all students are formally required to be present. After you have handed in your project, the programme is effectively finished. In the period between your project submission and the final meeting of the Board of Examiners, you may be asked to attend a viva or, should plagiarism be suspected, to attend some other investigatory hearing. You should ensure that you can be contacted and can return, if required, during this time.

*What is the JACS code?*

This code is needed for those applying for a visa for employment after the completion of the programme. The JACS code is G440.
Taught Modules

The full list of modules and module choice form is available at:

http://www.cs.bham.ac.uk/internal/programmes/2013/MScHCI.html

Choosing your modules

At the beginning of the academic year, you must complete a module choice form and get the signature of your Academic Advisor. This form should be completed by the date given in the Important Dates section of this booklet and posted in the appropriate assessed work pigeon hole (next to the Reception).

The form is available to via the above links.

Some advice:

▪ Please note that there is a possibility that timetable clashes may render some combinations impractical.

▪ The first consideration is your aim and objectives in studying for your MSc programme. Your choice should fit your desired specialisations.

▪ Some modules have prerequisites. You should examine the descriptions of prerequisites to ensure you have covered the material in previous modules, perhaps as part of your first degree. You should also consult the member of staff responsible for the module you wish to study to satisfy them that you have sufficient background knowledge.

▪ Some modules have co-requisites. You should ensure that you opt for these modules, unless you have previously studied the material. Again, contact the member of staff responsible for the module you wish to study to satisfy them that you have the required knowledge.

▪ When choosing your first semester modules, you should look at second semester modules to ensure that you study any prerequisites for the second semester.

▪ Talk to your proposed mini-project supervisor. Your mini-project supervisor may have a particular module he or she wants you to study to help you with your work. Ask your proposed supervisor if she or he has any advice, but make sure that the modules he or she suggests are on your list of modules!

▪ Try modules out. Use the first week to attend lectures in several modules to see which suits you best. You have about one week in which to decide which modules you intend to complete.
- Check that your choice of modules does not include a timetable clash.

- Finally, discuss your proposals with your Academic Advisor who will guide you through the programme.

**Frequently asked questions about taught modules**

*Do I have to have an equal weight of modules over the first and second terms?*
Most students will find that it is best to have an equal weight of modules (60 credits) in the first and second terms. The School will allow you to choose to have an imbalance of 50 credits in one term and 70 credits in the other term. If you wish to have a greater imbalance, for instance 80:40, you will have to have the have the agreement, in writing (with a copy added to your student file), of your Programme Director.

*Can I change modules?*
It is possible to change modules but there are restrictions. You need to check the following:

1. *Is the module you want to give up one of your programme’s core modules?*
   You must take the core modules of your programme unless you have the agreement, *in writing* (with a copy added to your student file), of your Programme Director to vary your study plan. Your Programme Director may decide to ask the Director of Postgraduate Studies to approve your study plan.

2. *Is it worth the correct number of credits?*
   The module you wish to move to must be of the same credit value as the module you wish to leave. (If you wish to move to a 20 credit module, you will have to leave a 20 credit module or two 10 credit modules.)

3. *Do you have the prerequisites and co-requisites?*
   You should check the prerequisites and co-requisites of the module you wish to move to. You must be able to satisfy the requirements of the prerequisites and co-requisites (if any). There may also be restrictions placed on taking certain combinations of modules.

4. *Is the module you wish to join in the right term?*
   The module you wish to leave and the module you that to move to should be in the same term.

5. *Is there room for you on the module?*
   Some modules have restrictions on the number of students that can take them (usually because of limitations on tutorial size or room size). You need to check with the Module Examiner to ensure there is space for you in the module you wish to move to.

6. *Is it too late to change?*
   It is possible to change modules within the deadlines given. After that, only in exceptional circumstances will permission be given to change modules.

*How do I change modules?*
If you decide early enough, you can change modules – see deadlines on page 1. You need to use a *Module Change Form* (available from the Teaching Support Office).
What happens if I have already studied one of the core modules of my programme (for instance when I was an undergraduate in the School)?

You are not allowed to obtain credit for the same module twice so another module must be substituted. You will need to discuss this with your Programme Director because you must have their agreement, in writing (with a copy added to your student file), to vary your study plan.

There are some important considerations when substituting a core module:

1. **A Level M module should be preferred.**
   The University’s regulations for postgraduate awards require you to gain a minimum amount of credit at Level M. You must check the regulations to ensure that your study plan includes at least the minimum number of Level M modules to gain sufficient credit. If you are already studying at least the minimum amount of Level M credit, you may want to study for more to ensure that you have a “cushion” should you fail a module.

2. **The timetable must allow you take your chosen module**
   You cannot select a module that clashes in the timetable with another module that you are committed to.

3. **Your module load over both terms should be even**
   See the earlier FAQ entry about having an equal weight of modules over the first and second terms.

4. **Your module choice should be appropriate to your Degree Programme**
   It is sensible to select modules that will contribute to your chosen Degree Programme.

Can I take an extended version of a module that I have already taken at a lower level?

This should only apply to students who have already studied in the School. The answer is no.

Are examination papers from previous years available?

Yes. The University maintains a database of examination papers from previous years. However, some care is needed in using this resource. Examination papers sometimes include more than one module so it is necessary to search carefully to find the correct examination paper for your module. If you have problems finding the examination paper for a module, you should contact the Module Examiner for advice.

You can access the examination paper via the student portal at:
my.bham.ac.uk

Further information is available at:
www.as.bham.ac.uk/exams/pastpapers.shtml

What is the pass mark?
The pass mark for all Level M modules is 50.
Mini-projects

What is a mini-project?

A mini-project should be a small time-scale piece of research in some area of Human Computer Interaction. It can be the preliminary work necessary to carry out a larger research project or it can be a small, complete piece of research in its own right. In either case, it must have the usual features of a research project such as: literature review, knowledge acquisition, critical analysis, etc. It should involve some or all of: hypothesis construction and testing, theoretical analysis, experimental development, or any other technique or practice common in research projects.

The mini-project is a small research project, with a potential to be extended to a full summer project. Whereas the summer project is weighted at 60 credits, a mini-project has 30 credits. Essentially, a mini-project functions as a full project, but on a smaller scale.

The mini-project is an essential part of the programme. Its purpose is to give you the opportunity to develop a number of skills and techniques:

- definition of aims, objectives and feasible working plans
- project management and time management skills
- systematic literature searching skills
- communication skills, both in written reports and in verbal presentations to supervisors.

How to choose a mini-project

There are many different ways in which students choose mini-projects. Here are some of the approaches that have been used previously and which you might use:

- you have an interest in a particular topic and want to study it in greater depth
- you want to be supervised by a particular member of staff and are willing to accept their topic interests
- you feel that you have not covered a topic in your previous studies and want to take the opportunity to study it now
- your sponsor requires you to develop expertise in a particular area
- by studying particular topics, you will be able to complement the taught modules you have chosen
- you have looked at previous mini-projects and found topics that have interested you.

Research interests of academic and research staff and mini-project and summer project topics are listed further on in this handbook.
Defining your mini-project

Whatever the reason or reasons for choosing a particular topic, you need to negotiate a topic with your supervisor. You need to address the following points:

Aim
Each mini-project must have a clearly articulated aim or aims. One way of thinking about aims is to think about why you are doing the project. For instance, your aim might be “to study neural networks in greater depth” or “to develop a knowledge of pragmatics in natural language processing”. Alternatively, the aim might be firmer: for instance “to develop a constraint logic programming-based parser for a unification grammar”.

In brief, your aims should be devised in such a way that you and your examiners are able to evaluate, in broad terms at least, whether you have met you aims.

Objectives
Whatever your aim or aims, you should be able to define a number of things you will achieve on the way to completing your mini-project. Objectives differ from aims. At the end of the mini-project, it may be possible to argue about whether or not you have satisfied your aims: you may or may not have succeeded in, for instance, achieving learning in depth when studying neural networks. However, it should be absolutely clear whether or not you have achieved each objective.

So, objectives should be activities that have a beginning and an end; for instance writing a particular piece of program code, to review a set of papers, or to install and use a piece of software. It follows from the setting down of clear objectives that you have the basis of a plan of work for the mini-project.

Project management skills
As part of the supervision process, you will be expected to devise a management plan and evaluate your progress against that plan.

Systematic literature skills
All mini-projects should include a substantial element of literature search. The amount of literature searching required will vary from project to project. For instance, if the aim is to gain a deep knowledge of a particular topic, then there is likely to be very extensive literature research. For mini-projects focused on a piece of software, there may be less. The aim, of course, is not to build a collection of references. You should ensure that you can demonstrate that you have undertaken a thorough review of the relevant literature (or software etc.). Typically, this is through presenting a detailed analysis of this previous work which will then stand as a foundation for your own contribution.

Communication skills
A basic level of practice in these skills comes with the normal process of supervisory meetings and report writing. Students and supervisors are encouraged to consider making mini-project work the basis of presentations in one of the School’s informal seminar series.
Declaring your mini-project

You will need to declare your mini-project 2-3 weeks into the corresponding semester (see the Important Dates section of this handbook for precise details). Instructions on declaring your projects will be issued by the mini-project co-ordinator.

Writing-up your mini-project

Guidance on writing mini-project reports is given separately (see http://www.cs.bham.ac.uk/resources/programmes/postgraduate-taught/msc-acs/msc_acs_nc_project_writing.pdf). You should also seek the advice of your supervisor.

Students are reminded that any form of plagiarism is taken extremely seriously and heavily penalised by the School. See the section on plagiarism of this handbook for more information.

