Q1 Enviro sensing HAT Concept [5]

Light sensor that works in conjunction with the STM32 Board.

It can be used to detect and monitor light intensity throughout the day and this data can be stored externally and be analysed for determining the light intensity conditions where the sensor is. This can provide information such as the maximum and minimum light intensity experienced during the day. By placing the sensor at various conditions, the recorded data can be used to find the optimum location for a specific use.

The HAT will also have a digital sensor that will measure the battery percentage of the device. This value can then be displayed on the LCD screen of the STM32 board.

Q2 Requirements [10]

User role/Scenario1:

In a water purification plant, the water can be run through a glass tube with a light on one side and a light sensor on the other. Depending on the amount of light that passes through the water, the water quality can be gauged.

- A compact device that can be mounted on existing machinery.
- High accuracy reading to be generated for quality control purposes.
- Cost-effective solution.

User role/Scenario2:

The device can be used to measure the quality of glass in a glass production line. Depending on the value of light intensity that passes through a pane of glass, the glass can be categorized.

- User-friendly design that does not require technical training for employees.
- Robust design with low maintenance costs.
- Takes readings at a fast rate to minimalize delays in production.

User role/Scenario3

The device can be used by subsistence farmers to find the optimal position in their plot to grow specific varieties of plants depending on the lighting conditions that these plants thrive in.

In this case the device will be placed out-doors therefore the onboard battery and battery level sensor will be useful.

- The device must be battery-powered as it will be placed outdoors far away from a power supply.
- Easy to move and set up.
- Waterproof design.

Q3 Project Subsystems Block Diagram [5]

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┌──────────────────────────┐        ┌──────────────────────┐
│ Power Regulating Module  │───────▶│    Battery Module    │
└──────────────────────────┘        └──────────────────────┘
                                              │
              ┌──────────────────────┐        │
              │  Battery Level Sensor │       │
              └──────────────────────┘        ▼
                          │         ┌──────────────────┐     ┌──────────────┐      ┌─────────────────┐
                          └────────▶│                  │────▶│Digital output│─────▶│                 │
                                    │       HAT        │     └──────────────┘      │     STM32F      │
  ┌──────┐   ┌──────────────┐       │                  │     ┌───────────────┐     │                 │
  │ LDR  │──▶│ Light Sensor │──────▶│                  │────▶│Analogue output│────▶│                 │
  └──────┘   └──────────────┘       └──────────────────┘     └───────────────┘     └─────────────────┘
                                                                                      │            │
                                                                                      ▼            ▼
                                                                          ┌──────────────────┐  ┌──────────────────┐
                                                                          │ Display battery  │  │  Output light    │
                                                                          │   percentage     │  │ intensity value  │
                                                                          └──────────────────┘  └──────────────────┘
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