

EE/CX318 Project: Information

The following text describes the operation/assessment of the EE/CX318 project; outline descriptions of the project topics offered are available elsewhere. These descriptions are not complete in that they do not offer a full project specification. It is the role of the group to develop and refine a specification for the topic they have been assigned. Each topic will require some initial research and a degree of interpretation to convert the descriptor into a useful specification and plan for completion by the group. Care should be taken when developing the specification to ensure that the interests and abilities of the group are incorporated and the aims/objectives are suitably ambitious (appropriate) for the time available. There is no point in promising too much and not delivering. Likewise, being too conservative in the system proposal may show a lack of ambition and be graded accordingly.

The first stage of the project is the development of the initial plan and its presentation at early in semester 2. This part of the project is undertaken solely by the group and the mentors or proposers of the topic are not involved. The objective here is give the group the responsibility and freedom to develop their own project rather than be “told” what to do by a mentor. **IT IS YOUR PROJECT**. After the formal presentation and further discussion with your mentor, the aims, objectives, timescales and deliverables may then be further revised. This is an entirely normal part of standard project work – continual review and revision of project work as time progresses and/or circumstances change.

Please note that all arrangements are subject to change as result of COVID-19 restrictions – either tightening or relaxation therein.

Mentors

Each group is assigned an academic staff member who will act as mentor and assessor for the group. Groups are expected to meet with the mentor around 4 times during the course of the project during semester 2. Each meeting will be formally recorded BOTH by the group and the mentor. The meeting will last about 30+ minutes and are arranged at the mutual convenience of the students and staff – roughly every two weeks. The role of the mentor is to review project progress, provide advice and direction for the work, provide mediation and to assess the project conduct of the group and individuals. The mentor will NOT be assessing that particular group’s final product or submitted report. (These two items are assessed by other staff from the mentoring team.) In some cases, a mentor may have proposed project topics but it is the student group who are responsible for the technical design and implementation aspects of the project. The mentor can provide advice to the group but will not be acting as the technical lead on the project. (Nor will they be debugging your code or fixing your hardware!).

All mentors are given formal guidelines outlining the expectations in this project from themselves and the students. Mentors are all required to formally record notes of each meeting – following a standard pro-forma – after each meeting. These notes are used to inform the final assessment of conduct and also can form part of the arbitration process for peer review. Mentors are also required to sign and date individual logbooks at each meeting – students have the responsibility to ensure that this is done! (Remind staff to do this at start of meeting.) At present, meeting between groups and mentors can be a combination of on-campus or on-line activities. The mode should be mutually agreeable but starts with the fundamental assumption that, if the university campus is open to students, that face-to-face in person meetings (with appropriate social distancing

applied) is the default. Students are expected to be generally be able to attend meetings whatever the format. Regardless of meeting mode, full notes should be taken as on-campus or on-line meetings have the same standing in project management.

Deliverables

The project has three key deliverables;

- ☐ Preliminary project plan – delivered 18th Jan 2023
- ☐ Demo Working system/Final report –around week 12/13 semester 2
- ☐ CX318 – Report/Demo Tuesday 18th April 2023 (tbc)
- ☐ EE318 - Report/Demo Tuesday 18th April 2023 (tbc)

The above dates are provisional and represent the start date of the semester 2 exam/assessment period. This represents the earliest date that demo and submission will be required. Final dates will be confirmed when exam dates are published – around March 2023.

Assessment

The project will be assessed as follows:

- ☐ Preliminary Plan and Proposal – 20%
- ☐ Project Deliverable & Presentation – 30%
- ☐ Project Report – 30%
- ☐ Conduct and Achievement – 20%

Peer Review and Marking

A peer review process will be applied to the above project mark to determine an individual's final mark. It is expected that all group members will make different but equivalent contributions to the design, implementation, testing and documentation of the project; each member will play specific roles and be responsible for individual tasks that will allow them to contribute equivalently to the project deliverables. The final awarded individual student project mark will be the project mark multiplied by a contribution weight that is determined by the members of the appropriate group. Thus, the final project awarded will reflect both the achievement of the group as a whole AND the relative contribution from each of the group members. Details of peer review will be provided at project demonstration.

The project is a group project and cannot be done by 4 individuals not working as a team. A key learning outcome is the ability to work EFFECTIVELY in a group and the final mark awarded will reflect the success (or otherwise) in this regard. The final mark awarded will not only reflect the individual contribution but also the relative success of team working.

The peer review process has mechanisms to mitigate against students attempting to game the system and will be considering the consistency of the peer reviews submitted by group members as well as individual peer reviews.