See also the School’s online guidance notes on plagiarism, at:

http://www.cs.bham.ac.uk/internal/students/handbook/current/- PLAG
http://www.cs.bham.ac.uk/internal/students/plagiarism.htm
http://www.cs.bham.ac.uk/internal/students/plag-policy.html

Assessing your mini-project

Your mini-project will be assessed by your supervisor and moderated by a member of the programme team. It will be assessed through both the inherent quality of your work and also the success you have had in meeting your aim and objectives, and displaying research skills of project management, literature review and communication skills. You will be given feedback in the form of a brief written report and a grade. See the project web page:

http://www.cs.bham.ac.uk/internal/programmes/postgraduate-taught/projects.php

for details of the criteria that will be used to assess your mini-project.

Late submissions

The submission deadlines for mini-projects are listed on page 1 of this handbook. Should you experience significant medical problems or personal problems, you may apply for an extension. Extensions can only be granted with authorisation from a member of the Welfare Team. For details see the appropriate section of the Student Handbook (http://www.cs.bham.ac.uk/internal/students/handbook.html - mitigating). It is always a good idea to discuss any such application with your mini-project supervisor, Academic Advisor and/or the Programme Director.
If no extension has been granted, or there is not sufficiently good cause for work being submitted late, then a penalty of 5% on the mark actually achieved will be imposed for each day the assignment is late until 0% is reached.

**Frequently asked questions about mini-projects**

Q1. *Must I write a program as part of my mini-project?*
A. Not necessarily. Some students work on purely theoretical topics; some write fragments of programs to help them investigate their topic; some use the mini-project to prepare for writing a larger program in the summer project.

Q2. *Can I have the same supervisor for both mini-projects?*
A. Only under exceptional circumstances. Part of the idea of two separate mini-projects is to allow you to benefit from the differing expertise of two supervisors.

Q3. *Can I study the same subject for both mini-projects?*
A. No. This would effectively convert the mini-projects into one year long project. Again, part of the idea of the mini-project is to give you the experience of carrying through two separate mini-projects.

Q4. *Who can supervise mini-projects?*
A. A list of those available to supervise is given in this handbook. Essentially, it includes research active members of staff of the School of Computer Science, both teaching staff and suitably qualified research staff.

Q5. *If I choose to take both mini-projects, do I have to choose both of them at the beginning of the first semester?*
A. No. Some students have attempted to organize their year of study as early as possible and obtained informal agreement for their second mini-project at the beginning of the year. This is generally a bad idea for a number of reasons. For instance, your interests may change while studying first semester modules; you may be influenced in your choice of topic or supervisor by comments from your colleagues during the first semester, and you may well change your ideas about what you wish to achieve from the degree programme during the first semester.

Q6. *May I choose both my mini-projects at the beginning of the first semester?*
A. Yes, but you will not be asked to declare your second semester mini-project until the second semester. Thus, any agreement with a supervisor for a second semester mini-project remains a private agreement until the time comes to declare your second mini-project.

Q7. *Are there any restrictions on mini-project topics?*
A. Mini-project topics must be approved by the Programme Director as being appropriate to the Aims and Learning Outcomes of the programme. Students’ individual programmes of study must be approved by the Programme Director (as the nominee of the Head of School), who will take into account topics students have previously studied at undergraduate level, ensuring that key subjects have been covered.
Summer Projects

A summer project is a medium-scale research project in some area of Human Computer Interaction. It can be the preliminary work necessary to carry out a larger research project or it can be a small, complete piece of research in its own right. In both cases, it must have the usual features of a research project such as: literature review, knowledge acquisition, critical analysis, etc. It should involve some or all of: hypothesis construction and testing, theoretical analysis experimental development, or any other technique or practice common in research projects.

How to choose a summer project

The summer project should be, in some way, a continuation of one or both of the student’s mini-projects. The choice of a project topic is therefore considerably easier than with most degree programmes.

If you have difficulty deciding which of your two mini-projects to convert into your summer project, there are some questions you may wish to consider:
- can you see a way in which a mini-project could be extended into a larger piece of work?
- are you interested in one particular topic more than the other and do you want to study it in even greater depth?
- do you want to continue to be supervised by a particular member of staff?
- do you think that extending a particular mini-project would give you an advantage in your career, for instance lead you into a particular area of employment or onto a PhD topic?

What is the difference between a summer project and a mini-project?

The essential difference is scope. You have longer to complete the summer project, you have already developed a knowledge of the topic in a mini-project and practised your research skills in two mini-projects. Thus, you can aim to produce a substantial piece of work of publishable standard. Indeed, previous students have published the results of their projects. For these reasons the format of the summer project report is different from a mini-project report, i.e. it must be presented as a journal article.

That apart, all the skills needed to produce a mini-project must be used in working for a summer project. So, you will be expected to demonstrate your repertoire of skills and techniques in:
- the definition of aims, objectives and feasible working plans
- project management and time management skills
- systematic literature searching skills
- communication skills both in written reports and in verbal presentations to supervisors.
Defining your summer project

As with your mini-projects, you need to negotiate a topic with your supervisor. You need to address the following points:

Aim
A project must have a clearly articulated aim or aims. Your aims should be devised in such a way that you and your examiners are able to evaluate, in broad terms at least, whether you have met your aims.

Objectives
Whatever your aim or aims, you should be able to define a number of things you will achieve on the way to completing your project. Objectives should be activities that have a beginning and an end; for instance writing a particular piece of program code, to review a set of papers, or to install and use a piece of software. It follows from the setting down of clear objectives that you have the basis of a plan of work for the project.

Project management skills
As part of the supervision process, you will be expected to devise a management plan and evaluate your progress against that plan.

Systematic literature skills
All projects should be firmly based on the review of previous work included in the corresponding mini-project. The amount of new literature searching required will vary from project to project. If the project is mainly a critical review, then there is likely to be a large degree of literature searching.

Communication skills
A basic level of practice in these skills comes with the normal process of supervisory meetings and report writing. Students and supervisors are encouraged to consider making project work the basis of publications in the School’s technical report series.

Declaring your project

You will need to declare your summer project shortly after the exam period (see the Important Dates section of this handbook for precise details), although most students will have begun planning their topic well before this point. Instructions on declaring your projects will be issued by the project co-ordinator.

Writing-up your summer project

The summer project report is to be written in the form of a journal article; specific guidance is given separately (see http://www.cs.bham.ac.uk/resources/programmes/postgraduate-taught/msc-acs/msc_acs_nc_project_writing.pdf). You should also seek the advice of your supervisor.
Students are reminded that at any form of plagiarism is taken extremely seriously and heavily penalised by the School. See page 5 for more information.

See also the School’s online guidance notes on plagiarism, at:

http://www.cs.bham.ac.uk/internal/students/handbook/current/ - PLAG
http://www.cs.bham.ac.uk/internal/students/plagiarism.htm
http://www.cs.bham.ac.uk/internal/students/plag-policy.html

Assessing your project

Your summer project will be assessed by your supervisor and another member of the academic staff with expertise in the area of your project. In addition to a written report you will be required to prepare and present a poster (see Important Dates section). The poster presentations will normally be arranged to coincide with an event which will bring external visitors to the school and is an essential part of the assessment of your project. Students who do not turn up for their presentation will receive a fail mark, unless proper mitigating circumstances have been submitted and accepted.

Your project will be assessed in part on the inherent quality of your work and in part on the success you have had in meeting your aim and objectives, and displaying research skills of project management, analysis of related work and communication skills. The two assessors will mark your work independently. They will discuss your work and provide a rationale for an agreed mark. If they are unable to agree then a third assessor will be appointed. See the project web page:

http://www.cs.bham.ac.uk/internal/programmes/postgraduate-taught/projects.php

for details of the criteria that will be used to assess your mini-project.

Late submissions

The submission deadline for the summer project is listed on page 1 of this handbook. Should you experience significant medical problems or personal problems, you may apply for an extension. Extensions can only be granted with authorization from a member of the Welfare Team. For details see the appropriate section of the Student Handbook:

http://www.cs.bham.ac.uk/internal/students/handbook/current - mitigating

It is always a good idea to discuss any such application with your mini-project supervisor, Academic Advisor and/or the Programme Director. If no extension has been granted, or there is not sufficiently good cause for work being submitted late, then a penalty of 5 marks will be imposed for each working day of lateness, until the final Cut-Off Date. No project will be accepted after this cut-off date, and a zero mark will be recorded.
**Frequently asked questions about projects**

Q1. *Must I write a program as part of my summer project?*
A. Not necessarily. Some students work on purely theoretical topics; some write fragments of programs to help them investigate their topic; some take the opportunity to develop the skills necessary in writing a large program.

Q2. *Can I have a different supervisor than the one I had for my mini-projects?*
A. Only under exceptional circumstances, for instance when a supervisor has left the University during your studies.

Q3. *Can I study a completely new topic for my summer project?*
A. Only under exceptional circumstances. Essentially, to get to an adequate level in the project you would have to cover all the work needed for a mini-project and the project itself in the time allowed for the project alone.

Q4. *When do I have to choose my summer project?*
A. After you have completed the second mini-project.

Q5. *May I work on a project outside the School or University?*
A. It is possible to work outside the School (e.g. for a project within another School) or even outside the University (for instance with a company). You must have a supervisor within the School who has agreed your project plan. You should also consider Q3. above.

Q5. *Will the School find a project outside the School or University for me?*
A. No. However, sometimes opportunities arise through collaboration between staff and outside people and you may be lucky.

