Electronic &
Electrical
Engineering

EEE163 System Design Analysis - *Lab Sheet for Final Analysis*

Introduction

This is the final EEE163 system design analysis. Each group will have a different item, selected from the list below. Following you analysis you will prepare a short presentation that forms the final assessment for this module.

Items

Will include: Oscilloscope, Digital function generator, Video recorder, Food mixer, Digital multimeter, Telephone, Video camera, Video/DVD player, Data projector, Optical disc drive, Computer, Flat panel display, Clock/radio, Radio/cassette, Data storage unit.

Aims

The aim of the EEE163 laboratory sessions is to allow you to explore the design, manufacture and functioning of electronic/electrical systems. By the end of the laboratory sessions you will have an appreciation of the way in which electronic systems are put together. The knowledge gained will be relevant background material to many other modules on your course. The laboratory sessions are highly investigative by nature – you should explore the system and to think about what you find.

Method

Within your group you will be given an item of electronic/electrical equipment. Your task is to ‘reverse engineer’ the product and address the tasks listed below.

You are encouraged to *carefully* dismantle the product, using the tools at your disposal. Some extra ‘specialist’ tools are available from the demonstrators. Make notes about the order in which you dismantle the product (taking photos may help!). It will probably be necessary to irreversibly break the product in order to dismantle it. This is OK, but please take care. Do not use excessive force. Do wear the safety goggles provided. It in doubt, ask a demonstrator. Internet access is available in the lab. Please use it to access data sheets, etc. A digital camera attached to a microscope will be available for high magnification photographs. Please use your laboratory books for all workings. These will be examined.

Safety

Wear safety glasses whilst disassembling the product, since parts may fly-off at high speed. Take special care with pulleys, springs and brittle components (e.g. glass). Do not use excessive mechanical force – if you are stuck, consult a demonstrator. Use the fume extractor unit when de-soldering and be careful to avoid burning yourself or your work mates! Do NOT connect the product or any sub-components to mains power. If using the 12V DC power supply, check wiring with demonstrator beforehand. Do not touch anything while power is on. Wear safety glasses. Try to avoid making a mess. Gloves will be available if needed.

Support

A number of demonstrators will be available during the lab classes to help you with your work. In addition, technical support will be available if you need help with disassembly/sectioning of any components.

Tasks

During the lab class you should address all the tasks listed below:

A	Product *name* / part number / manufacturer/ year of manufacture?
B	*Function(s)* of the product?
C	What *physical principles* allow the product to achieve this/these function(s)?
D	Construct a *diagram* describing the function of the system.
E	Describe the electrical *power* source(s) and their distribution. AC/DC? Voltage? Transformers?
F	Describe the signal *inputs and outputs* from the system. Data bus? Removable disc?
G	Produce a *parts list* for the product. Identify the function of each semiconductor (data from the web helpful) Give a figure for the number of passive components.
H	Produce a breakdown of the *materials* used in the product, including an estimation of the mass of each.
I	Suggest likely *failure mechanisms* for the product.
J	Identify any components that can be *replaced or repaired*.
K	How should the product be *recycled*?
L	Characterise any *printed circuit boards* (PCB) in the product (line width, line pitch, metal thickness, board thickness, number of layers). To help with this, you should ask a demonstrator to help you section one of the PCBs, then examine it using the digital microscope.
M	Characterize the *assembly* of components onto the PCBs. Surface mount? Through hole? Flip chip?
N	Characterize any *electromechanical components* in the item (e.g. motors, loudspeakers)
O	Comment on the *safety* features of the product.
P	Comment on the aesthetic *design*, ergonomics, packaging and appearance of the product.
Q	The item you have analysed is likely to now be obsolete. Compare the specification for this item with what is available for purchase now.

Assessment

Following completion of the tasks, you should prepare a 20 minute duration group talk to present your results. A second afternoon (2-5 pm Tuesday 24 April) is available for this preparation. The talks will then take place between **2-5 pm on Tuesday 8 May** in three separate venues, as indicated below. All group members should contribute equally to the presentation. The assessors will be marking you presentations against the task list, so please use the A-Q list as the framework for you presentation.

Venue	Assessor	Groups
Portobello B51	Prof Tozer	1-6
Hadfield K13	Dr Seed	7-12
Hicks F41	Dr Williams	13-17

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