

German University in Cairo

Advanced Mechatronics (MCTR903)

Project Overview

Table of Contents

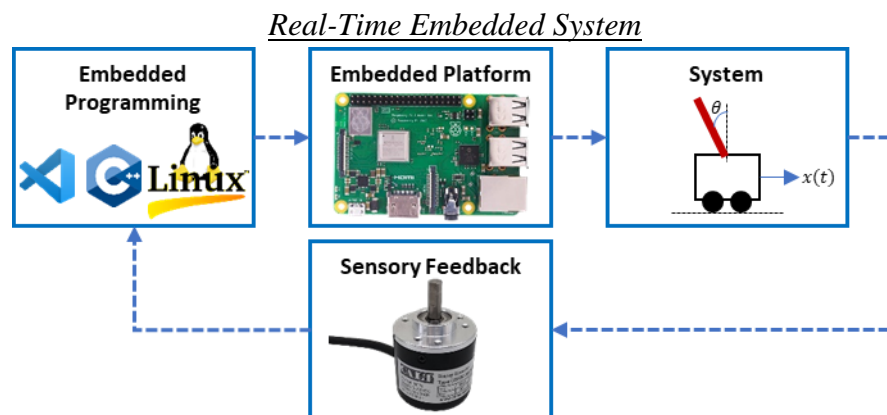
1. Objective	3
2. Project Overview	3
3. Project Categories	4
4. Team Assembly	4
5. Project Requirements	5
a. Hardware.....	5
b. Programming Language.....	5
6. Important Announcements.....	5

1. Objective

- The objective of this document is clarifying all dimensions required in the Advanced Mechatronics course project.
- It highlights brief overview about the project aim, followed by stating the project requirements in terms of hardware, and used programming languages.
- Additionally, the general rules, team assembly regulation and important links are stated at the end.

2. Project Overview

- The main objective of the Advanced Mechatronics course is to implement a:



- This means that the student should go through the whole procedure of a basic embedded system with its subsystems (System Modeling, Hardware Design, and Software Design).
- The target here is to implement the concepts taught in the course on different small projects.
- Firstly, a system is modeled with the different discrete event-based modelling techniques and hybrid technique.
- Afterwards, a hardware is fabricated including all components; actuators, sensors, and processors, to verify the modeled system on through embedded programming.
- The student will get the sense of how to build a hardware with the appropriate actuators that suits the fabricated hardware taking into consideration the hardware parameters as the inertias, friction elements, ... etc.
- Additionally, the student should choose the set of sensors that sense all required states needed for the modelled system taking into consideration all inputs and outputs.
- The student should select the embedded processor with the appropriate memory, CPU capability, frequency, I/O ports, communication protocols, ... etc.

3. Project Categories

- The student can choose projects from one of the two below categories:
 1. **Choosing from the List:**
 - A list will be provided by the course team with different ideas for projects.
 - The assignment of list projects will be on **first-come first-serve base**.
 - By maximum, **3** duplicates are allowed for each project.
 2. **Proposal Project:**
 - A team can propose a new project idea **based on the literature**.
 - The proposals must be **reviewed** first and approved/rejected by one of the course team before proceeding with the submission.
 - A **complete proposal** must be provided with full project description identifying the problem formulation, system inputs and outputs.

4. Team Assembly

- The project team consists of **3-5** members **cross** tutorials.
- Note that registration will **not** be counted in case of less than 3-member registration and as a result the project selection will be automatically neglected.
- Students not assigned to teams by the deadline of registration will be **randomly** clustered into groups and randomly assigned to project.
- **No change** to the project teams (interchange to another team or exchange of project) will be accepted under any circumstances.

5. Project Requirements

a. Hardware

- Each team must build a complete hardware including **all mechanical and electrical** components.
- Each Team **MUST** purchase a **Raspberry Pi** embedded processor. (Minimum Model is 3 B+).
- **The quality of the hardware** will be considered while grading the project.

b. Programming Language

- The programming languages that will be utilized in the project is C/C++ programming.
- The main operating system that will be used in **Linux** by installing **Windows Subsystem for Linux (WSL)**.
- The student will be asked to install **Raspberry pi OS** on the SD card inserted in the raspberry Pi.
- The student will be asked to use write **Visual Studio Codes (VS)** with C/C++ compiler.
- The student will be able to code embedded software using the tools of **Multi-tasking** (P-threads) and **scheduling** processes for the **concurrent** system.

6. Important Announcements

- Registration is open starting today and the deadline is **Tuesday 19th of October, 2021**.
https://docs.google.com/forms/d/e/1FAIpQLSdl2OEW43wwkWiKuCA42mAu946RM8pQUYR4z4b5tE4PYTPuiQ/viewform?usp=sf_link
- Each team should select one of the projects categories to be chosen in the registration from.
- **For category 1:**
 - A list of some provided projects' ideas can be accessed through the below link:
<https://docs.google.com/spreadsheets/d/1AGCocAiwWKUfk4wdrqwMrWh73DhKC4rBZxZ-8u5SJ8A/edit?usp=sharing>
 - In case a team wants to take a project from the proposed list, 5 different priorities should be chosen to maximize the chance to get one of your preferred projects.
- **For category 2:**
 - In case a team wants to propose a project idea, it should be submitted through the same submission link.
 - The proposal idea must be reviewed first by one of the course team (instructor or/and TAs) before the deadline.
 - After approval, please proceed with preparing a brief project description (.pdf), identifying the inputs and outputs, then upload it to you G-Drive and submit the sharing link through the registration form.