Q6. *Are there any restrictions on the project topic?*
A. Project topics must be approved by the Programme Director as being appropriate to the Aims and Learning Outcomes of the programme. Students’ individual programmes of study must be approved by the Programme Director (as the nominee of the Head of School), who will take into account topics students have previously studied at undergraduate level, ensuring that key subjects have been covered.
Research interests of academic and research staff & mini-project and summer project topics

HCI Projects should be referred to first, but students may take any project topic so long as there is a strong component of HCI in there – questions about suitability should be discussed with the MSc Programme Director.

Dr Rami Bahsoon
Room: 112       Email: R.Bahsoon@cs.bham.ac.uk

I am research active in Cloud Software Engineering. I have been supervising PhD and MSc students in areas related to the below investigations since 2008. I am looking for your new perspectives and approaches to the below problems.

- Cloud as a market place and requirements: Cloud adoption, service selection, matching Service Level Agreements (SLAs) to selection of cloud providers, SLA negotiation, goal-oriented and viewpoints modelling for cloud adoption, information security compliance, automated tool support.
- Cloud elasticity: overprovision and under provision of cloud recourses and their implications on SLA compliance/violations; scalability in the cloud.
- Quality of Service (QoS) of cloud-based applications: QoS modelling, sensitivity modelling and analysis, dynamic tradeoffs, QoS-driven selection and composition of services; QoS value and debt quantification.
- Self.*, Self-adaptive and self-aware architectures on the cloud;
- Application of economics-driven approaches for solving cloud problems: Auctions; Double Auctions; Real Options; Portfolio Theory; Market-based heuristics, game theory etc.
- Cloud security: Identity management in the cloud; trust and reputation dynamics; Architecture level testing for security and the cloud;
- Artificial Intelligence and machine learning approaches for self-adaptive clouds;
- Green cloud: modelling power consumption in relation to QoS, self-* solutions to power consumption;
- Cloud simulation tools;
- Application of search-based software engineering to cloud.

More references:
- Green Cloud: http://www.cs.bham.ac.uk/~rzb/ResearchSE.htm

Please be free to contact me to discuss other topics of interest and their relevance to your course of study. Alternatively, I am always keen on your own suggestions for novel and timely research in Software Engineering and cloud software engineering.

Professor John Barnden
Room: 136       Email: J.A.Barnden@cs.bham.ac.uk

I am interested in the following main topics within AI and natural language processing:

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• processing of metaphorical and other figurative utterances, and especially the complex reasoning needed in such processing;
• extracting value judgments and information about emotions, moods, etc. from natural language input, possibly for the purposes of implementing intelligent conversational agents;
• reasoning about mental states (beliefs, desires, intentions, etc.), largely (but not exclusively) for the purposes of natural language processing;
• analogy-based reasoning and case-based reasoning;
• diagrammatic reasoning, whether it involves manipulation of external diagrams or processing of internal, mental visual images that have a diagrammatic quality.

Professor Russell Beale
Room: 141 Email: R.Beale@cs.bham.ac.uk

Russell is interested in projects that look at new forms of interaction. Projects fall into two camps: more research-oriented proof-of-concept ones, and more practical programming-focussed ones.

Research

Behaviour change
Technologies are ubiquitous, and can help us by altering our behaviour and transferring unhealthy habits into healthier ones, for example. We're interested in both the theory and application of different techniques to nudge, persuade and cajole people into more appropriate forms of behaviour.

Affective interaction
The role of emotion, affect and personality in interactive systems is becoming more understood, but its effective utilisation is not. This research will investigate what and how affect can be effective in enhancing human interaction with systems.

Context-aware interaction
The use of intelligent sensing, mobile and ambient, can be used to create more effective interactive system, whether they be location-aware social networks, contextually relevant visualisations, or pattern recognition systems that could negotiate lower costs for your health insurance as they notice you go to the gym regularly. This research will investigate this work in more detail.

Health
We are interested in a number of health-related areas, from the use of monitoring technologies for assisted living through to developing and evaluate approaches to supporting rehabilitation and post-trauma recovery in real-time 3D virtual settings (using games engine technologies).

Psychological principles
Many concepts in Psychology, although highly relevant to HCI are not prominent in the their application and investigation. Concepts such as syntactic and semantic alignment, social identity, visual processing and working memory all impact on our experiences with technologies as interactions move from the individual to the social and from the mouse and keyboard to more gestural and spatial methods of interaction.

**HCI4D**
Interactive systems have great potential to support the developing world, especially those focussed on mobile technologies. We are interested in research that supports this.

**Novel interactions**
Any ideas around new interaction approaches, design concepts or possible products that have a strongly novel element will be considered as self-constructed projects.

**Programming-focussed projects**

*Web-based journal publishing system*
To design and build, using HTML5 technologies, a lightweight workflow and document management system to allow open access online journals to be created. Built on top of Amazon EC2, it would offer a clean web interface for authors to upload documents, reviewers to enter reviews, and a journal to be created from accepted articles. Full guidance of the workflow will be given- skills in web design, html5, and developing your database skills on cloud-based providers such as Amazon, you'll be creating a system that potentially could have a major impact on academic research and student experience.

*Bibliographic metrics*
Indices such as the h-index (h is the largest value of n such that n papers have at least n references) are increasingly used to quantify academic performance. This project looks at how this can be manipulated, and whether more complex webs of referencing are needed to provide effective measures of a paper/author's significance. Similarly, metrics for the value of a journal or other outlet can be computed (impact factor is commonly used - but is it accurate?)

*Learning analytics*
Understanding learner behaviours is challenging, but the rise of MOOCs provides large quantities of data that can reveal insights into approaches to learning. Projects in this space will work with the FutureLearn team and other MOOC providers to analyse data and understand what can be usefully gleaned: this may be social network analysis, text analysis, or course progression data. Work will involve mining large datasets with publically-available tools, programs such as R, and scripts and bespoke code, to produce insights.

*Interaction with multitouch*
This research will investigate the relationship between the different styles and type of interaction afforded by multitouch devices and interactive surfaces, and can look at a variety of things; for example, the nature of the supported interactions, the forms of visualisations used, how to interact with 3d touchtables, the relationship between collaborative multitouch and engagement.
Dr Bernd Bohnet
Room: UG37          Email: B.Bohnet@cs.bham.ac.uk

I am interested in Natural Language Processing, Natural Language Analysis, Dialog Systems, Text Generation, Machine Translation, Text Summarization, Information Extraction, Reasoning and Information Retrieval. I am supervising mini-projects/projects on the topics listed below, I am happy to define with students other projects that would fit the individual student’s interests.

**Conversational Dialog System**

In Computer Games, artificial characters interact with players via written or spoken language. Robots, mobile phones (e.g. SIRI), or any devices have to communicate with humans in the most natural form via language. There is a wide range of possible parts or full systems that could be developed. A dialog system or conversational agent (CA) is a computer system intended to converse with a human, with a coherent structure. Dialog systems have employed text, speech, graphics, haptics, gestures and other modes for communication on both the input and output channel.

**Natural Language based-Information Storing**

Humans read articles in newspapers and can remember and process the content. Machine should be able to do the same. An artificial system for reading information and storing it in memory is a desired component in Human-Machine interaction.

**Visual Analytics for Natural Language Information**

Visual analytics is an outgrowth of the fields of information visualization and scientific visualization that focuses on analytical reasoning facilitated by interactive visual interfaces. Linguistic system contain obvious structural information that can be explored (syntactic trees, semantic networks, reference networks, rhetoric structure) and hidden structures (probabilities in syntactic networks).

Dr Behzad Bordbar
Room: 116          Email: B.Bordbar@cs.bham.ac.uk

Topics: Big data, Cloud computing, Web services, Security, Automated Code generation

**Security via Virtual Machine Introspection (Joint supervision with HP Lab)**

Breaking into a Cloud (private, commercial or G-cloud) can have a high payload due to the large amount of data available to be exploited. Conventional security methods, which are used to protect small systems, are dwarfed by the sheer size and complexity of the Cloud. Virtual Machine Introspection (VMI) is a method of allowing peeking through memory pages of a Virtual Machine (VM) to search for identifying malicious behaviour. It is never a good sign to come across a large number of credit card number in a memory page. If you are
interested in operating systems (in particular TinyOS) let me know. Also the project is suitable for people who are interested in programming of Cloud.

Fault tolerance in Web services (Joint supervision with BT)

We are increasingly reliant on Service oriented Architecture (SoA) in the applications used on daily basis in e-business, social networking, financial and telecommunications systems. The aim of this research is to develop methods of creation of fault Diagnosers: software modules that identify if a failure has occurred in real-time or near-real-time. Diagnosers are often compared to sensors used in embedded applications. In this project, which builds on current collaboration with BT, we will study existing methods of creation of Diagnosers and investigate their extensions.

Autonomic Cloud and/or services (Joint supervision with HP Lab)

Cloud is complex and large. How can we control it? For example if we build monitors that identify a Service Level Agreement (SLA) is violated and other monitors that hints on possibility of malicious behaviour, how can we respond? It is not possible to rely on human users to control such large and distributed infrastructures. There is a wide range of Cloud providers in the market. We are going to investigate methods of automated controlling of Cloud. Topic is suitable for control engineers or people who want to know about Business Logic Integration Frameworks (Check Drools!)

Is malware becoming component based? (Joint supervision with HP Lab)

There are commonalities between different malware. As they become complex, malware writers incorporate malware written by others. We are trying to find similarities between malware products. By studying and comparing famous malwares such as Stuxnet, Confiker, Shady RAT and crimewares such as Zeus to discover the symptoms of such components.

