School of Electronic, Electrical and Computer Engineering

## Third Year MEng Group Project (EE3GP) 2012-2013

Read this document through carefully.

Ignorance of its contents will to be accepted as an excuse for failing to carry out any aspect of the group project requirements.

## **GROUP PROJECT (EE3GP)**

## 2012-2013

### Introduction

The first and second years of the degree programme within the School of Electronic and Electrical Engineering are very prescriptive. The contents of lecture courses are clearly defined and laboratory experiments follow a rigid set of guidelines. A key skill that will be developed in the EE3GP module is that of undertaking a programme of study where **both the task and process are only very loosely defined**. Thus, as well as deciding what the project is about, you will also be responsible for obtaining the necessary laboratory equipment, software and analytical models.

EE3GP is also the module that requires the most interaction with others – an extended, large-scale group project.

### **Aims and Objectives**

The aims of the group project are:

- To induce students to undertake some "hard science" without being spoon-fed.
- To introduce students to the advantages and disadvantages of working as a group.
- To develop by trial-and-error the skills required to transform a group into a team.
- To introduce research skills into the undergraduate curriculum.
- To introduce a range of new skills that will not be covered elsewhere in the course in a non-prescriptive manner, e.g. using data books and unfamiliar hardware.
- To ensure that students have to search for information in libraries and other repositories of information.

By the end of the group project you should have experienced what goes right and what goes wrong within a technical team. Therefore, when you are aware of similar situations arising within your period of paid employment, you should have some idea about which techniques are appropriate for a given situation.

This year's group project loose specification can be found in Appendix A of this document.

### **Technical Details**

The **Undergraduate project laboratory (Room N.216)** will be available for any practical activities. These benches are equipped with a basic oscilloscope, power supplies and PC. The laboratory space will be used on a "hot-benching" arrangement, so please tidy up and lock your system away when you vacate your workspace.

An initial stores **budget of £1200** will be allocated per group – it is advisable to ensure that only one, or at most two, designated team members may book out components in order to avoid exceeding your budget. Please remember to add VAT to external orders to ensure that your accounting is accurate.

The group project is much more than a traditional build project normally associated with some final year projects. A fully functional technical demonstrator is required as part of the expected deliverables, supplemented by analytical work, software models, hardware, or any combination of the above as is necessary. Furthermore, partial designs require that the group demonstrate that subsystem or system integration will work. It should be noted that "hot air" is not a deliverable whether presented in a verbal or written form. Fierce competition will develop between groups and <u>care should be taken not to neglect your other course work</u>.

### **Assessment Procedures**

The overall mark for the group design study will consist of the following elements:

1.	First demonstration & presentation by project assessment team	5%
2.	Interim group report (assessed by supervisor only)	5%
3.	Second demonstration & presentation by project assessment team	20%
4.	Poster session on project open day (peer assessment)	2.5%
5.	Final group report	67.5%

The above elements will be used to determine an overall group mark. Individual marks will be obtained by multiplication of the group mark by an apportionment factor introduced in procedure 6 below and elaborated in detail in Appendix C.

The assessors will be looking for the following elements in each component:

### 1. Field demonstration & presentation – Semester 1 (Open to all)

- Evidence that the presentation has been well planned and rehearsed
- A3 flip-chart (or equally effective) visual aids (please have a **backup** if electronic presentation aids go wrong you will be penalized if this happens), introduction, content and conclusions
- Evidence that the team is working, as one would expect of a "top-flight" group of engineers
- Ability to answer questions over a broad range of subject topics
- That the results look like a minimum of 600 person-hours of effective work
- Dry-run competition result

### 2. Interim Group Report

- An executive summary
- An interesting introduction aimed at the intelligent but uninformed reader
- An analytic approach to the problem
- Experimental verification of analytic material
- System design and early stages of implementation

- Conclusions
- Summaries of meetings to date, actions arising and decisions taken
- Appendices of supporting material, minutes of meetings, mathematical derivations, circuit diagrams, etc. This report is a trial run for the final report credit will be given to those students who demonstrate that they can learn from their mistakes
- This report has a page limit of 30 pages (around 10,000 words) plus 20 pages of appendices
- A Curriculum vitae (CV) should also be submitted by each team member see Final Group Report component below regarding this requirement

