Group Project Guidelines.

EE297FZ Signals and Systems Integration Project

1. Introduction to EE297FZ

- The different modes of assessment employed (reports, presentation, and interviews) evaluate learning outcomes 5 – 7. Learning outcomes 1 – 4 are primarily evaluated in the final report and interview.
  The number and scheduling of the assessment procedures are designed to indirectly evaluate learning outcome 7.
  The aims of this module are:
  • To promote project based learning in the field of embedded and intelligent devices.
  • To instil the creative spirit in students.
  • To develop oral and written communication skills.
  • To develop students experience of working in a group.
  • To engender an awareness of ethical issues in engineering.

- Learning Outcomes
  On successful completion of the module, students should be able to:
  1. Apply problem-based learning to solve unforeseen problems in the areas of embedded and intelligent devices.
  2. Apply structured design to a range of problems in the domain of signals and control.
  3. Apply theoretical knowledge in solving problems encountered.
  4. Discuss any ethical issues, environmental impacts and health and safety issues associated with their project.
  5. Prepare and deliver an oral presentation.
  6. Defend their work through interview.
  7. Demonstrate appropriate project management techniques (including time management and project planning).

2. Introduction to group project

- This is a group project (5 students in a group).
- The final group project report and individual interview is worth a combined 100% of the total EE297FZ mark.
- Project's marks are awarded as:
  - Execution 10%
  - Report 40%
  - Video demonstration/presentation 30%
  - Individual interview 20%
- Students can choose the project title from the list below in page 5 and submit your response to Moodle.

3. Report Contents

Cover page

- You must include your names, your ID, project title and supervisor name on here

Abstract

- The abstract must be an accurate reflection of what is in your report (not the project itself), it should tell the essence of that report.
- Your abstract must be self-contained, without abbreviations, footnotes, or references.
- Your abstract should be 150 - 250 words written as one paragraph and should not contain displayed mathematical equations or tabular material.
- The abstract must cover motivation, the problem statement, the approach, your results, and your conclusions.

Introduction

- An introduction is 'the big picture' of your project.
- The introduction will help the rest of the report flow better.
- The introduction should consist of :-
  - Topic: Introduction to the topic addressed in the project
  - Problem statement: Describe the technical problem needed to be solved in your project.
  - Approach: summarise how you addressed solving the problem. Provide an overview of how you analysed the problem, how you designed a solution, and how you evaluated your solution.
  - Metrics: describe how you are going to evaluate your work.
  - Project: list, and briefly describe your significant achievements in the project (probably 3-5 of these in a typical project).
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Technical background / Literature review.

- The purpose of this chapter is to show your depth and breadth of reading and understanding of the problem domain.
- Include two sections: Material relating to the topic (Technical Background) and Material relating to the technical solution (Literature review).
- The background summaries key material that should help the reader understand information in later sections of the report and the literature review outlines what work has been done in your problem.
- This section should contain plenty of references.
- Exclude your work in this section.

Design methodology.

- The purpose of this chapter is to show your design process flow (your proposed solution).
- The content should include discussion of the process flow, the block diagram and flow chart of the project.
- The design method should describe the testing procedure that has been carried out.

Results and discussion.

- The purpose of this chapter is to clearly identify, discuss, and justify the decisions you make.
- Implementation: discuss anything interesting here, put full source code, where relevant, in an appendix or attachment.
- The content should discuss the simulation or experimental results obtained.

Conclusion

- Summarise the key findings, conclusions, results, etc. of your overall report.
- Discuss your project results and approach
- Discuss future work, based on what you have done (and not done).

References

- This contains a list of citations used throughout the report
- The reference format should follow IEEE style.
- Use conference papers, journal papers, books (book chapters & subsections), and avoid websites

Appendices

- Include here all addition material that is related to the work in the report but not necessary in the report itself or would take up too much space in the report, e.g., your source code, manual, data sheets, overflow of images, setup instructions, etc..

4. Report Format

- Follow IEEE style (IEE report format can be found on Moodle)
- The report should be WORD processed on A4 size paper.
- Font: Times New Roman
- Font size: 10
- Spacing: 0.95
- Justification: FULL
- Maximum 8 pages (excluding Appendices)
- No tolerate for plagiarism/cheating. If any report found to be copied, a mark of **0** will be given.

5. Submission

- The report and demo video/presentation MUST be submitted on **Week 15 (3-Jun-2022, 23:59 China time)**.
- Only submit **ONE** report and **ONE** demo video/presentation per group (use ppt, maximum 5 minutes).
- Penalties: Late submission of reports will be subject to a penalty of 10% of the assessment grade for each day (or part thereof) overdue.
- No tolerate for plagiarism/cheating. If any report found to be copied, a mark of **0** will be given.