Front end for SiTra

Simple Transformer (SiTra) is an MDD framework developed by Bordbar and his students (http://www.cs.bham.ac.uk/~bxb/Sitra/index.html). It has been used in numerous projects in industry and academia. We are interested to make a graphical representation for SiTra but we have many unanswered questions about the design and architecture of the tool. This project involves investing graphical representations used in MDD, identify their shortcoming (we know some of them) and producing a better design. Feel free to contact me if you are interested in a topic related to any other theme from my research page (http://www.cs.bham.ac.uk/~bxb/Research.html) or (http://www.cs.bham.ac.uk/~bxb/Software.html).

Big data and hadoop

Big data is everywhere! We are doing a large project with a major telecom company working on anomaly detection. As a part of this project we make use of hadoop, hbase and Neo4j (Check these if you don’t know what they are). There are a number of project in this space. We are also involved in helping with an open source project relate to persistence of runtime object to NO-SQL databases. If you are interested in any of the above two project or any
other project related to NOSQL data bases and hadoop, send me an email at bxb@cs.bham.ac.uk and book an appointment for a chat.

Dr John Bullinaria  
Room: 113  Email: J.A.Bullinaria@cs.bham.ac.uk

I am happy to supervise any projects in the general area of natural computation (neural networks, evolutionary computation, particle swarm optimization, and such like). Generally, projects in this area can be quite mathematical, and are usually only feasible if you have already taken, or are planning to take, a relevant course/module.

Students with specific or vague project ideas of their own in these areas are welcome to talk to me about them, or I can offer suggestions to students who only have a general interest in a particular area. Some specific project areas, in which I have particular interests, are outlined below. These potential projects are ‘real research’ projects, but contain a large programming component. There will be opportunities for good students to end up with work worthy of publication in a conference proceedings.

Neural Network Applications

Neural Networks can be applied to a wide range of classification and regression problems. If you have a particular application area in mind, it will make an interesting project to determine an appropriate neural network approach (e.g. Multi-Layer Perceptron, Radial Basis Function Network, Kohonen Network) and build a working system based on it. Alternatively, you could attempt to build models of particular human psychological/cognitive abilities.

Evolution of Complex Structures

Evolutionary computation has been used to design many types of structure, ranging from sculptures of artistic merit, high performance turbine blades, to efficient electronic circuit layouts. Projects in many application areas are possible. A particularly interesting challenge is to evolve systems that grow, and can repair themselves when damaged, in the manner of biological systems.

Evolving Neural Networks

A big advantage that human brains have over artificial neural networks is that they have emerged as a result of evolution by natural selection to be particularly good at what they do. Modern computers are now powerful enough to implement an evolutionary process for artificial neural networks to produce systems that are far superior to those formulated by human researchers. There is much scope for using this approach to optimize all types of artificial neural network systems, and to better understand the evolution of biological neural networks.

Ensembles / Committee Machines

Often, ensembles or committees of models (such as neural networks) can work better than individual models on certain types of problem. There is scope for building systems to explore when, why and how this works. This could involve developing new algorithms for old problems, or testing old algorithms on new problems, or both.

Artificial Life
The field of Artificial Life covers all aspects of creating computer systems that mimic 
biological lifeforms, from the evolution of intelligent agents, through to the simulation of 
social interactions. Surprisingly complex behaviours can emerge from very simple 
systems. A range of projects are possible in this area.

**Particle Swarm Optimization**

This is a form of search algorithm based on a population of 'particles' swarming through 
parameter space in the manner of a flock of birds. There are a number of general aspects 
of this approach that could usefully be explored by explicit computer simulation, or it 
could be applied to particular application areas.

**Time Series Prediction / Computer Aided Gambling**

Can machine learning techniques like neural networks and evolutionary computation be 
used to predict share prices, currency exchange rates, and so on? Can they predict odds 
better than bookmakers for horse races, football matches, snooker tournaments, and so 
on? Could they produce efficient strategies for playing online poker? I’d be surprised if a 
student could develop a system that was able to consistently make money in this way, but 
I would be willing to supervise students with sensible ideas in this area. There is also 
plenty of scope for more general explorations in time series prediction which will not 
require you to have studied a particular application area, and for applications that do not 
constitute gambling.

**Dr Tom Chothia**

Room: 111    Email: T.P.Chothia@cs.bham.ac.uk

I would be happy to supervise any kind of project based on computer security. Some possible 
ideas, ranging from the most mathematical to the most hacky include:

* Definitions of security based on information theory.
* Modelling and verifying systems using formal methods.
* Passive fingerprinting of remote computers and networks.
* Analysing what anonymous communication systems are used for.
* Hacking BitTorrent trackers.

If you would like to discuss doing a project in this area, please e-mail me or drop by my 
office.

**Professor Ela Claridge**

Room: 139    Email: E.Claridge@cs.bham.ac.uk

My research area is image understanding and computer vision, especially in application to 
medicine and biology. The projects on offer are all related to current research and would be 
an ideal introduction for students wishing to pursue doctoral studies in medical image 
analysis. Most projects involve mathematics and the students choosing them will have to be 
prepared to master the necessary background and techniques - if needed I shall provide 
support and guidance. I also very much welcome discussions with students interested in 
medical image analysis who have their own project ideas in this domain.

*Skin cancer detection from multispectral images using machine learning*
We have a large database of multispectral images of skin lesions (moles) together with their diagnosis (normal / abnormal and also histological diagnosis). This project seeks a student with interest in machine learning techniques to attempt the abnormality detection directly from the multispectral image data (up to 8-dimensional). Some experience in machine learning is required as I don’t have much expertise in this area; I can provide much guidance on the skin lesions and on the multispectral image data.

**Parametrising models of tissue histology using Manifold learning**

Imagine a set of points \((x,y,z)\) forming a “swiss roll” with values \(f(x,y,z)\) increasing from the centre of the roll outwards. Parametrising such sets (i.e. finding a functional form of \(f\)) in Cartesian space is quite hard, especially if the geometry of the point set is not known a priori (unlike knowing that the points form a swiss roll). If you could unwrap the roll to form a rectangle \((x’,y’)\) parametrisation would be trivial as \(g\) increases monotonically as a function of (say) \(y’\). Manifold learning is a family of methods based on non-linear dimensionality reduction (see e.g. http://en.wikipedia.org/wiki/Nonlinear_dimensionality_reduction) that we would like to use to learn a lower-dimensional functional form of abstract models of tissue histology.

This could then be used for classification of tissue properties and, further on, for detection of abnormal areas such as early cancer. The project will explore various methods of dimensionality reduction, initially on the swiss roll model.

**Optimisation for quantifying distribution of the macular pigment in retinal images using Zernike polynomials**

Macular pigment (MP) plays an important role in maintaining health of a retina. The amount of pigment as well as its distribution can be used for early diagnosis of eye diseases such as Age-related Macular Degeneration (AMD). Our group has developed a novel method for extracting maps showing the distribution of macular pigment from multispectral images. The challenge remains in deriving quantitative parameters characterising the distribution of MP.

Zernike polynomials form an orthogonal basis function set that seems particularly compatible with the kind of shapes we see in MP maps. This project will use optimisation methods to fit Zernike polynomials (ZP) to the MP distribution maps. It is anticipated that the coefficients of ZP will provide a quantitative parametrisation of the macular pigment distribution.

**Dr Ben Cowan**

Room: 134  
Email: B.R.Cowan@cs.bham.ac.uk

My academic interests can be summarised as focusing on human-computer interaction, more specifically how technology psychologically affects the user when in interaction and how technology can influence behaviour. I'm happy to supervise anything related to how interface design impact on emotion, behaviour and cognition. Project students will be expected to design and execute an experiment/conduct some form of data gathering and statistical analysis using R.

All suggested readings below can be accessed form either Google Scholar or the library e-journal catalogue. If you have any trouble accessing specific readings please email me and I will be happy to help.

Specific Topics:
Language behaviour in human-computer dialogue:
My recent research focuses on exploring how the design (e.g. voice anthropomorphism) and behaviours (e.g. comprehension errors, use of metaphor) of a computer partner in human-computer dialogue affects user’s language behaviours (lexical and syntactic choices). I am specifically interested in the concept of alignment, a phenomenon whereby speakers use the same linguistic constructs as their conversational partner in dialogue, and the reasons for its appearance in human-computer dialogue interactions.

A project in this area would involve designing a basic dialogue system, recruiting participants, running experiment session and statistical analysis using R.

Anxiety towards technology:
I am also interested in how technology design affects anxiety towards its use and how this anxiety can affect the user cognitively. Projects related to computer anxiety as well as anxiety towards online posting and social computing are of interest.

A project in this area would involve using online questionnaire tools and statistical analysis using R.

Predictors of user experience
Recently HCI has moved from usability to the encompassing of emotional reactions towards interactions with the concepts of presence, fun and engagement becoming prominent in the minds of HCI researchers and designers. Projects in this area would look to research how variables such as personality or experience affect people’s experience of technologies.

A project related to this would involve the deployment of online questionnaires to judge the user experience of a chosen interface as well as measuring other related concepts. Statistical analysis using R will be needed.

Social Identity and Trust of online posts
Research from social psychology suggests that how we judge others and behave towards others can be dependent on social identity (e.g. abuse by Team X supporters to Team Y and vice versa). Projects in this area would involve the exploration of whether and how this manifests online, with a potential project being based on how this social identity impacts other’s judgement of information quality or trust in another user’s posting. This would involve mocking up an online forum or twitter stream, experiment design and data analysis using R.

All of these projects may lead to publication.