### 3. Field demonstration & presentation – Semester 2 (Open to all)

- As in the bench inspection of semester 1, plus
- That the results look like a minimum of 1,800 person-hours of effective work
- A demonstration of a fully engineered product
- Competition result

### 4. Poster Session and Interaction with Visitors

- Evidence that the poster presentation has been well planned and rehearsed
- Good quality, readable poster with diagrams, pictures and not too much text
- A demonstration of what you have achieved pitched at the intelligent non-specialist
- Evidence that all members of the team know about the work of other team members
- Evidence of a good team spirit
- A good advert for the standard of a Birmingham MEng degree

### 5. Final Group Report

- As in the Interim Group Report, **plus**
- Photographs of the final unit
- Adequate proof that the objectives have been achieved
- The report has a page limit of 80 pages (around 30,000 words), plus 40 pages of appendices. Lengthy code listings should be avoided and a CDROM can be inserted in a sleeve inside the back cover if necessary
- A revised CV for each team member should also be submitted that includes a short section on the team working skills each person has gained, together with corroborative evidence (e.g. identifying individual contributions to EE3GP)

### 6. Group Apportionment

• A percentage factor for the overall contribution of each team member. For a team of *N* members, 100\**N*% marks will be available for distribution between members. The mark apportionment factor form must be counter-signed by all the members of the group as well as the supervisor to be acceptable

## **General Assessment Guidelines**

Students are awarded a degree which is classified intro one of a number of categories. It may be helpful to state the general attributes of each of these categories.

Degree	Mark	Typical Characteristics
	Range	
1 <sup>st</sup> class	70-79%	Extraordinary levels of motivation and hard work. Significant
	(normally)	added value. High level of analytical ability. Ability to find ways
		around problems. Fully engineered system demonstrated. Critical
		analysis of all actions. Well read. Marks above 80% are possible
		and will be indicative of outstanding performance.
Upper	60-69%	High levels of motivation and hard work. Noticeable added value.
2 <sup>nd</sup> class		Good level of analytical ability. Ability to find ways around
		problems. Fully engineered system demonstrated. Well read.
Lower	50-59%	Little added value but implemented to the minimum standard
2 <sup>nd</sup> class		consistent with the status of a professional engineer. Working
		system demonstrated but with little original thought. Reading
		constrained to the basic technical issues.

**Warning:** There is a common misconception that high marks are readily obtained in subjects examined by coursework for relatively little effort expended by the student. This is certainly not true of the MEng Group Project and many students may be surprised by the apparently low marks awarded to them by staff and their peers.

## Health and Safety

In order to ensure that your work complies with UK Health and Safety legislation, you will be required to perform a comprehensive risk assessment on all aspects of your group project work before being permitted to proceed to either undertaking laboratory based work or demonstrating that your project works in the field. The University guidelines on undertaking a through risk assessment are available on the intranet (ADF log-in required at <u>https://intranet.birmingham.ac.uk/index.aspx</u>). Moreover, the School technical services web pages provide you with more specific information and a tailor-made risk assessment form at <u>http://www.eee.bham.ac.uk/techsupp/</u>.

The risk assessment is not a paper exercise. Neither is it intended to prevent you from undertaking work that involves risk. It is intended to ensure the safety of anyone who helps you, your assessors, any bystanders/members of the public and above all yourselves do not come to any hard, by carefully identifying all potential causes of death, injury or ill health and carefully planning on either how to eliminate them or minimise the possibility of their occurrence and their potential effects.

Your risk assessment will be approved in the first instance by your supervisor and finally by the School's Heath and Safety office, Mr Andy Dunn, or his authorised representative.

### **Ethical Review**

For most student projects, taking place within the School ethical behaviour is a matter of adhering to professional practice standards with regard to plagiarism and honest reporting of results and data. However, in some cases the details of the project and methods involved will require Ethical review: This includes research where humans are the participants on the project, directly providing information on user requirements or evaluating software and devices developed as part of the project. Ethical review must take place before the start of any substantive project work (including pilot studies, but excluding literature review).

- a) All students undertaking projects in the school will be required to complete an ethics questionnaire to be submitted by their supervisor.
- b) Those that require further ethical review will need to complete a detailed form in consultation with their supervisor by a given date.
- c) Failure to complete the form where needed will result in parts of the project affected not being marked.
- d) Where required, supervisors will need to store participant consent forms at least until the student has graduated.
- e) Where a publication results from the project, supervisors need to treat data and other documents in the same way as for other research and store them for 10 years from the date of publication.

