

(CSE211s) INTRO. TO EMBEDDED SYSTEMS

PROJECT DOCUMENTATION

Team members:

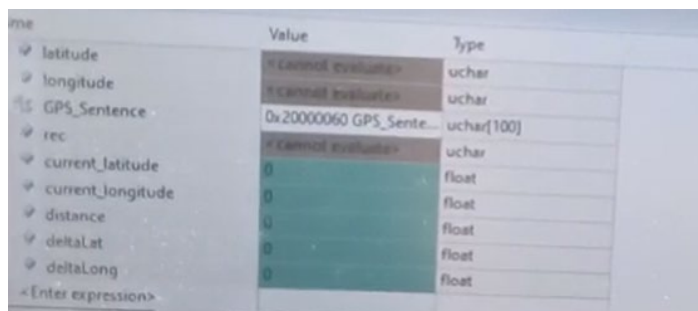
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1. Project Outline:

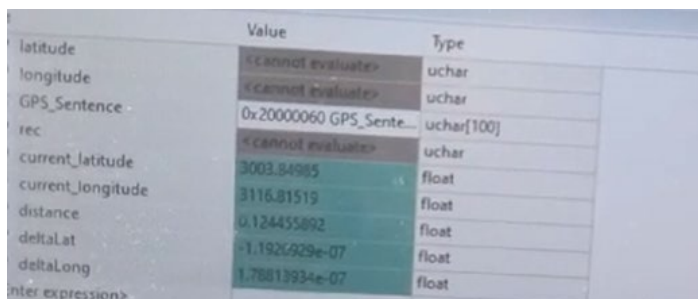
In the given project, we are assigned to a **GPS TRACKING SYSTEM** developed using embedded C programming, by gathering real-time positional coordinates while a microcontroller is in motion (using TM4C123G LaunchPad) after power-on until a destination point is reached. The collected data will be efficiently transferred to a personal computer and visualized on a map application.

2. Project in Action (Screenshots):

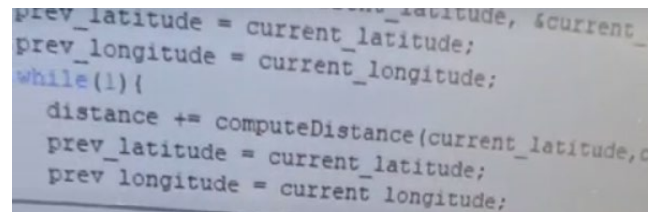
The following screenshots were captured real-time, as we tested our **GPS** module:



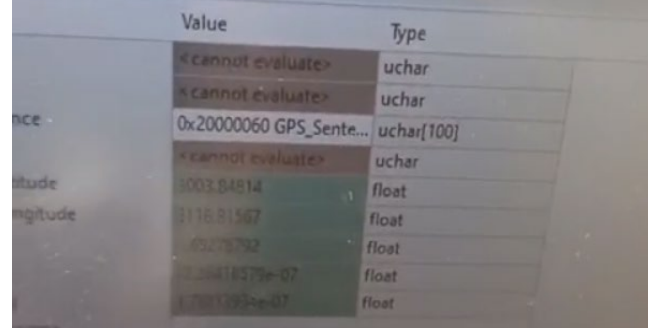
	Value	Type
latitude	«cannot evaluate»	uchar
longitude	«cannot evaluate»	uchar
GPS_Sentence	0x20000060 GPS_Sente...	uchar[100]
rec	«cannot evaluate»	uchar
current_latitude	0	float
current_longitude	0	float
distance	0	float
deltaLat	0	float
deltaLong	0	float



	Value	Type
latitude	«cannot evaluate»	uchar
longitude	«cannot evaluate»	uchar
GPS_Sentence	0x20000060 GPS_Sente...	uchar[100]
rec	«cannot evaluate»	uchar
current_latitude	3003.84885	float
current_longitude	3116.81519	float
distance	0.124455892	float
deltaLat	-1.1926929e-07	float
deltaLong	1.78813934e-07	float



```
prev_latitude = current_latitude;
prev_longitude = current_longitude;
while(1){
    distance += computeDistance(current_latitude, c
    prev_latitude = current_latitude;
    prev_longitude = current_longitude;
```

