

EEE3088F 2023 Concept Proposal Template

Q1 Enviro sensing HAT Concept [5]

Our concept is to create a temperature and light sensing hat used primarily for homeostatic management i.e. keeping a controlled environment at the same temperature and or brightness.

We have incorporated a UV sensor as our analogue sensor and a temperature sensor as our digital sensor, our STM32 will communicate to peripheral devices such as fans and heating lamps to regulate the given environment, in the instance of a meat dehydrator, incubator, flu vaccine transportation and room temperature regulation. Our use case is in cases where an environment must be regulated in order to keeping thing working as intended or growing as intended.

The hat will attach to the top of our STM32 and externally to a UV sensor and a temperature sensor, it will communicate the information collected to the microcontroller to be acted on.

Q2 Requirements [10]

Scenario 1:

In this scenario, there is a farm that specializes in growing exotic plants, and they have set up an incubator to create a controlled environment for these plants to thrive. The incubator needs a temperature sensor to monitor the temperature inside and ensure that it stays within a specific range that is optimal for the plants' growth.

The temperature sensor must be small for it to be mounted inside the incubator; it should constantly measure the temperature in the incubator. The temperature sensor should be designed to be fully accurate and sensitive, so it can detect even slight changes in temperature. This is important because the temperature in the incubator needs to be kept within a specific range to ensure that the plants grow properly. If the temperature goes too high or too low, it can cause damage to the plants or even kill them.

- R1.1: The temperature sensor must be able to sense within the plant's temperature range, and environment.
- R1.2: It should always be on.
- R1.3: Should be sensitive with exceptionally low uncertainty.

Scenario 2:

Pfizer requires a temperature sensor to monitor the temperature inside a Flu vaccine storage container while it is being transported in a truck. The vaccine needs to be kept at a specific temperature range to ensure its efficacy and safety. The sensor should be able to send alerts to the truck driver and the central control system in case the temperature goes outside the specified range, so that corrective action can be taken immediately.

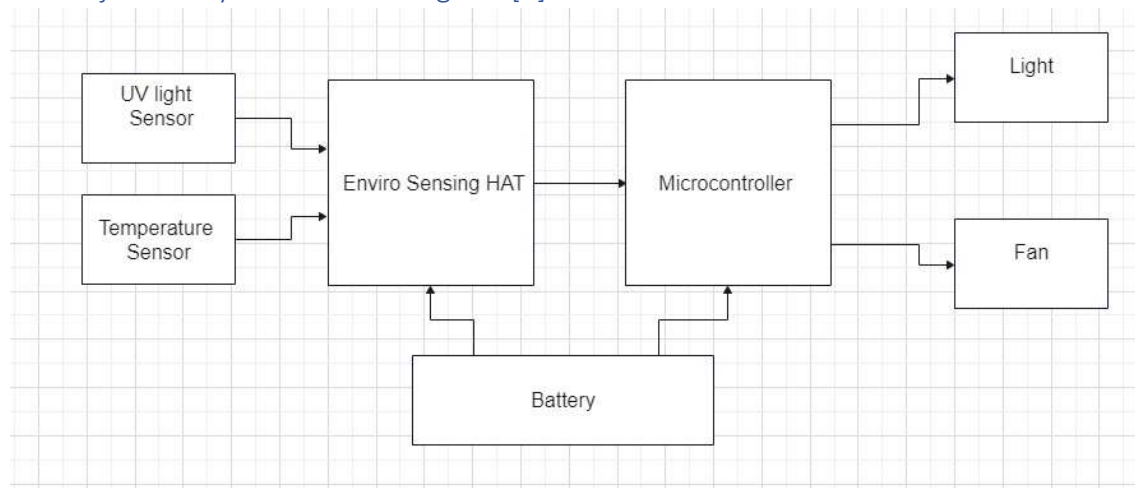
- R2.1: The sensor should be capable of measuring the temperature in the range of 2°C to 8°C, which is the required temperature range for storing the Flu vaccine.
- R2.2: The sensor should be highly accurate and should have a margin of error of less than 0.5°C.
- R2.3: The sensor should provide real-time temperature monitoring, with data being transmitted at regular intervals to the central control system.
- R2.4: The sensor should have a long battery life to ensure uninterrupted monitoring throughout the delivery journey.
- R2.5: The sensor should be easy to install and should not require any specialized tools or skills.

Scenario 3:

A homeowner wants to install a temperature sensor in their living room to monitor the temperature and ensure that it stays within a comfortable range. The sensor should be easy to install and use, and it should provide accurate readings of the temperature in real-time. The homeowner would like to be able to access the temperature readings remotely using their smartphone or computer, and they would like to receive alerts if the temperature goes outside of a certain range.

- R3.1: The sensor should be able to provide accurate readings of the temperature in the room, with a precision of at least $\pm 1^\circ\text{C}$.
- R3.2: The sensor should be able to provide real-time monitoring of the temperature in the room, with updates at least every 5 minutes.
- R3.3: The sensor should have a long battery life, ideally lasting at least 6 months to a year, so that the homeowner doesn't need to replace the batteries too frequently.
- R3.4: The sensor should be easy to install, with minimal tools or expertise required. Ideally, it should be a plug-and-play device that can be set up quickly and easily.

Q3 Project Subsystems Block Diagram [5]



Q4: Link to Team Git Repo [5]

https://github.com/BestNkhumeleni/EEE3088F_group22_2023.git