Further guidance and the above mentioned questionnaire are available through the student information section of WebCT (log on at <u>http://www.weblearn.bham.ac.uk/</u>).

### **Supervisors**

For the academic year 2012-2013 the group supervisors will be *provisionally* Dr Costas Constantinou and Mr Phil Atkins. However, you should treat *all* academic members of staff in the school and beyond as potential "consultants" for your work.

Each group will notionally meet with their supervisor once per week.

## Groups

The *provisional* group constitution for 2012-2013 is shown in Appendix B.

### Coordinator

The project coordinator is Dr Costas Constantinou. His contact details are: Room N.209; Tel. 44303; email: c.constantinou@bham.ac.uk

## Appendix A

## 2012-2013 Third Year MEng Group Project specification

## THROWING TEDDY BEARS OFF THE ROOF

SUPERVISORS: COSTAS CONSTANTINOU AND PHIL ATKINS

### Specification

You are required to design, prototype and demonstrate a system comprising a launch subsystem that can be operated by a member of staff on your group's behalf on the roof of the Gisbert Kapp building, an autonomously steerable "flying" teddy bear, and a homing signal subsystem surrounding a target of 1 m in diameter on the ground capable of performing the following tasks/functions:

### The system requirements are as follows:

- The launch subsystem must be:
  - 100% safe to operate
  - sufficiently lightweight and compact for one person to carry (i.e. weigh no more than 10 kg and its dimensions should not exceed 30 cm x 30 cm x 200 cm); the assessors are likely to be more impressed by light-weight solutions
  - $\circ~$  capable of being operated by a person standing at least 60 cm away from the roof railings
  - $\circ$  operated without the need for accurate pointing at a particular direction
  - operated through the push of a simple button
- The teddy bear must be:
  - o autonomous
  - capable of landing on the target without suffering damage over repeated launches
  - capable of being remotely put into an emergency "landing" mode to ensure that in the event of strong wind gusts it does not drift outside a predetermined cordoned off area at the back of the Gisbert Kapp building and presenting a risk of colliding with any humans or objects
  - limited in the maximum terminal-velocity it can reach to  $1 \text{ ms}^{-1}$  and this value may only be exceeded in the first 2m of descent following launch
- The homing signal subsystem must be:
  - wireless or passive
  - o battery powered

### The safety requirements are as follows:

• A full health and safety assessment must be carried out

• A safe operating procedure must be devised and approved by an appropriate committee comprising academic and support staff

The total budget per group is restricted to £1200.

## Rules

- 1. Keep the entire exercise legal and do not bring the University into disrepute!
- 2. Please respect university property, buildings and grounds.
- 3. If you employ sensing and/or short-range communication and control systems using radio or optical radiation, you must comply with UK spectrum licensing and usage laws.
- 4. Perform a real risk assessment and stop other members of your team from getting into trouble.
- 5. There are no other rules at this stage, but we reserve the right to make changes or add to these rules (within reason) until noon of Friday week 2 of the Spring term.

### Assessment

In assessing the performance of groups, the following additional criteria to the ones published in the Group Project handbook will be used in judging each group's performance:

- 1. A working and reliable system able to meet the spirit of the exercise.
- 2. A group that really works well together to deliver a class-beating (working) solution.
- 3. Creative and innovative solutions to the problem.
- 4. Academic and scholarly approach demonstrating a clear understanding of the underlying science and synthesising techniques that have been published in reputable (refereed) sources in many disparate areas.

The **last Wednesday** of each of the **autumn term** (dry run) and **spring term** (final competition) will be allocated to the competition/field demonstration; these are in addition to the traditional presentation (and interrogation) sessions held on the same days. Attendance is compulsory by all students on these days and you are expected to self-manage any timetable conflicts should these arise.

**Assessment protocol**: A fixed demonstration time period will be allocated to each group. Up to two, substantially different guidance and retardation techniques may be demonstrated per group. Up to three deployment attempts will be allowed per substantially different guidance and retardation technique (thus the group who demonstrate functioning alternative strategies will gain advantage).

