

Ultrasonic Range Finder Proposal

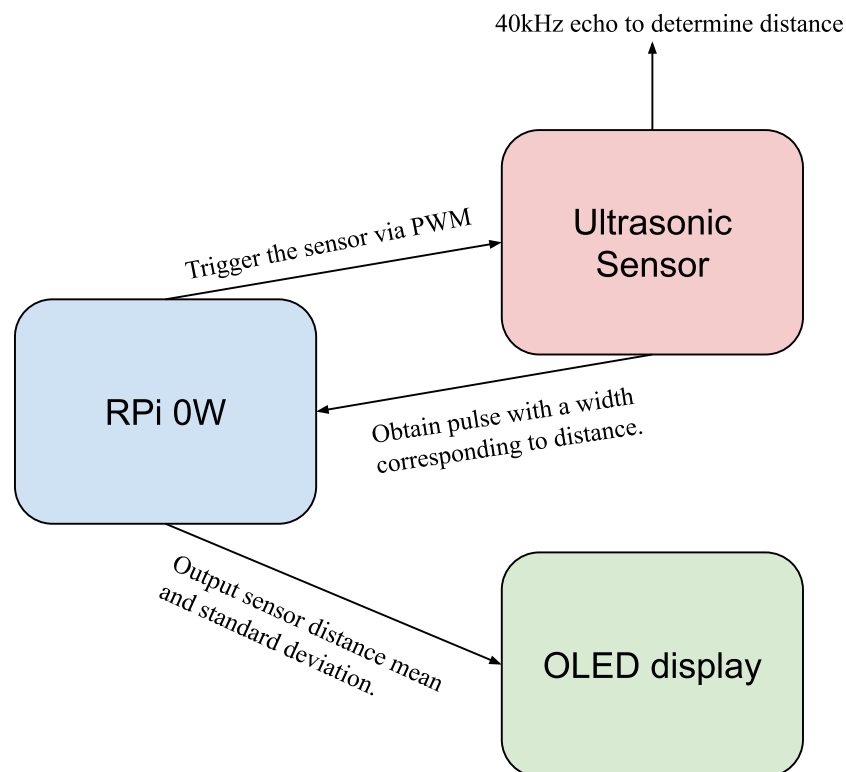
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The team will build an embedded system device that measures distance using an ultrasonic sensor. The distance from the ultrasonic sensor will be presented on an OLED display. A Raspberry Pi microcontroller will process and output the distance value. This project will demonstrate the team's embedded system skills through the implementation of hardware and software. This device will require the team to consider real-time deadlines to get accurate readings. This project will display the team's ability to optimize software and debug issues.

This project will not require a complex hardware design. The components will be connected to a solder board. Jumper wires will link these components to the microcontroller. The ultrasonic sensor must be placed at the edge of the board to avoid obstructions from other components.

The software design will be more involved. GPIO will be used to trigger the ultrasonic sensor and input echo pulses. Pulse-width modulation (PWM) may be used to trigger the sensor continuously. The mean and standard deviation of the inputted values will be taken over a certain time period to ensure data accuracy. The I2C communication bus will be used to output the processed data. The C programming language will be used for communication between the hardware. A block diagram of the intended design is present below along with a bill of materials.

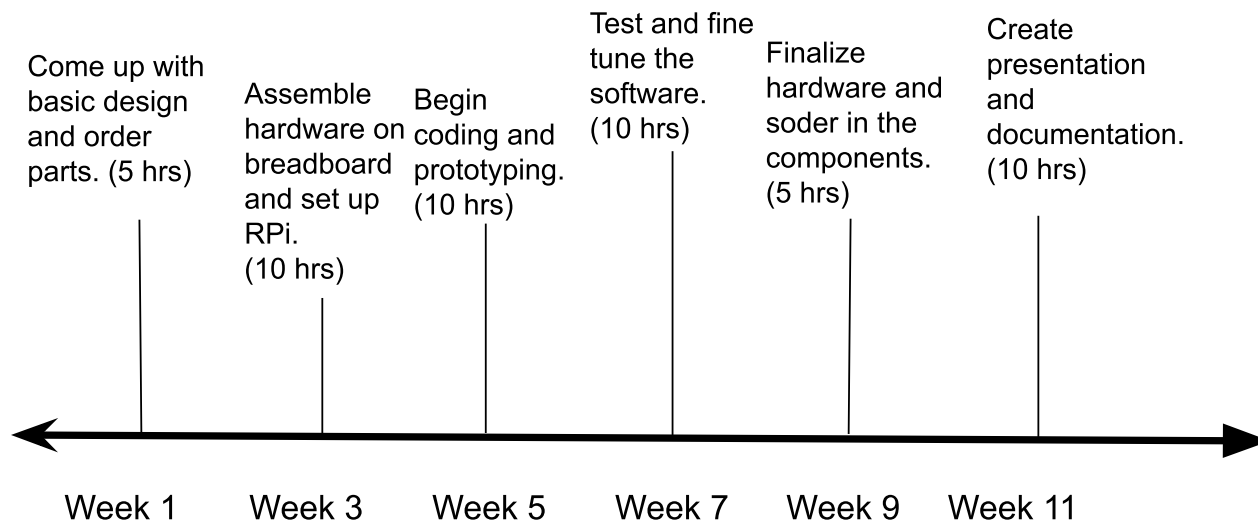
Block Diagram



Bill of Materials

Component	Part Number	Unit Price	Supplier
Raspberry Pi Zero W	3400	\$15.00	Adafruit
OLED Display	SSD1306	\$5.50	Digikey
Ultrasonic sensor module	HC-SR04	\$4.50	Sparkfun
Jumper Wires	N/A	\$0.00	The team
Solder Board	N/A	\$0.00	The team

Project Timeline



Additional Information

This project may require the use of an external library to drive the OLED display. The below datasheet contains information regarding the ultrasonic sensor and will be referred to by the team.

<https://www.electroschematics.com/wp-content/uploads/2013/07/HCSR04-datasheet-version-1.pdf>