**Dr Hamid Dehgani**
Room: UG38 Email: H.Dehghani@cs.bham.ac.uk

I am interested in the application of physics based models for the study of human physiology and the application of image reconstruction algorithms in medical imaging. Specifically, I will be happy to supervise projects that are concerned with medical image formation, visualisation as well as novel computational frameworks in medical computation. Below is a list of possible projects that I am willing to supervise. If none of these project appeals to you,
but you have an idea that you think may coincide with my interests, then come and see me - I'm always happy to consider student's own suggestions.

3D model creation and visualisation:
In medical imaging, we create a large number of reconstructed images, based on complex models of human anatomy and physiology. Most 3D visualisation toolboxes are complex and/or not free. I am interested in creating 3D visualisation tools that will take as input models and images created by our software (www.nirfast.org) and creating a free, platform dependant add-ons that will allow easy, fast and robust visualisation and analysis.

Cloud computing
We have developed a set of models and image reconstruction algorithms for optical imaging, which can be used in MATLAB. One of the new directions is to create a toolbox of these algorithms that can be utilised under cloud computing to enable fast computational speed. This project will be to evaluate the possible options of creating a set of tools for our software to allow the user to run models and simulations under cloud computing.

Parallel/GPU based matrix solvers in MATLAB:
MATLAB is a user friendly software that allows fast prototyping of various algorithms and tools. However, it is not sophisticated enough to determine which type of solvers are best suited for various matrix algebra, under different platforms. This project will be focused on creating a set of rules that will allow MATLAB to determine the best matrix solvers, based on platform under which is being run as well as matrix size and property, to help novice users. Additionally, we will be interested in creating parallel and GPU based matrix solvers.

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**Dr Flavio Garcia**  
Room: 115  
Email: F.Garcia@bham.ac.uk

I would be interested in supervising motivated students in the topics of reverse engineering and security analysis of real life systems, especially regarding embedded devices.

Examples of such systems include, but are not limited to:

- RFID/NFC protocols.  
- Payment and banking systems.  
- Implantable medical devices  
- Vehicular security.  
- Mobile phone security and privacy.  
- Wireless protocols for embedded devices.

Requirements: computer security, cryptography, familiarity with de-compilers (IDA, JD) OR signal processing.

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**Dr Andrew Gargett**  
Room: 106  
Email: A.D.Gargett@cs.bham.ac.uk

My interests are in using Natural Language Processing techniques to investigate linguistic phenomena. Currently, I am most interested in using natural language generation (NLG) for
this purpose (relatively under-researched, compared to natural language understanding). Some of the languages I have worked on include: Australian Aboriginal languages, Arabic, Austronesian (especially the languages of Malaysia, Indonesia and Philippines), and English. I have specific linguistics background in phonetics/phonology, morphology, syntax, semantics and dialogue/pragmatics.

Broad topic areas that might be of interest to MSc students include:

(1) Generation of some specific linguistic phenomena. For example, I am currently working on generating formulaic language in Arabic.

(2) Modelling situated language use. For example, I have access to a parallel Arabic-English corpus of instruction giving in a virtual world, and this can be mined to investigate patterns in situated dialogue across two distinct languages. I have already investigated feedback in English dialogues (e.g. "mhm", "ok", "yeah"), and a straightforward extension of this would be a comparison to feedback in Arabic dialogues.

(3) Techniques for improving corpus-based generation for languages where this has not been carried out as yet. For example, statistical generation is a popular technique, but equally interesting options include instance-based NLG, or even situated NLG (generating both actions and language, see topic (2) above on the kind of data we could use here).

(4) Investigating polysemy in FrameNet. For example, how can we best model patterns within FrameNet, in order to automatically detect metonymy in corpora of English? Alternatively, how can we use our models of such patterns to generate metonymy in English?

(5) Techniques for improving evaluation of generation, in particular, combining objective with subjective forms of evaluation. Note that this links to topics (1) to (4) above.

From this list, specific MSc-mini project topics can be developed. Initially, I would like to meet with potential students to try to define some very clear questions we could find an answer to, sketch out some ideas for how to find likely answers, and then develop a more detailed plan of research from this. Implementing such plans typically involve basic research, data analysis, programming, evaluation, and reporting results.

If any of this sounds interesting, please feel free to contact me by email or drop by my office.

**Dr Dan Ghica**

Room: UG35 Email: D.R.Ghica@cs.bham.ac.uk

I am interested in applications of 'hardware compilation', i.e. the synthesis of digital circuits from programs written in conventional 'software' languages. The typical project would involve the use of the Verity language ([http://www.veritygos.org](http://www.veritygos.org)) to implement an interesting algorithm (e.g. neural networks, image or sound processing, routing, security) in C or Java then in Verity and comparing the performance of the special-purpose circuit against conventional CPU-based execution. For students seeking particularly challenging projects I
can assign work which would improve the compiler itself (e.g. language extensions, optimisations, usability features, etc.)

**Dr Peter Hancox**
Room: 240  Email: P.J.Hancox@bham.ac.uk

I am interested in concurrent programming using constraints, particularly using the language Constraint Handling Rules (CHR). The following are starting points for project work.

**Java/CHR re-implementation of a Prolog/CHR meta-interpreter**
Meta-interpreters are compilers for a programming language written in that language itself. The point is that it allows changes in the behaviour of the programming language. There is a meta-interpreter for CHR that makes its concurrency more explicit by modelling an array of processors and scheduling processes to this array. It is written using the version of CHR that comes with SICStus and SWI Prologs. A re-implementation using the version of CHR developed for use with Java would give insights into implementing concurrency.

**Development of the Prolog/CHR meta-interpreter**
The meta-interpreter described above could be developed further in several ways. The model of the array of processors could be replaced (and extended) by using the Linda package bundled with SICStus Prolog. Alternatively, the scheduling model could be experimentally refined to allow exploration of the effects of differing scheduling algorithms.

**Parser-implementation using the CHR meta-interpreter**
There are many well-known parsing algorithms, many based around chart parsing. Some of these have been implemented in CHR; some await implementation.

Prolog/CHR and the CHR meta-interpreter run the same programs but their differing models of concurrency can produce different results. (For instance, the unordered merging of two lists always gives the output list in the same order in Prolog/CHR but the CHR meta-interpreter simulates processor load and so typically gives output lists of varying orders at different times.) Application-based projects could look at the differences in parsing caused by differing models of concurrency.

**Implementing Flat Concurrent Prolog in CHR**
There has been much work on implementations of concurrent Prolog. Flat Concurrent Prolog (FCP) is a family of concurrent Prolog languages that allows the exploration of some of the problems of concurrent programming. A compiler for the simplest version of FCP exists for the SICStus and SWI CHR implementations. Project work could either look at transferring this implementation to Java/CHR and/or explore adding extra functionality such as atomicity.

**Dr Nick Hawes**
Room: 133  Email: n.a.hawes@cs.bham.ac.uk

[only available for project supervision in Semester 2 and the summer]
I am happy to supervise projects in the fields of AI, robotics (we have access to a couple of robot platforms that you could use) and the simulation of behaviour. In general I prefer projects which are biased towards exploring problems through implementation and engineering (i.e. making things work) rather than working with formal descriptions. I am most likely to be interested in projects which either develop autonomous intelligent systems (robots, game or virtual world characters, desktop assistants, web crawlers, software agents), or apply AI techniques to everyday situations (such as interfaces for phones and computers, productivity software, smart home devices, health care, security etc.). In addition to these I would be interested in supervising projects which use, or make major contributions to, existing toolkits for AI and robotics (e.g. our own CAST toolkit, Player/Stage, OpenCV, MS Robotics Studio, URBI, etc.). Some additional example project types/fields:

**Memory**
I am currently developing a interest in the role of memory in cognitive systems, and would like to supervise projects that develop implementations of memory models (short-term, long-term, episodic etc.) in an intelligent system.

**Modelling biological behaviours**
Implement a model of an aspect of animal behaviour or intelligence, such as flocking, path integration, hunting, or learning; a simulated animal (a crow, octopus, spider, crab); or some human kind of human behaviour (problem solving or learnt behaviour) using a model hypothesised by biologists or psychologists.

**Linking motivation, planning and execution**
Investigate ways that an autonomous system can generate their own goals then produce behaviour to satisfy them using deliberative or reactive planning approaches.

**Multi-modal or intelligent systems for your daily life**
Build a conversational or gesture interface to existing software or hardware. This could be a mobile phone, music player, linux command line, file manager, washing machine, toaster or your entire house. Create a robot for the home which could monitor an elderly person and call for help in case of emergencies.

**Cognitive Architectures**
Pick an existing, implemented model of human cognition (ACT-R, ICARUS, Soar etc.) and solve a problem with it. Or implement your interpretation of the work of your favourite cognitive scientist or philosopher (Andy Clark, Daniel Dennett, Michael Tomasello, Thomas Metzinger). You could even do this on one of our robots.

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**Dr Shan He**
Room: UG36 Email: S.He@cs.bham.ac.uk

1. Predicting survival, resuscitation requirements and recovery in major perineal trauma: applying Machine Learning to help in the management of battlefield casualties

This project will be jointly supervised by Dr Shan He, Dr David Smith in the School of Math and Flt Lt Somayyeh Mossadegh
Many soldiers suffering IED (improvised explosive device) injuries in Afghanistan are being saved by our military healthcare system that in previous conflict would have been universally fatal. These injuries are rarely encountered in peace time. The optimal way to treat these patients to ensure their survival is a matter of current and intense research interest. What is needed is a simple yet evidence-based scheme of best practice for surgeons to follow. This project will apply the machine learning method of Decision Trees to produce a best practice protocol from our available data. This project will have important ramifications for the future treatment of these patients, potentially saving many lives.

