

ENGI1020 Lab Project Proposal

Environmental Monitor – “Students Names”

ENGI 1020, Winter 2023

1 - Summary of proposed project

What will your project do?

The environmental monitor will track and display information about various aspects of an environment including temperature, humidity, and light and noise levels. It will provide visual and audio feedback about the data collected from sensors as well as time-based graphics summarizing the data collected through multiple options (per month, per week, or per day). This could be used to monitor a semi-remote environment or sensitive areas. It could be used as part of an alarm system, where if any of the sensors went beyond the calibrated values, a buzzer will sound with high frequency along with sending an email to notify all users in the environment.

What features and functionalities will you implement?

The environmental monitor will:

- Collect environmental data from up to three four sensors (more could be added if available).
- Allow the admin to manipulate or change the minimum and maximum values expected for each sensor.
- Provide those using the system with monitoring information visually (via the LCD screen) and audibly (via the buzzer) that indicates the sensor value relative to set ranges.
- Plot collected data based on the choice indicated by the user, and send emails to notify the users of the environment status when needed.

2 - Inputs and outputs

Inputs:

- **Temperature sensor** will be used to get environment temperature in Celsius;
- **Light sensor** will be used to get light level of environment (no units);

- **Sound sensor** will be used to track sound level of area (no units);
- **Keyboard** will be used to get system information (minimum and maximum ranges of sensor, sensors to be monitored, frequency of plotting) from user; and
- **Button** will be used to allow for user override (stop to, for example, change system settings)

Outputs:

- **LCD colour** will be used to indicate relative temperature;
- **LCD brightness** will be used to indicate relative light level;
- **Buzzer** will be used to indicate relative noise and alarm conditions; and
- **Console/computer** will be used to show (and store) plots.

3 - Links to key concepts and examples of use

- **Expressions** will be used to convert sensor values to output values (eg. light level to brightness, temperature level to colour);
- **Variables** will be used to save system information (eg. user-manipulated settings);
- **Branching (IF statements)** will be used to make decisions about alarms: buzzer and emails (eg. sound buzzer if observation above threshold);
- **WHILE loops** will be used to keep the system running (eg. infinite loop) and to allow overrides (eg. button-dependent loop);
- **Strings** will be used to print debug information when needed and to format plot information;
- **Lists** will be used to store data (eg. list for temperatures, list for light levels detected, etc.);
- **Functions** will be defined so that code can be easily reused (eg. one to manipulate alarm output values, one to format plots); and
- **Modules** such as *time*, *matplotlib*, *numpy*, *smtplib*, *engi1020*, will be imported into the project so that their features and functions can be used. If time permits, parts of the project may be defined within my own module, *envMonitor*.

*Note that these are just examples for *my* proposed project. Think about how you can use these concepts in context of *your* proposed project.*