



Global Positioning System (GPS)

Project Description

The goal of this project is to develop an embedded system using C programming that gathers real-time positional coordinates while a microcontroller is in motion, and display location information on an attached computer or an LCD. The positioning system should use the TM4C123G LaunchPad. A map of the place with coordinates of various landmarks should be stored on the device. When approaching a landmark, its name should be displayed.

As a demo, it's required to load the coordinates of at least 5 different halls of the faculty.

Up to 5 bonus marks for an autonomous working device with LCD and battery.

Project Requirements:

Hardware:

1. A microcontroller development board (e.g., TivaC)
2. A GPS module (or a compatible sensor that provides positional data)
3. A personal computer (PC)
4. Connecting cables (USB, serial, etc.)

Software:

1. A C-development environment (e.g., Keil)

Functional Requirements

1. After power-on, the system should read GPS module data and wait until there is a GPS fix (Check GPS module datasheet to check how can this be done).
2. After acquiring the coordinates, it should display the name of closest landmark from a list of preset landmark coordinates.
3. Periodically update the displayed location information.



Milestones

First milestone

- You should make sure that you can flash your code from the IDE (e.g., Keil) to your kit.
- You should implement a function that initializes the ports of your microcontroller (e.g., configure GPIO ports).
- You should write a function that configures the UART of your kit to communicate properly with the GPS subsystem.

Second milestone (Final)

- You should write the function that parses the coordinates sent from the GPS in the form of ASCII and stores the coordinates, while the microcontroller is in motion.
- You should store a list of places and coordinates.
- You should integrate the developed functions to form your program and test everything.

Number of Students

The project team should be between 5-7 members.

Project Instructions

1. Download the kit header file from the below link to include it to use its defined macros in your code.
<https://drive.google.com/file/d/1Gyt1VkYqfyEYHeF1VL6ivl9W2FQkB-GQ/view?usp=sharing>
2. Your implementation should be in embedded C.
3. The demo video should be taken as one shot without cuts or edits.



Deliverables

1. Both milestones have a deadline of 12th May 11:59pm.
2. The expected to be delivered: **One PDF submitted to LMS** with project report, any necessary screenshots or photos, and links to demo and code. Mention also the contribution of each team member.
3. The team should push their codes on the GitHub repository.
4. The team should deliver a video for the project. Upload your video on the drive/YouTube or any social platform and attach the **video link to the report**. The video should be one shot showing you when you are walking from one landmark to another.
5. You are allowed to update and improve your repository after the deadline, but the report must be finalized by May 12th.
6. You may include supplementary material in your repository, but it is necessary to link everything in the report PDF.

Final Delivery Deadline

1. The deadline for the submissions will be 12th May at 11:59 pm.
2. The project delivery files will be submitted on LMS.
3. The initial dates for the live demo will be held between 13th May and 14th May.

Evaluation

1. The grading criteria are to be announced on April 27th ISA.