### **Disclaimer:** <u>Any implementation/demonstration must comply fully with UK legislation.</u>

## **Appendix B**

## MEng3 EE3GP Teams (provisional) – 2012-2013

Title	Surname	First name
Mr	Aleem	R
Mr	Bagherigolroodbari	А
Mr	Hosseini Sohi	SA
Mr	Jahanian	Н
Mr	Mahari	М
Mr	Sperin	K

### Group A – Supervisor PRA

### Group B – Supervisor CCC

Title	Surname	First name
Mr	Amar	Y
Ms	Baharali	Р
Mr	Lewis	С
Mr	Mashhadi Hossein Khabaz	М
Mr	Moaz	М
Mr	Willetts	В

## **Appendix C**

## **Guidance on Mark Apportionment Process 2012-2013**

## Introduction

The group project handout states clearly:

### 6. Group Apportionment

• A percentage mark for the overall contribution of each team member. For a team of N members, 100\*N% marks will be available for distribution between members. The mark apportionment form must be counter-signed by all the members of the group as well as the supervisor to be acceptable

The group members together with the supervisor are at liberty to decide <u>unanimously</u> on a procedure for arriving at a mark apportionment scheme, provided this can be made available for scrutiny to the external examiners for the undergraduate programme in the School.

Furthermore,

- The resultant mark apportionment can be moderated by the group supervisor on academic grounds, without redress to the group, and
- If factual errors or omissions, agreed upon by the whole group, are found to exist, the group project coordinator reserves the right to undertake a final and definitive moderation of the mark apportionment.

## **<u>Suggested</u>** mark apportionment procedure

The following suggestion to the mark apportionment procedure is intended to be nonprescriptive, but can be used as a baseline procedure as it has arisen from identified good practice in the past.

- 1. Each student nominates one member of the group other than himself/herself to list their positive contributions to the group project
- 2. A list of positive contributions is agreed upon
- 3. Based on this list, a secret ballot of scores between 0 10 (either as a whole or divided across contribution categories, e.g. technical progress effort, tangible technical deliverables, tangible non-technical deliverables such as group coordination activities, presentations, report editing, etc.) is given for each group member's contributions; the group member casting each ballot cannot vote for himself/herself
- 4. A ranking list of average scores is produced
- 5. The position of each group member within the ranking list is discussed openly and adjustments to the average score and rank order can be made with majority agreement (supervisor is to police this)
- 6. The dynamic range of maximum to minimum scores is reviewed and adjusted through majority agreement (supervisor is to police this)
- 7. A final ranking list, apportionment mark (score converted to percentage) and final review of the reasons against everyone's mark apportionment is agreed upon and handed to the supervisor

### **Group Project**

### First Field Demonstration & Presentation Assessment Sheet

Group Name/Student Names:

Supervisor: .....

The following sections are intended to provide feedback about your performance.

Presentation Skills (25% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
Presentation, visual aids, etc.							
Technical Progress to Date (50% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
Demonstration of hardware built, software written, equations, etc.							
The Future (25% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
<i>Technical merit of proposals for completing the project. Adequacy and appropriateness of workplan.</i>							

Total grade allocated [in 1<sup>+</sup>,1<sup>-</sup>,2.i<sup>+</sup>,2.i<sup>-</sup>,2.ii<sup>+</sup>,2.ii<sup>-</sup>,F]:

**Comments And Advice** 

continue overleaf if required

Project Team Assessor(s): ..... Date: ..... Date: .....

### **Group Project**

### Second Field Demonstration & Presentation Assessment Sheet

Group Name/Student Names:

Supervisor: .....

The following sections are intended to provide feedback about your performance.

Presentation Skills (20% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
Presentation, visual aids, etc.							
Technical Progress to Date (40% of	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
overall mark)							
Progress, hardware built, software written, equations, etc.							
The Results (40% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
Competition Results. Evidence that the results are commensurate with a group exercise. Technical, time, resource and skill management.							

Total grade allocated [in 1<sup>+</sup>,1<sup>-</sup>,2.i<sup>+</sup>,2.i<sup>-</sup>,2.ii<sup>+</sup>,2.ii<sup>-</sup>,F]:

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**Comments And Advice** 

continue overleaf if required

Project Team Assessor(s): ..... Date: .....

**Group Project** 

### Interim Group Report Assessment Sheet

Group Name/Student Names:

Supervisor:

The following sections are intended to provide feedback about your performance.

