German University in Cairo
Media Engineering and Technology
Assoc. Prof. Dr. Hassan Soubra

Embedded Systems, Winter term 2019
Project Submission Guidelines
Deadline: 2/12/2019 11:59 pm

1 Features Constraints

The following notes are complementary to the project description document, and you need to refer to them both in order to implement your project properly.

FreeRTOS

a) You must divide your system into schedubale tasks.

   1. It is not a must to represent a whole feature as a single task.
   2. A task may contain multiple elements from different features.

b) All features must work together without any user intervention.

c) You need to prioritize the tasks in a way that ensures the system is working properly.

d) Using semaphores is a must in the Luxury $\star$ category.

e) Some features' elements may be implemented using interrupts instead of adding them to tasks.

1.1 Lane Departure Warning (LDW)

a) The lane may be represented as a single line where the car is moving on it, or as two lines where the car is moving in between them.

b) The car **MUST MOVE** using the motors and Pulse Width Modulation.

c) The visual warning should be represented as a LED or displayed on the LCD, and the audible warning should be represented as a buzzer or using the speaker from the Sound System feature if implemented.

1.2 Automatic Emergency Braking (AEB)

a) The car **MUST MOVE** using the motors and Pulse Width Modulation.

b) The car **MUST STOP** by any means when it detects an obstacle.

c) The audible warning should be represented as a buzzer or using the speaker from the Sound System feature if implemented.

1.3 General Purpose Display and Automatic Headlights

a) The current gear **may not** be reflected on the car movement.

b) It is required to change the gear using a physical joystick.

c) The date, time, and temperature must be displayed in real time.

d) You need to turn on and off the headlights using the corresponding sensor.

1.4 Warning Indicators and Power Mirrors

a) The rain detection and the fuel level detection must use independent sensors.

b) The power mirrors are simulated using one servo motor in two directions using a physical joystick.

c) The seat-belt may be simulated using a button or a switch.

d) The seat-belt audible warning should be represented as a buzzer or using the speaker from the Sound System feature if implemented.

1.5 Sound System

a) You must use any external speaker to output sound.

b) The Next and Previous buttons must not work if no sound is being played. This must be handled using **semaphores**.

c) Your system must have at least three playable songs on the SD card.

1.6 Keyless Entry

a) All other features must be off until the car is unlocked using the correct card/tag and the engine is running.

b) For the engine to run, you need to press the Start/Stop button.

c) The Start/Stop button must not work unless the car is unlocked.

d) You need to keep track of the car status (locked/unlocked).

e) You need to determine the conflict resolution mechanism when trying to lock the car while it is running.

f) **No global flags are allowed.** You must use **semaphores** to signal all the other features to work when the engine is running.

2 Report

The report should include the following items:

a) A cover page containing the team number, name, and members information.

b) Brief description about your project idea and approach.

c) The components used in your project and their functionalities.

d) The project full circuit using Fritzing `https://fritzing.org/home/`

e) The names of the libraries used and their functions.

f) How do you take and handle the inputs?

g) How do you configure and handle the outputs?

h) Explain how the features were prioritized and divided into tasks using freeRTOS

i) The problems or limitations faced during the implementation of your project.

j) How did you divide the work among the team members?

The report should be named in the following format: [TeamNumber]_[TeamName]
Teams List: `http://met.guc.edu.eg/Download.ashx?id=30568&file=CSEN701_Project_Teams_Distributions_V3_30568.pdf`

Note: Part of the project report grade will be allocated on sentence structure and flow, grammar, the neatness of the report, and whether it includes all the requirements or not.

3 Submission

You should submit a ZIP file to the course e-mail containing the following items:

- The main/source code (.ino).
- Any additional code file used.
- Any external library file used.
- The project report in PDF format.

E-Mail: csen701.w19@gmail.com

The ZIP file should be named in the following format: [TeamNumber]_[TeamName]

Submission Deadline: Monday 2/12/2019 11:59 pm.

4 YouTube Video

You should create a 5-10 minutes YouTube video in English demonstrating the functionalities of the project, where each student will have 2-3 minutes presenting their part.

The video should include a full working demo for your project **at the beginning of the video.**

Each student contribution in the project must be stated cleary during their part.

You will upload the video on the course channel with the following format:

"TeamName TeamNumber FeaturesNames"

FeaturesNames = [LDW, AEB, GPD&AH, WI&PM, SS, KE]

Account: embeddedguc2019@gmail.com
Password: embedded2019

Channel: `https://www.youtube.com/channel/UCbTW6cm5NQJf6XS5Ak91nPw?view_as=subscriber`

Video Deadline: Wednesday 4/12/2019 11:59 pm *(For the YouTube video only!)*

Note: Students who will not appear in the video will receive a **ZERO** in the entire project!

5 Evaluation

The evaluations will take place starting from Sunday 8/12/2019.

- The entire team must show up to the evaluation on time.
- Students who won't attend the evaluation will receive a **ZERO** in the project.
- Each student will be asked in the part they contributed to in the project.
- You will run a live demo of the project during the evaluation, so bring the physical project with you.
- Bring a hard copy of the project report with you to the evaluation.

Note: The evaluation slot reservation form will be sent via e-mail.