2. Identification of cancer driver mutation using graph theory.

This project will be jointly supervised by Dr Shan He, Dr Dan A. Tennant in the School of Cancer Sciences.

Cancer is caused by somatic mutations, of which only a small subset provide the cancer cells evolutionary advantages. Such subset of somatic mutations, or so-called driver mutations, contribute to the tumorigenesis and is of great important to our understanding of cancer. In this project, we will use an integrated approach based on novel graph algorithms to discovery cancer driver mutations from glioma gene express data, copy number variation data and possibly epigenetic datasets. I am happy to supervise MSc projects in the multidisciplinary areas of computational intelligence and computational systems biology. I am keen on working closely with motivated MSc students on the following projects:

**Bob Hendley**

Room: 236  
Email: R.J.Hendley@cs.bham.ac.uk

My main interest is in intelligent and novel interactions between people and systems and how these can be made more intelligent, productive and natural. There are some underlying technologies on which I am working, such as:

- Visualization (e.g. of the web, phone calls etc.)
- User modelling, system adaptation
- Agent systems and emergent behaviour

These techniques can be applied to many different areas, including Information browsing (WWW, document repositories, ...), Knowledge discovery, Education and Learning and Creativity and Art

I’ve listed some ideas below but there are many more. These are open-ended projects.

1. GWAP (Games With A Purpose). The aim here is to turn the annotation task into a game that will challenge the annotator to more deeply explore the space of annotations so that they properly discriminate between competing descriptions (whereas they presently will come up with descriptions that are routine). It will involve building a web-based multi-user game framework and implementing a series of alternative approaches.

2. Challenging users. The aim here is similar to the previous project but with an intelligent agent that will reason over the annotation space to devise questions or tasks for the user that will force them to consider aspects that they had previously overlooked.

3. Extracting ‘mood’ from articles. Although most annotation systems focus on concrete
information it is apparent that searches by journalists are often more likely to focus upon subjective information (I need a clip that includes wind farms with a dark or negative aspect). This project will focus upon the extraction of these more subjective features from video or text.

4. Annotation by analogy. Rather than annotate from scratch, how can we re-use information that is already available in similar or dissimilar articles? E.g. This article is very like this one in this area but unlike this one or this class. How can we enable the user to explain these relationships?

5. Visualisation of articles. Here we are interested in allowing a user to use a visualisation of the annotations. This may be during searching or within the annotation process. It is likely that that this will use a force based clustering model or an ‘organix’ like model based on our earlier work.

Mini-projects that I supervise will probably include the application of one of these technologies into one of the application areas in which we are working. I would expect the projects to include a wide ranging survey of the state of the art, the development of a proposal to carry this forward and a prototype to demonstrate the feasibility of some of these ideas.

Professor Andrew Howes
Room: 135   Email: A.howes@cs.bham.ac.uk

I am interested in Human-Computer Interaction and Cognitive Science. I enjoy supervising projects that investigate a wide range of questions (examples below) but I am flexible and like to start a supervision with a discussion of topics that are of mutual interest.

I currently collaborate with NASA and the Federal Aviation Administration (FAA). There are opportunities to collaborate on relevant projects.

Potential projects:

1. How to design consumer feedback mechanisms for e-commerce, e.g. eBay and Amazon?

2. How to design new equipment for high pressure environments such as cockpits?

3. How to design social network sites so that they respect the boundaries imposed by different social spheres (e.g. family, work, and friends)?

4. How to design for an internet in which personal information can be persistent, which can have both positive and negative consequences?

Professor Achim Jung
Room 213   Email: A.Jung@cs.bham.ac.uk

I am interested in Mathematical Structures in Computer Science, and more specifically, in ordered structures, topological spaces, Stone duality, and category theory. The connection to computer science is via the study of programming languages.

I am also interested in the teaching of computer science at school level, from primary schools to A-levels.
Specific project ideas can be developed in discussion with the student.

**Dr Ata Kaban**
Room: G32   Email: A.Kaban@cs.bham.ac.uk

My research interests include Statistical Machine Learning and Natural Computation.

Project suggestions:

*Algorithms for approximate volume computation*
Computing the volume of a d-dimensional body in polynomial time plays a fundamental role in, e.g. Bayesian inference, machine learning, econometrics and physics. Nature-inspired search algorithms have been very successful for finding the modes of a function, however they don't directly apply to computing the volume defined by the function. This project will seek to investigate whether (and how) mode searching can help volume computations. Existing hybrid MCMC techniques and population-MCMC may be reviewed as a starting point.

*Multi-task learning*
Most of the existing learning algorithms aim to learn from examples to perform one single task. However, one often needs to learn to perform several different tasks that might have something in common. How can we exploit similarities between tasks to increase the efficiency of learning? This project will investigate this question by a literature review and/or implementation of ideas.

*Distances in high dimensions*
In high dimensional spaces, the Euclidean distance suffers from a counter-intuitive phenomenon called 'concentration': As the dimension increases, the distances between any two points may become too similar. In consequence, distance-based methods (e.g., k-means, k-nn) run into problems, often referred to as the 'curse of dimensionality'. This project will study the concentration effect in both classical and novel distance or dissimilarity definitions, in order to identify which are the ones better suited for high dimensional problems. Rank order distances could be a possible candidate.

*Dimension reduction by random projections*
The Johnson-Lindenstrauss lemma implies that a linear random mapping of high dimensional data on a much lower dimensional Euclidean space preserves much of the geometric structure of the data high probability. It has been hence intriguing to exploit this as a cheap dimensionality reduction method for machine learning. However, the guarantees are probabilistic hence the quality of results is variable. This project aims to find ways to improve stability by appropriately taking account of the probabilistic nature of theoretic guarantees. Strategies to combine or select from several random projections may be investigated.

*Breakdown points in sparse learning machines*
In the new area called 'compressive sensing', there are precise results regarding the data characteristics that allow for exact reconstruction of sparse signals from their compressed versions. These are characterised by a phase-transition, beyond which the reconstruction breaks down. There are reasons to believe that similar behaviour is exhibited by sparse
learning machines in terms of their generalisation performance. This project will verify this experimentally.

**Generative-discriminative tradeoff models**
In machine learning, generative models estimate the joint density of inputs and targets $p(x,y)$, from which they then obtain the predictive distribution $p(y|x)$ by Bayes rule. By contrast, discriminative models approximate the predictive distribution $p(y|x)$ directly. The debate as to which of these methodologies is preferable is a long standing one. This project is to look at a new modelling scheme that interpolates smoothly between these two model types. There are many opportunities for experimental or/and theoretical work to determine the optimal tradeoff against varying data dimensionality and the sample size.

**Rotational invariance of learning methods**
A learning method is said to be rotationally invariant if upon an arbitrary rotation of the data (training set and test point) it produces the same result as on the original data. It has been shown that certain learning methods that are rotationally invariant exhibit a suboptimal worst-case sample complexity (i.e. they may require a lot of training examples). This project is to empirically assess to what extent this is a problem in practice.

You may also find ideas that could possibly be up-or-down-sized for an MSc (mini)-project on my publications page: [http://www.cs.bham.ac.uk/axk/papers.htm](http://www.cs.bham.ac.uk/axk/papers.htm) or on the Machine Learning module's page: [http://www.cs.bham.ac.uk/axk/ML_new.htm](http://www.cs.bham.ac.uk/axk/ML_new.htm)

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**Dr Manfred Kerber**

Room: 137

Email: M.Kerber@cs.bham.ac.uk

I am interested formal reasoning with applications to economics. I am investigator in the EPSRC funded ForMaRE project, [http://www.cs.bham.ac.uk/research/projects/formare/](http://www.cs.bham.ac.uk/research/projects/formare/). We have started work on the formal representation of auctions and extracting verified code from these using the Isabelle theorem proving system. Further interests in this area are about matching problems, e.g. matching employees to offices based on their preferences.

Other interests include paradoxes, reasoning with partial functions, many-valued logics, heuristics and their usefulness, knowledge representation and re-representations, as well as AI in general.

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**Dr Mark Lee**

Room: 110

Email: M.G.Lee@cs.bham.ac.uk

I am happy to supervise any project involving Natural Language Processing or Information Retrieval techniques. The following are a few concrete projects I have in mind but I am open to other ideas.

**Word Sense Disambiguation**
According to any dictionary, most words have more than one sense. For example, “bank” can refer to either a river bank or a money bank. Such ambiguity is not consistent across languages and so words must be tagged with their appropriate senses prior to Machine
Translation. This project would involve implementing and testing various techniques for tagging words with dictionary definitions.

**Un-supervised Language Identification**

Given the following strings
- e pruebas bioquimica
- man immunodeficiency
- fairs se sont produi

it is hardly surprising that a person can identify the languages as Spanish, English, and French respectively. It isn’t even surprising that somebody with essentially no knowledge of Spanish or French can distinguish between the two languages. However, what is interesting is whether a computer programme without using any hand-coded linguistic knowledge could be trained to do the same task using statistical methods.

**Language Detection**

Given a data sequence, how could we distinguish whether it was a natural language from random data or some mathematical series? Clearly there are features universal to all natural languages which do not necessarily occur in non-language data and it has been suggested that these could be used to distinguish natural languages from other types of data. However, this is not a trivial task. For example, there is wide debate about whether the Voynich manuscript is a secret natural language, a code or just random characters. This project would involve comparing an electronic transcription of the Voynich manuscript with other corpora using computational linguistic techniques.

**Dr Paul Levy**

Room: 216 Email: P.B Levy@cs.bham.ac.uk

I'm open to supervising various kinds of projects. Here are some suggestions. Please discuss with me if you are interested in any of them.