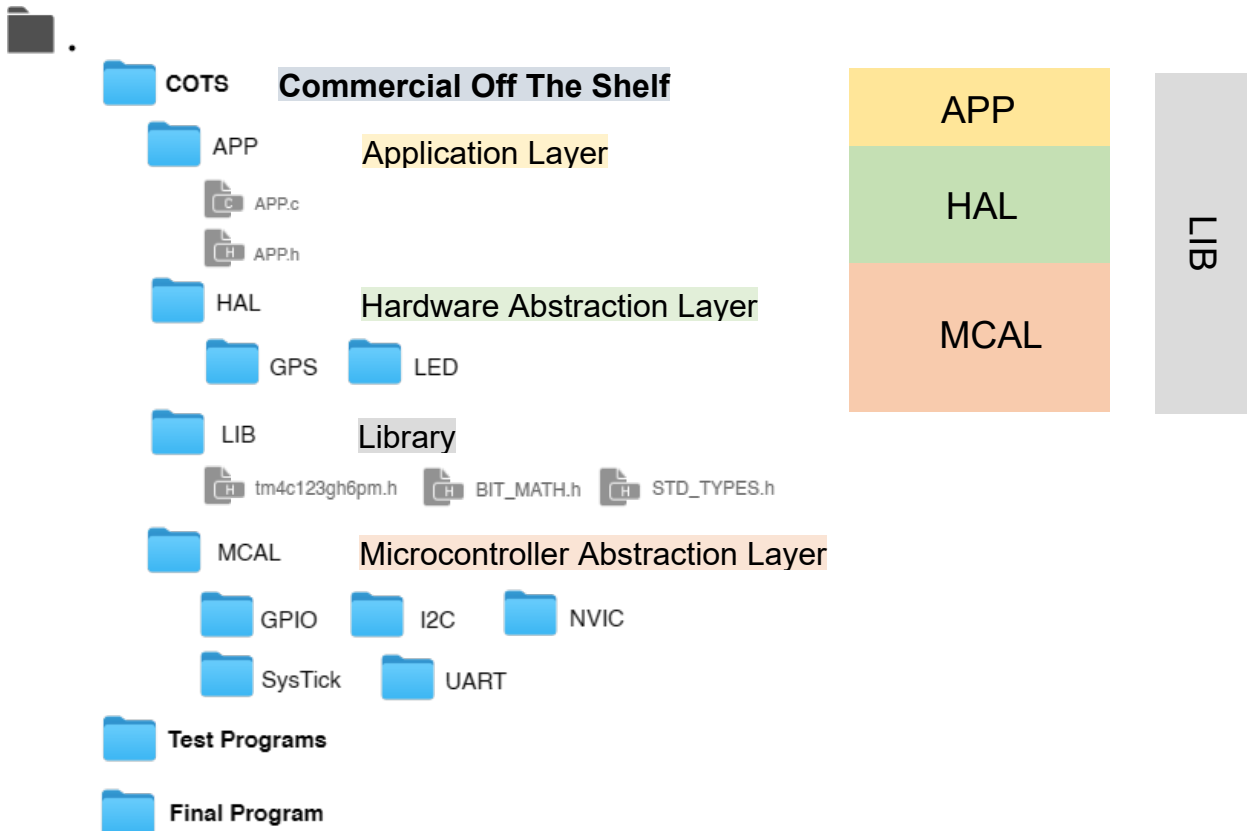


	Value	Type
latitude	«cannot evaluate»	uchar
longitude	«cannot evaluate»	uchar
GPS_Sentence	0x20000060 GPS_Sente...	uchar[100]
rec	«cannot evaluate»	uchar
current_latitude	3003.84814	float
current_longitude	3116.81567	float
distance	0.124455892	float
deltaLat	-1.1926929e-07	float
deltaLong	1.78813934e-07	float

3. Source Code:

Entire project source code can be found on our team's GitHub repo:
<https://github.com/MashaWaleed/GPS-System-TIVAC-CSE211>

The tree structure of our repo is explained briefly on this page:



The layers, as depicted in the figures above are demystified as follows:

(APP) Application Layer:

It's where the main flow of the program resides and is software specific.

(HAL) Hardware Abstraction Layer:

provides a high-level interface to the hardware. It makes the application code more portable as the same application code can work with different hardware just by using a different HAL implementation.

(MCAL) Microcontroller Abstraction Layer:

manages the microcontroller hardware. It includes our main drivers, i.e: GPIOs, communication interfaces (SPI, I2C, UART), ADCs, etc.

(LIB) Library:

Include third-party or proprietary libraries that the project might depend on. They provide various functions and utilities that are not specific to the hardware or the application but are used by them, such as data structures, math functions, or communication protocols.