

ECE 153B Project Proposal

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Overview

The project we are working on is a smart trash can that will monitor the amount of waste in the can and display the level on a display in percentage form. This will be achieved by using a combination of hardware components, including an STM32 Nucleo board, an ultrasonic sensor, and a display.

The STM32 Nucleo board is a powerful microcontroller board that will serve as the brain of the project. It will be responsible for processing the data from the ultrasonic sensor and communicating with the display. The ultrasonic sensor will use an I2C serial interface protocol, which is a widely-used protocol for communicating between electronic devices. The sensor will measure the distance between the bottom of the trash can and the top surface of the waste, allowing the system to determine the level of waste in the can.

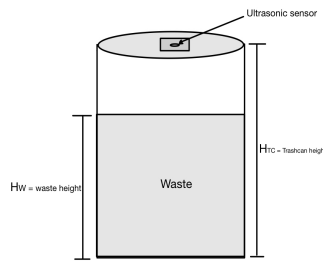


Figure 1: Ultrasonic Sensor Overview

$$P_{full} = \frac{H_{TC} - H_W}{H_{TC}} * 100\%$$

The display will use the SPI interface protocol, which is also a widely-used protocol for communication between electronic devices. The display will show the percentage of the trash can that is filled, allowing users to know when it's time to empty the can.

Overall, the project aims to create a simple yet effective solution for monitoring trash levels in a smart way. It can be used in homes, offices, or public places to help keep the environment clean and improve waste management.

Peripherals

1. Ultrasonic Sensor
2. Display

Serial Interface Protocols

1. I^2C
2. Serial Peripheral Interface Bus(SPI)

Block Diagram

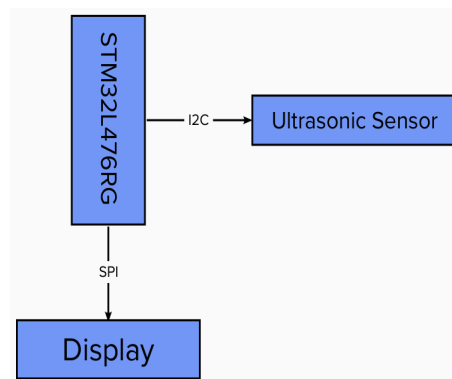


Figure 2: Block Diagram

Software Summary

The ultrasonic sensor will be integrated with the Nucleo board through I^2C protocol which the Nucleo board will then translate the following information into a percentage form and display such information on the display.

Responsibility

- Abel: Ultrasonic Sensor integration, Background calculations, and some software components.
- Vikram: Display Integration, Most of the Software components