1. **Semantics and logic of programs**

I do research in semantics of programming languages, lambda-calculus and related areas of algebra. I'd be very happy to supervise a mathematically-oriented project in one of these areas.

2. **Strict and lazy functional programming**

Functional programming languages are generally of two kinds: strict (e.g. ML and Scheme) where evaluation takes place early, and lazy (e.g. Haskell) where evaluation takes place late. What are the advantages of each of these over the other for a programmer? Such a comparative analysis could be very helpful. It might (but need not) connect to research that I do in "call-by-push-value", a calculus that captures aspects of both kinds of language.

3. **Just intonation**

"Intonation" is the way that a musical instrument is tuned, and "just" intonation plays every
interval as a rational frequency ratio. In this system is possible to depict harmonic relationships on a grid. The aim of the project would be to use these ideas to produce an educational tool for teaching about musical intervals.

Dr Leandro Minku
Room: 244 Email: L.L.Minku@cs.bham.ac.uk

I am interested in the areas of machine learning and evolutionary computation. In particular, I am very keen in supervising projects on machine learning in changing environments, and on applications of machine learning and evolutionary computation to software engineering tasks. A short description of these can be found below.

**Machine learning in changing environments**

Machine learning is an area within artificial intelligence concerned with studying and developing computational models capable of improving their performance with experience and acquiring knowledge on their own. Learning occurs through training examples. Let's say that we want to build a system to predict whether a certain credit card transaction is fraudulent or not. Each training example could include the value of a certain transaction, the salary of the person who made the transaction, the age, etc. It could also include a label informing whether that transaction was fraudulent or not. A learning machine would learn how to predict whether future transactions would be fraudulent based on such available examples of previous transactions.

Offline learning machines operate in two separate phases: training and testing. The training phase performs learning by using a set of pre-existing training examples. Only after this phase is complete the machine can start being used to make predictions (testing phase). New training examples that become available after the training phase cannot be used to further improve or update the learning machine.

Online learning machines, on the other hand, have no distinction between training and testing phase. The machine can be used to make predictions at the same time as it is learning. In the credit card transaction example, new transactions can be used to improve the online learning machine whenever they become available. A very useful feature of online learning machines is that they can try to adapt to changes to the learning problem. An example of change would be if a certain transaction that would not be fraudulent in the past becomes fraudulent due to the world economic situation. Several applications can benefit from online learning, e.g., spam detection, intrusion detection, electricity demand prediction, etc. Projects in this area involve developing new online learning machines, or applying online learning machines to new problems.

**Software Engineering Tasks**

Two examples of software engineering tasks that can be solved using machine learning and evolutionary computation are Software Effort Estimation and Software Project Scheduling Problem.

Software Effort Estimation is the process of estimating the effort required to develop a software project. It is a task of strategic importance in project management, as software effort
is the major contributing factor for software cost. Both over and underestimations of effort can cause serious problems to a company. For instance, overestimations may result in a company losing contracts or wasting resources, whereas underestimations may result in poor quality, delayed or unfinished software. Due to the importance of this task, automated decision support tools to provide software effort estimation can be used to help the software manager. These tools frequently use machine learning for creating estimation models based on examples of completed projects for which we know the true required effort and features such as team expertise, programming language, estimated software size, etc. Projects in this area involve creating new machine learning methods for software effort estimation.

Software Project Scheduling Problem is the problem of assigning employees to tasks in a software project so as to minimise the cost (total salary paid) and duration of the project. Being an optimisation problem, evolutionary algorithms can be used to find good assignments. Projects in this area involve improving existing evolutionary algorithms to solve this problem.

**Dr Michael Mistry**  
Room: 233  
Email: m.n.mistry@cs.bham.ac.uk

I am interested in understanding the principles behind robot and human motion, primarily through of the study of dynamics and control. I am willing to supervise projects such as:
- physical simulation and control of a dynamic robots (e.g. an arm, hand, head with cameras, or full body humanoid.)
- robot vision: tracking human motion or other dynamic objects (e.g. thrown balls) in 3D using, for example, a Microsoft Kinect camera.
- studying human movement through psychophysical experiments (e.g. arm reaching, grasping, sit-to-stand, etc.)

**Dr Mirco Musolesi**  
Room: 138  
Email: m.musolesi@cs.bham.ac.uk

The scope of my research interests is fairly broad and rather interdisciplinary. Current areas of interest include:

- Social and ubiquitous computing
- Large-scale data mining ("big data" mining) and data science
- Networked systems and network science

I am happy to supervise projects in any of the areas listed above.

**Dr Shishir Nagaraja**  
Room: 132  
Email: S.Nagaraja@cs.bham.ac.uk

I would be happy to supervise students in the area of computer security. Any project in the areas of:

- Smartphone Privacy
- Software-Defined Networking
- Secure Distributed Networks
- Anonymity and Traffic Analysis
Dr David Parker
Room: 107 Email: d.a.parker@cs.bham.ac.uk

My research interests are in the areas of formal verification and modelling and analysis of probabilistic systems. I am happy to supervise projects on tools, techniques and case studies in these areas.

One possibility is a project that develops and analyses/verifies a mathematical model to study, e.g.:

- **security protocols or models**, e.g. electronic voting or attack-defence trees
- **planning problems for robotics**, e.g. using temporal logic goal specifications
- **biological systems**, e.g. cell signalling pathways or DNA computing designs
- **player strategies**, e.g. in games of chance or gambling scenarios

Another possibility is to develop novel and/or efficient algorithms for verification and analysis. Typically, this will be done in the context of the open source probabilistic verification tool PRISM, which is developed here in Birmingham (www.prismmodelchecker.org).

- investigating novel Monte Carlo simulation methods for timed temporal logics such as MTL
- investigating efficient techniques for automata-based model checking of probabilistic systems
- investigating the feasibility of model checking algorithms developed for new modelling formalisms such as Markov automata or interactive Markov chains

I have more details on this page: http://www.cs.bham.ac.uk/~parkerdx/project-ideas.php

Please feel free to drop by to discuss any aspects of these projects or to suggest your own ideas in these areas.

Professor Uday Reddy
Room: 210 Email: U.S.Reddy@cs.bham.ac.uk

My research interests are in tools and techniques for program analysis and program verification, which are applicable to large and long-lived software systems. For this year, I am offering the following topics for mini-projects. Some background in programming language principles and functional programming are necessary to work on them:

**Effect systems**

In large software systems, it seems crucial to ensure that certain parts of programs do not have certain kinds of effects, such as changing crucial program variables or throwing undesired exceptions etc. Effect systems, invented by Gifford and Lucassen at MIT several years ago, present one way to deal with such issues. This project involves exploring the application of effect systems to ensure the desired properties about the effects of program parts.
Separation Logic
Separation Logic is a novel logic devised by John Reynolds, Peter O'Hearn and colleagues in 2000. It has enjoyed a tremendous success in a short span of time as a tool for verifying programs as well as for program analysis dealing with dynamic data structures. Projects in this area include (i) implementing analysers or provers for small parts of Separation Logic and (ii) proving the correctness of challenging algorithms using Separation Logic techniques. A specific implementation project here is to implement a verification system devised by John Reynolds and me this year for Concurrent Separation Logic based on Syntactic Control of Interference.

Dr Eike Ritter
Room: 209  Email: E.Ritter@cs.bham.ac.uk

Automatic Program Verification
I have developed and implemented new logics for program verification which makes it easier to construct the verification of large programs from the verification of its smaller components. I already have a preliminary implementation of this logic. Although the logic has been developed, a good way of annotating programs and verifying them automatically is missing. The mini-projects and projects would develop ways of doing this.

Security
I am happy to supervise projects in this area. Possible topics are intrusion detection (to detect irregular patterns of behaviour), protocol verification (is the given protocol safe against attacks) and verification of kernel code (illegal pointers, violation of semaphore conditions etc.)

Professor Mark Ryan
Room: 237  Email: M.D.Ryan@cs.bham.ac.uk

[Not available to supervise projects this year]

Alan Sexton
Room: 239  Email: A.P.Sexton@cs.bham.ac.uk

My research interest is in various forms of document image analysis, i.e. the analysis, recognition and understanding of documents from their images. This includes optical character recognition but also much more.

Documents to be analysed may be in bitmap image form or in a "born digital" form such as PDF or Postscript. They may come from printed documents, handwritten manuscripts, photographs of whiteboards or street signs or from online interactive sources such as tablet or pad computers or digital whiteboards. Each option provides different research problems.

The documents themselves may be historical (e.g. some 10th century manuscripts) or recent. Particular research problems involve recognising tables, mathematical formulae, diagrams or particular graphical notations such as music scores, electronic diagrams, Entity Relationship diagrams, UML diagrams etc.
The output of such document analysis systems is also a matter of research. For non-sighted users, rendering the documents recognised into speech using text to speech software is one target, although research on how to read out diagrams and mathematical formulae is very much still ongoing.

There are many specific areas of research: from low level image analysis algorithms such as noise reduction, binarization, de-warping and segmentation, to various pattern recognition and clustering problems, medium level tools such as word-spotting, and text line extraction, to higher level issues such as the design of tool sets to be used by non-computer scientist experts (such as historians and social scientists) who have a great interest in and knowledge about certain kinds of documents but not the computer science knowledge to understand and use complex image analysis tools properly.

This is a wide and active area which provides scope for a very broad range of research skills and interests.