Log Books

All students are required to maintain a project logbook dedicated to the EE/CX318 activities. This logbook will be handed in with the final report and will contribute directly to the assessment of the project conduct. The logbook itself can be either an A4 paper books or a form of electronic record such as a wiki, WP files and formal notes.. as appropriate. A shared file space on strathcloud or one-drive may be a suitable way to

maintain the logbooks at a group level. Also, the logbook will provide a record and corroboration for each student's individual contribution to the achievements of the group. Students **must** bring/use their logbook to/at all project meetings (with or without the mentor). The logbooks will be viewed by the mentor at each group project meeting; feedback may also be given as to the quality of the record keeping, progress and contribution. As well as reflecting the individual student's activities and contribution, the logbook should also contain information about the activities of the group as a whole and other individuals within the group. ***(Consider the implications and practical consequences of a group member not being able to complete a task or participate in the project.)***

Prior to each meeting (with or without their mentor), each individual group member should write a short summary of the group's progress since the previous meeting along with an agenda listing the items that need to be discussed in the meeting. At the end of the meeting, the logbook should contain a list of outcomes from that meeting and all action points (for all group members). Also, the date for the next meeting should be agreed and recorded.

Sample draft notes for a group meeting are provided on myplace. All students in the group are expected to maintain their own logbooks.

Your logbook must be seen (and signed if possible) by your mentor during the scheduled meeting. The signature along with the date represent a formal timestamp in the logbook confirming the entry and supporting the validity of each logbook record. Students should remind mentors to sign logbooks at meeting – alongside ensuring the date of the next meeting is arranged. Mentors will be taking notes at meeting and will also corroborated

(Maintaining a functional and appropriately detailed logbook is mandatory for each student. No excuses! It is also a responsibility of the group as a whole to monitor, advise and support individuals within the group to maintain an effective logbook.)

Project Work – Time Commitment

The EE/CX318 class is worth 10 credits and the group project is equivalent to around 80 hours per student giving a total man-hours contribution of around 320 hours per group. Assessment of group achievement and reports is predicated upon this level of effort – not more, not less. Students are reminded of the amount of effort that they are expected to expend in respect to this module. This is active and real participation rather than time spent idling over youtube videos and facebook groups. It is up to the group to organise their work so that both group based and individual activities can be accommodated during the normal working week.

Laboratory Facilities

Under normal circumstances, the project work will use the EEE Royal College computer labs (R4.48/46) and the EEE Project labs (R6.21). However, access is not yet possible and it is not clear whether access will be available during the semester. If and when access is possible, details of how to access the laboratories will be provided. In the meantime work will be based upon software development supported by hardware design proposals and system modelling using PSpice or other appropriate tools.

PCB construction is undertaken by the Electronics Workshop (R4.19); students simply submit a mask on tracing paper/acetate to the workshop staff in R621 or by email

directly and a drilled but unpopulated PCB will be constructed. Students are reminded that fabrication takes time and should allow sufficient time (at least one working week) to receive the board.

A key objective in the project is to produce a working demo based upon a functioning circuit on group designed/built PCB. The PCB is the last stage of the design/construction phase and students **MUST** be using prototyping boards or soldered vero-board as intermediate stages. A key element of the system deliverable for all projects is the incorporation of a meaningful and relevant PCB. The PCB manufacture has a real cost both in time and materials. Provision is included for a single* PCB (max size 4"x4", double-sided) per group. The cost of any 2nd or above PCB will be borne by the students themselves and thus care must be taken to ensure wasteful and redundant PCBs are avoided. (* This represents a single mask – it is possible to have multiple circuits on the 4"x4" board!) Groups will be charged £10 for any additional PCB that is required. A charge which must be paid in advance of the board being commissioned.

Basic training for PCB design should have been completed prior to the start of the project (at end of Semester1). The suggested tool to use is Eagle (search "Eagle", "PCB") which can be downloaded and run at home. Other tools are also available. Eagle is sufficient for simple circuits and is also available in the EEE PC labs via remote access. Groups should have designed a simple PCB and in week 0 will have opportunity to build the circuits and become familiar with basic tools..

Soldering and Prototyping

It is assumed that all students have had some experience with basic circuit prototype construction – use of vero-board, proto-board, basic connectors, wiring, sockets etc. Some videos are provided on the module's myplace pages and students are advised to consult parts catalogues and appropriate text books; "The Art of Electronics" being particularly useful in this regard. With new hardware labs becoming available, training will be provided (required) before accessing the labs – details as and when appropriate. The plan – at time of writing – is to provide training in week 0 – from 10th Jan onwards. Note that many components available now come as a surface mount construction. While it is possible for the experienced individual to construct circuits using such devices it is recommended that either no SM devices are used OR if SM is preferred that the EEE works staff are asked to solder the devices. EEE does have a solder oven to support SM devices.

Microcontroller Work

The general assumption is made in the EE/CX318 project that all students have participated and completed the micro-controller labs associated with EE312 or, for CES students, an equivalent embedded systems module. Therefore, **ALL** students are expected to be able to specify, design, implement and test code on a simple micro-controller board. The projects were not intended to be solely software based and would require integrating a micro-controller board into a real-time (real-life) application; thus system design incorporating both hardware and software aspects is required.