6. Important dates

- Project selection (week 1 & 2)
- Group meeting with supervisor 26-Mar-2022 (week 5)
- Interim Report Submission: 22-Apr-2022 (week 9)
  (Abstract, Introduction, Literature Review, Methodology)
- Group Presentation: 30-Apr-2022 (week 10)
  (Abstract, Introduction, Literature Review, Methodology)
- Final Report Submission: 3-Jun-2022 (week 15)
- Demo Video Submission: 3-Jun-2022 (week 15)
  (Maximum 5 minutes)
- Final Individual Interview: 11-Jun-2022 (week 16)

Project Title

Rain Detector

This project is developed for the users to sense the presence of rain outside a building. When there is rain, the rain detector plate senses the presence of rain. The output of the rain detecting plate is a positive pulse, which is given to a NPN Transistor. The transistor drives ground from Emitter to collector when the base gets a positive pulse. Thus, a negative voltage is derived from the collector of NPN Transistor. The negative voltage is given to the base of a PNP transistor. When the base of the PNP transistor gets negative pulse, it drives positive voltage from emitter to collector and thereby drives a relay. The relay is used on any device according to the need of the user, for example, shutter.

Car Battery Monitoring and Low Voltage Alert System

Battery is an important device in automotive. The aim of this project is to design a real time battery monitoring system with low voltage alert system. It uses a microcontroller and has voltage measurement circuit and temperature measurement circuit integrated to it. This system can be used in UPS, hybrid vehicles, regular electric vehicles etc.

IOT Garbage Monitoring System

This project IOT Garbage Monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page or mobile APP. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth.

Automatic Room Light Intensity Based Window Blind Control System

Part of home automation system is control of blinds. A microcontroller based automatic blind control system is developed in this project. The blinds shut or open based on the intensity of the light in the room. For this, a couple of LDR’s are used along with a motor for sliding the blinds. License Plate Recognition.

Real Time Water Quality Measurement System based on GSM

Water quality is very important as many types of polluting agents are present in the environment and are polluting the water. A system is designed which does a real time water quality management. A set of sensors like pH, turbidity, conductivity and temperature sensor are integrated to a microcontroller through an ADC. There is a GSM module included which alerts a remote monitoring centre.

IoT Air & Sound Pollution Monitoring System

Air and sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. In this project, air quality as well as sound pollution monitoring system that allows user to monitor and check live air quality as well as sound pollution in a particular area through IoT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also, system keeps measuring sound level and reports it to the online server over IOT.

Walking Stick with Heart Attack Detection

The ECG circuitry unit on the wrist captures abnormal heart beat signal from the patient. The micro controller on the stick runs a heart attack algorithm. Warning is given out to the person about his heart condition. The Bluetooth emergency calling system calls for medical help at the moment of heart attack. This project aims to shorten the time between the moment of heart attack and the arrival of medical personal. The warning before the emergency call will give the patient a chance to avoid heart attack.

Development of a Digital Controller for Motor Control

A digital motor controller needs to be designed, built, and tested. The controller may use an encoder for position measurement, and an H-bridge to drive the electromechanical plant. A user interface will be created to enhance usability of the device. The user interface will allow displaying key parameters of the control algorithm as well as the state of the system. It will also facilitate in modifying the gains and sample rate of the control algorithm.

Hardware and Software Study of Active Noise Cancellation

Noise cancellation involves removing an unwanted noise while keeping the source sound. The source sound may consist of speech, music played from a device such as an iPod or a computer, or no sound at all. The objective of this project is to study the process of noise cancellation both as hardware and as software. The hardware will consist of building a noise cancelling circuit that uses headphones as an output, a microphone to pick up the noise to be cancelled and, if desired, a source sound.

Tracking Device for Elderly Care System by using GPS and RF Tags

At present, elderly people are surfing from dementia and Alzheimer's disease across the world. The aged population has been increasing and will continue to do so in the coming decades. Those elderly who are suffering from dementia and Alzheimer's disease require continuous attention. So, these people need a responsible person (either a nurse or family caretaker) to look after and provide support in any case of emergency. The number of these patients is dramatically increasing. This is difficult to care for them all by hiring a personal caretaker for each patient. Consequently, students are required to develop efficient and user-friendly devices that can help look after a patient easily or even remotely.

Electric Smart Load Meter

This project requires the design of an electric meter that reads the signals of any device plugged into an outlet and displays cost readings that may potentially reduce power consumption. The sensor should monitor whether a plugged in device continuously consumes power after completely charging up. For a charging device, the current will remain constant until the device reaches 100% charge. Once the device becomes fully charged, the current discontinues for proper power usage. The meter may be made unique if it also displays cost per hour, day, and year. Displaying the cost per unit of time creates awareness for customers, potentially causing them to use less energy to power or charge their devices.

Tracking Robot Using Ultrasonic Technology

This project requires the development of a robot that follows a transmitter within a chosen distance using ultrasonic technology. The purpose of the report is to investigate how the chosen distance affects the robots ability to react to changes in speed and direction. The robot should be able to communicate with a transmitter preferably through ultrasonic sound.