Group Writing Skills (25% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
<i>Structure and fitness for purpose. Clear introduction, easy to read and general flow.</i>							
		1					
Technical and Analytic Content (50% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
Analytic understanding of the problem.							
The Future (25% of overall mark)	1+	1-	2.i <sup>+</sup>	2.i <sup>-</sup>	2.ii <sup>+</sup>	2.ii <sup>-</sup>	Fail
Technical merit of proposals for completing the project. Adequacy and appropriateness of workplan.							

Total grade allocated [in  $1^+$ ,  $1^-$ ,  $2.i^+$ ,  $2.i^-$ ,  $2.ii^+$ ,  $2.ii^-$ , F]:

**Comments And Advice** 

continue overleaf if required

Project Team Assessor(s): ..... Date: .....

**Group Project** 

#### Poster Session Peer Group Assessment Sheet

Group Name/Student Names:

Supervisor:

The purpose of this exercise is to allow students to take a small part in the assessment process of the Group Project. Your group should assess the poster presentations and displays of the other groups from the viewpoint of one of the visiting external examiners or industrial visitors. <u>A grade should also be assigned based on the usual honours degree scheme: 1<sup>+</sup>, 1<sup>-</sup>, 2.i<sup>+</sup>, 2.i<sup>-</sup>, 2.ii<sup>+</sup>, 2.ii<sup>-</sup>, F. At the end of the session you should compare your assessment with all the other groups and then return the forms to CCC.</u>

Group 1 – Comments	Rank	Grade

Group 2 – Comments	Rank	Grade

Group 3 – Comments	Rank	Grade

**Group Project** 

#### **Mark Apportionment Sheet**

Group Name/Number:	Supervisor:

It is hoped that all members of your group worked equally hard and that they should be awarded the "group mark" as determined by the assessment team. However, occasionally one or two members of a group do not "pull their weight" and it would be appropriate for them to receive a mark different from the group mark.

For the purposes of this exercise assume that each member of the team is awarded 100%, so a team with eight members would have a total of 800% to allocate between members. These should then be distributed between the team members in the most appropriate manner. The apportionment will then be used as multiplier acting on the group mark. Please return this form to the EE3GP coordinator.

Team Member 1:	Mark Apportionment:
Comments.	
Signature:	
Team Member 2:	Mark Apportionment:
Comments:	rr · · · ·
Signature:	
Team Member 3:	Mark Apportionment:
Comments:	
Signature:	
Team Member 4:	Mark Apportionment:
Comments:	
Signature:	
Team Member 5:	Mark Apportionment:
Comments:	
Signature:	
Team Member 6:	Mark Apportionment:
Comments:	
Signature:	
Team Member Supervisor	

Signature to indicate approval of above marks (moderated if necessary):

**Group Project** 

#### **Final Group Report Assessment Sheet**

Group Name/Student Names:

### Supervisor:

The final report should be assessed on the standard School marking schedule which may be loosely described as follows:

Degree	Mark Range	Typical Characteristics
1 <sup>st</sup> class	14-20	Extraordinary levels of motivation and hard work. Significant added value.
	(>16 counts	High level of analytical ability. Ability to find ways around problems.
	as a very	Fully engineered system demonstrated. Critical analysis of all actions.
	good first)	Well read. Marks > 16 need additional justifying.
Upper	12-13.9	High levels of motivation and hard work. Noticeable added value. Good
2 <sup>nd</sup> class		level of analytical ability. Ability to find ways around problems. Fully
		engineered system demonstrated. Well read.
Lower	10.0-11.9	Little added value but implemented to the minimum standard consistent
$2^{nd}$ class		with the status of a professional engineer. Working system demonstrated
		but with little original thought. Reading constrained to the basic technical
		issues.

The following sections are included for your guidance and to help you rank the groups.

Group Writing Skills [0 – 5 marks, to 0.5 mark accuracy]:	
Structure and fitness for purpose.	
Clear introduction, easy to read and general flow.	
Edited to remove repetitions; adequate coverage of important areas.	
Thoroughly checked before submission.	

#### **Technical and Analytic Content [0 – 10 marks, to 0.5 mark accuracy]:** Analytic understanding of the problem. Performance modelling. Technical progress. Demonstration of working/completed sections.

The Gains made by the Group [0 – 5 marks, to 0.5 mark accuracy]:Technical merit of proposals for completing the project.Adequacy and appropriateness of workplan and execution.Evidence that meetings are being used productively.

Total mark allocated [out of 20]:

#### Please include comments to justify your decision on this page or overleaf.