The current position is that active work will focus on the software design and implementation with an anticipation of **possible** integration of hardware at the end of the semester.

The projects will be based around the MSP430 micro-controller boards used previously in the EE312 labs. The data sheets provided with the micro-controller devices are readily available and the prime source of information. Web resources and text books can also be consulted. Remember, in the report, to cite appropriately these third party sources.

For students using the MSP430 in their project an interface card and connector are required. The general assumption is that all EEE students have access to the uC board. Arrangements for CES students to obtain MSP430 boards will be made shortly. Other controller options are available.

Throughout the years, students have requested to use Arduino devices to replace the cited MSP430 device. In this project, Arduino devices (processor and peripherals) cannot be used to as the main central processor – it is possible to use such devices as peripheral devices where the MSP device retains master control. A project based solely around an Arduino device will be an automatic fail.

Students on CX318 have a wider experience of software development and devices and systems and can bring this fully to bear in their project so that submission reflects the skills and attributes of a CES group. However, the requirement to have a microcontroller interfacing with hardware devices is still at the core of the project and construction of a great web server or fabulous app does relieve the project of this obligation.

Ordering Components

No components for the project can be ordered for the project until after the 1st formal meeting with your mentor. Indeed, one should avoid the temptation to order things too quickly and without due diligence – “buy in haste, repent at leisure”. That said, leaving things to the last minute can render the project deliverables vulnerable.

A range of discrete components (resistors, capacitors etc) and some commonly used ICs are available in the EEE project labs. Other, more specific components can be obtained for the project via the EEE Electronic Workshop or R6.21. A requisition form (available in R6.21 and on myplace) that lists the required component, its catalogue number and approximate cost is required and must be submitted to R4.19 where the components can be ordered. Some parts may in stock while others may need to be ordered. ***ALL ORDERS FOR COMPONENTS MUST BE COUNTERSIGNED BY THE GROUP's MENTOR.***

Each group project has a nominal maximum budget of £20 and ALL expenditure is managed through the EEE Electronics workshop. Any components etc ordered outwith the EEE department's workshop cannot (and will not) be reimbursed. Students should also beware that the University/Department is constrained with respect to where it can obtain parts etc. Also, the University/Department has special arrangements with certain suppliers that facilitate discounts, attractive return and replace policies and rapid delivery and so before making any request for components the workshop should be consulted first. The University can only order from proscribed suppliers (e.g. Rapid, OneCall, RS et al) using its Financial Management System (FMS) and it is NOT possible to order directly via the web using credit card, Paypal, Ebay or other such mechanisms. At present, it will not be possible to order parts from non-UK suppliers – issues with delivery costs, VAT, import duties, addition charges, delays and refund policies abound. Technical staff and mentors can provide advice to students prior to submitting orders.

The department does recycle parts from previous projects and students should speak to technical staff when ordering components in that a proposed new part could be replaced

by a similar or equivalent part of an earlier project. The lab also has a drawer of old uncatalogued parts that students are welcome to rummage through to see if they are useful for your projects. Students are NOT expected at all to buy any their own parts and groups who decide to use parts of their own or pool money over and above the allocated budget constraints may find themselves actually losing marks if it is felt that rules are broken or the spirit of the rules has been breached. Like all things, if not sure, ask mentor or module registrar.

Notes

Please note the EEE workshop has to support a range of department research and teaching activities. EE/CX318 has over 30 project groups and thus in the planning stage, groups should recognise that a) requests to the workshop should be made in a timely fashion and b) that any such requests will be queued along with others and may take time to complete.)

The list of preferred suppliers is posted on the notice board outside R353 and will be posted on myplace in due course.

Students are NOT expected to make purchases on their own behalf and should stay within the project budget. We all know that more can be done if each group had more funds available but engineers often have to demonstrate their ingenuity by working within a set of constraints.

Technical staff may be on hand in the labs or workshop to give advice or answer questions students may have with regards the projects – they are experienced and knowledgeable staff. However, the overall responsibility for design, construction and testing of the system lies solely with the group itself. Technical staff will not do your project for you!

EE318 & CX318 – Engineering Projects

Request for PCB Manufacture

This form must be completed and countersigned by all members of the group.
A charge of £10.00 per board will be levied – payable in advance – for any additional PCB. The cost of the first PCB for each group is included in the group's budget.

Submit completed form along with PCB mask (on tracing paper or film) to R4.19.

Group Number:		
	Group Member - Name	Signature
1.		
2.		
3.		
4.		

Dated Submitted:		
Date Required:		
	Yes	No
1 st PCB		
Design Simulated on PCB:		
Prototype Constructed and Operational on Breadboard:		
Prototype Constructed and Operational on Vero Board:		
PCB design reviewed by Group:		

PCB Mask received by:	
Payment received:	£10 per PCB