**Dr Iain Styles**  
Room: 109  
Email: I.B.Styles@cs.bham.ac.uk

My research interests span a wide range of problems in biomedical imaging. My main focus is on the development of mathematical methods and computational algorithms for the extraction of information from what can be very complex image datasets. I work with a range of imaging methods including diffuse optics, mass spectrometry and various optical microscopies. Some of the areas of particular current interest to me and members of my research group include:

- Machine learning methods for feature extraction from high dimensional image data
- Compressed sensing methods for image reconstruction
- Random matrices for dimensionality reduction
- Bayesian models of image formation

I also have an interest and some expertise in the modelling and simulation of both classical and quantum physical systems (for example, chaotic dynamical systems, quantum computers)

I am normally very happy to supervise projects of your design provided that I am satisfied there is sufficient intellectual content. The most important thing when choosing a project is that you are motivated to study the subject. It is much more important for you to choose a project that you are deeply interested in, than one that happens to fit my interests.

**Dr Hayo Thielecke**  
Room: 208  
Email: H.Thielecke@cs.bham.ac.uk

I am interested in supervising topics related to programming languages, including parsing, regular expressions, software security, parallel programming. Specific project topics include:

*Regular expression learning game*

This project is about developing a game for helping students learn about regular expressions. The software could run in a browser or as an iPhone/Android app. The game should be made
engaging and fun by using gamification ideas such as points, levels and achievements. Since many properties of regular expressions are decidable, it should be possible to have creative questions where players have to construct their own regular expressions for the more advanced levels of the game.

Dr Peter Tiño
Room: G33 Email: P.Tino@cs.bham.ac.uk

In general, I am interested in machine learning, cognitive science and evolutionary computing. I have experience with practical and theoretical aspects of processing data with strong temporal component (well-formed sentences of a natural language, DNA or protein sequences, financial time series such as closing daily values of a financial index, inflation rates etc.). I am also interested in data visualisation and computer-aided art creation. Even though I am keen on supervising mini-projects/projects on the topics listed below, I am happy to interactively formulate other projects that would fit the individual student’s interests.

Data mining of structured data
Vectorial data mining is well-developed and understood, because there are natural measures of data similarity for fixed-dimensionality vectors. The situation is much more complicated in the case of structured data (e.g. DNA or music sequences, web documents, graphs representing molecules etc.). We will work on methodologies to mine structured data in a consistent framework (e.g. probabilistic modelling). There is a possibility to work with real DNA/protein sequences, music sequences, EEG time series etc.

Self-Organisation and optimisation
There are several approaches to finding good solutions of difficult optimisation problems through self-organisation of partial solutions. These methods tend to work quite well, but involve one or several parameters that need to be set in an ad-hoc manner. We will work on methodologies for setting those parameters automatically. Also, we will extend/modify the basic set-up to accommodate different types of optimisation problems.

Computational Finance - Inflation targeting
Predicting inflation rates plays an important role in designing monetary policies. It has been long recognised that when predicting inflation rates on 2-4 quarters horizon, relatively simple (possibly non-linear) autoregressive models achieve respectable performances. It is an open and still unresolved question whether inflation rate predictions could be improved by considering past measures of supply and value of money. We will be investigating usefulness of different forms of money aggregation and so called divisia money indexes for predicting US inflation rates using methods of machine learning. We will work with real data in collaboration with Aston Business School.

Evolutionary art
There have been many nice evolutionary approaches to help artists in creating interesting and unorthodox pictures. Many extensions are possible, for example in modifying the vocabulary of basic transforms to allow for hierarchies of self-similar fractal-like objects, defining continuous mappings on such fractal- generating transformations etc. Other possibilities in music composition include e.g. helping a composer to create interesting new tunes, or given an existing melody, create an appealing counter melody.
Dr Steve Vickers
Room: 214 Email: S.J.Vickers@cs.bham.ac.uk

My research work is largely mathematical, on the interface of topology, logic, algebra and computer science, and I would be particularly interested in supervising projects that include some mathematics.

Quantum theory
A major new project of mine, funded by the Engineering and Physical Sciences Research Council with Research Fellow Bertfried Fauser, is to apply my favourite logic (the so-called "geometric logic") to some approaches to quantum theory that have been developed at Imperial College and at Nijmegen. Our aim is to develop more pictorial ways to understand the machinery of topos theory that they use. We would like also to relate it to the vivid diagrammatic descriptions that the Oxford group (Abramsky, Coecke and others) are using to describe quantum protocols for message passing.

For further details of the project see:

http://www.cs.bham.ac.uk/~sjv/geophysics.php

I would warmly welcome any mini-project or project on these topics. You would also have the opportunity to see something of how the EPSRC project works.

Other topics in theory
If you look at my overall research website

http://www.cs.bham.ac.uk/~sjv/research.php

and my summary of papers

http://www.cs.bham.ac.uk/~sjv/papers.php

You can see more general topics that I am interested in. They revolve around the interaction between topology and logic, using techniques of algebra - in fact I wrote a book about this for computer scientists in an earlier century (1988), although the ideas have evolved enormously since then.

Again, I would welcome a mini-project or project for anyone who wishes to develop some understanding of these topics.

One that may be fairly practical would be to work with the "Cartesian theories" that I wrote on (with Erik Palmgren) in "Partial Horn logic and cartesian categories". This is a logical calculus that allows for the fact that sometimes you can write algebraic expressions e that may be "partial" - they don't always compute an answer. An example might be if a computation doesn't terminate or some preconditions aren't met. In our logic, you say e = e only if it does give an answer. Cartesian theories are where you say what the (possibly partial) operators are, and you say what equational implications they obey. These turn out to be of great importance in abstract algebra and it would be good to have some software support for manipulating them.
The project would be to develop some software that enables you to -
- store Cartesian theories as data
- prove well-definedness and equality in a theory
- construct new theories out of old ones
- translate from one format of theory to another

You would need to learn a little about logic, for example the notions of logical theory and of structure and model.

Professor Xin Yao
Room: 211 Email: X.Yao@cs.bham.ac.uk

My major research interests include evolutionary computation for optimisation, learning and design, and neural network ensembles. I am keen on real-world applications, especially in optimisation and data mining. I am willing to supervise any projects related to evolutionary computation. The following is a partial list.

(1) Solving software engineering problems using meta-heuristic algorithms

Many software engineering problems can be formulated as optimisation and search problems, such as testing, software module clustering, etc. As a result, modern meta-heuristic algorithms, including evolutionary algorithms, simulated annealing, swarm intelligence, tabu search, etc., can be used to solve them automatically. One of the major advantages of such search-based software engineering is the automation of previously tedious and human-intensive process. Furthermore, meta-heuristic algorithms can provide novel approaches to tackle hard software engineering problems that are beyond human beings (given a limited amount of time). A good example of this is automatic software bug fixing.


An interesting idea for novel meta-heuristic algorithms is to develop an algorithm portfolios, borrowing ideas from financial investment:


(2) Software Effort Estimation as a Multi-objective Learning Problem

Estimating the cost of a software project is a task of strategic importance in project management. Both over and underestimations of cost can cause serious problems to a company. For instance, overestimations may result in a company losing contracts or wasting resources, whereas underestimations may result in poor quality, delayed or unfinished software. The major contributing factor for software cost is effort.

An alternative to human effort estimations is to use automated effort estimators. Models for estimating software effort can be used as decision support tools, allowing investigation of the
impact of certain requirements and development team features on the cost/effort of a project to be developed.

This is a specific project in automated software effort estimation. The main task is to extend an existing work by investigating the impact of different multi-objective evolutionary algorithms on software effort estimation. See the relevant paper below:


To do this challenging project, the student is expected to have knowledge about both evolutionary computation and neural networks. Knowledge in machine learning in general is also very useful.

(3) Algorithm Selection Using k-arm Bandit Solvers or Other Methods

It is well-known that different meta-heuristic algorithms are good at solving different types of problems, although it is often very hard to know the exact type of problems in practice. One way to tackle this problem is to have a pool of candidate algorithms and then select an appropriate one to execute during the optimisation process. The aim of this project is to investigate whether a k-arm bandit solver could be used to select an algorithm appropriately during run-time, and whether there might be other methods (especially other machine learning methods) that could be used effectively for algorithm selection.

Adapting the algorithm selection can be regarded as a natural generalisation of adapting the operator selection in evolutionary algorithms, as illustrated by Gaussian mutation vs. Cauchy mutation in the following paper:


(4) Robust Optimisation Over Time (ROOT)

This project is about dynamic optimisation using evolutionary approaches. A solution is called robust over a certain time interval when its quality remains acceptable and is relatively insensitive to the environmental changes during this time interval. A found solution that is robust over time will be used until its quality degrades to an unacceptable level in the current environment. When the solution quality is unsatisfactory, a new robust solution must be found. Therefore, the task of dynamic optimisation now becomes to find a sequence of robust solutions over time intervals. The ideal situation takes place when only one solution is enough and robust over the whole life cycle of the problem. The process of finding such a sequence of robust solutions is referred to as robust optimization over time (ROOT). ROOT usually assumes implicitly that implementing changes of solutions will incur significant costs in practice.

My research is centred around nature-inspired algorithms, in particular (but not limited to) artificial immune systems and evolutionary algorithms. While evolutionary algorithms are inspired by natural evolution, artificial immune systems are built after the immune system of vertebrates. I am interested in both, theoretical and practical aspects of such algorithms in different areas of application.

I am happy to supervise any projects in the general area of natural computation and computational intelligence. For most projects previous knowledge in this area is an advantage but not a necessity.

Some project ideas can be found on my student project page: http://www.cs.bham.ac.uk/~zarges/student-projects.html

However, I am also happy to discuss your own project ideas. If you would like to discuss doing a project with me, please e-mail me or drop by my office.