Milestone 03 Description

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Milestone 03 Overview

Milestone 3 is a big step where we set up the main hardware for the project. This means getting and putting in all the specific parts we need on the project body. We're paying close attention to connecting sensors and actuators to the right microcontrollers. After that, we're working on creating simple and well-explained code that makes sure all parts of the project work together at the same time. The main goal is to make sure the project does what we planned in the proposal. We're also making sure that the hardware looks neat and organized, not just working well. Milestone 3 is super important because we need everything to come together smoothly, both in how the parts are set up.

This milestone includes:

Milestone 03 Description

1. Hardware Task

- In this milestone, make sure that all specified hardware components mentioned in the project proposal are working.
- Physically install the obtained hardware onto the project body, ensuring secure and proper placement.
- Connect all sensors and actuators to their respective microcontrollers using organized and reliable wiring.
- Configure a stable and suitable power supply for all hardware components to guarantee consistent and reliable operation.
- Implement the Structural design such that it is relevant to your project functionality.
- Make the modifications told by the TAs in the past milestones.
- There shall be no visible breadboards / excessive wiring connections, try to **EMBED the hardware logic in your model.**

● **Note:** Feel free to Include/use any additional libraries to access any of the components. The code can include embedded **C / C++.**

● **Note:** for teams using **WIFI**, it is advised either to use the **internal WIFI drive**r or an **external WIFI module (ESP8266)** that has a present GitHub documentation / C driver, However **Micro-Python** will be permitted only for the internal WIFI module communication / Speech recognition / image processing part while the rest remains in **C/C++.**

WIFI Interfacing :

- **Micro-Python internal WIFI : https://randomnerdtutorials.com/raspberry-pi-pico-w-wi-fi-micropython/**
- **Use the Internal Wifi within the pico rp2040 (cyw43_arch.h driver) : https://github.com/raspberrypi/pico-examples/tree/master/pico_w/wifi (BONUS)**
- **Use ESP8266 (WIFI Module) and connect to it using UART Protocol sending A/T commands to set up the WIFI (BONUS): https://circuitdigest.com/microcontroller-projects/iot-based-ARM7-LPC2148-webserver-to-control-an-led**
  A/T commands : https://www.instructables.com/Get-Started-With-ESP8266-Using-AT-Commands-Via-Ard/

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2. Software Task

- Develop a fully functional comprehensive code that establishes connections between all hardware components. Implement the communication Protocols if needed .
- Ensure that the code is written in **drivers** and following the best practices.
- add **concurrency** in your code, by including **RTOS and using it to ensure parallelism in your microcontroller functionality.**
- Design and implement a testing code specifically focused on assessing the functionality of the overall system. This code should execute the predefined functions outlined in the project proposal, thoroughly evaluating the project's ability to meet its intended objectives.
- Write a code that tests different scenarios, simulating various input conditions to assess the robustness and adaptability of the system. This involves creating test cases that cover a range of potential situations the project might encounter.
- Document the code comprehensively, providing explanations for key functions, variables, and decision points.
- Make the modifications told by the Tas.

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Evaluation & Submission Guidelines

● The deadline for submission is **open till the exhibition however, the TA's will conduct evaluations starting from 8/12 till 12/12 .**

● You are requested to submit/show the following documents at the evaluation:

1. A 1-2-minute video showing the project body/mechanism and all the connected hardware components. Sensors and actuator should be activated during the video to guarantee the full grade.

   name the Video (MS_03_Team_m_Video.mp4)

2. All developed project files (workspace folder) containing all the drivers and. main files and any extra libraries/directives needed to run the developed code of all sensors/actuators.

   name the Code (MS_03_Team_m_Code.zip)

   Note: file names should be self-explanatory of the content for example Ultrasonic_sensor.c , servomotor.c , etc.…

3. The required project description report

   name the report (MS_03_Team_m_Report.pdf)

   - Add Explanatory notes for each subsystem classifying the drivers, Hardware for each system.
   - Attach a component list of your hardware components, with links of their datasheet and the driver names, add a connection diagram for each hardware (sensor/actuator).
   - Add the updated State flow diagram with extra adjustments if any.
   - Mention the concurrency in your system and explain the logic behind it.
   - Show your final hardware Design in the report.
   - Add a GitHub link for your project.