Ultrasonic Range Finder Proposal

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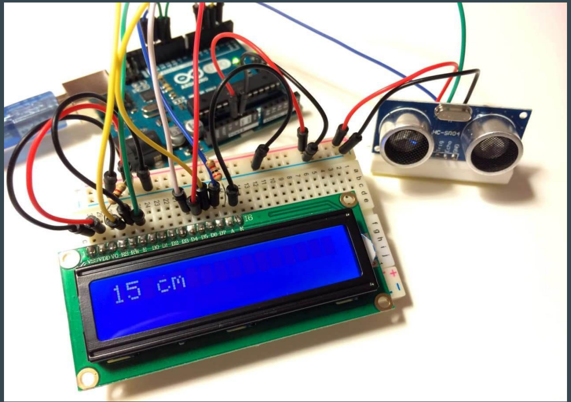
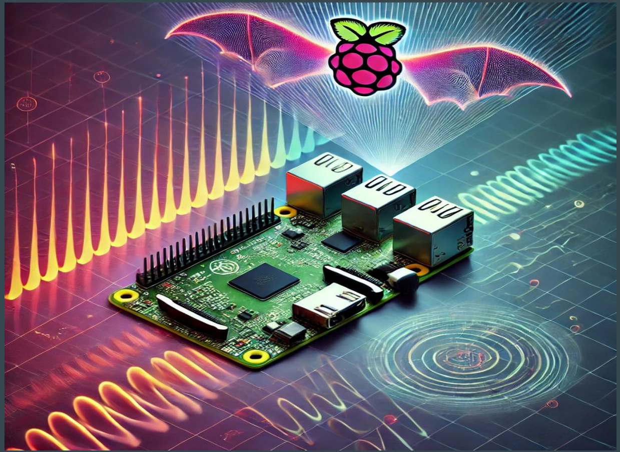
Motivation

- This device will allow for versatile short-range distance measurements without needing physical tools.
- Real-time distance measurements are needed by many automated machines.
- This project allows us to practice and showcase our embedded system skills to current and prospective students.





How Is This Problem Solved?

- One method is to use a measuring tape or similar tool for short-range measurements.
  - This can be inconvenient and/or cumbersome depending on the situation.
- Another approach is to use a laser rangefinder.
  - Results may be more accurate, but the cost and complexity of making a laser rangefinder is greater. Laser rangefinders typically draw more power, which isn't desirable in our project.
- Our approach is to use ultrasonic waves to determine distance.
  - This solution is inexpensive and simpler to implement. Our project doesn't require extreme precision, so this solution fits best.

How Will We Solve The Problem?

- The primary idea of our project is to use an ultrasonic sensor to determine distance.
- The sensor works similar to the echolocation used by bats in caves. It will send out a 40kHz signal and generate a pulse proportional to return time.
- We will analyze the pulse and extract the distance. This distance will be averaged over a short period of time for accuracy.
- We will use PWM to continuously trigger the sensor and obtain readings.
- A display will be used to output the averaged distance along with other relevant metrics.

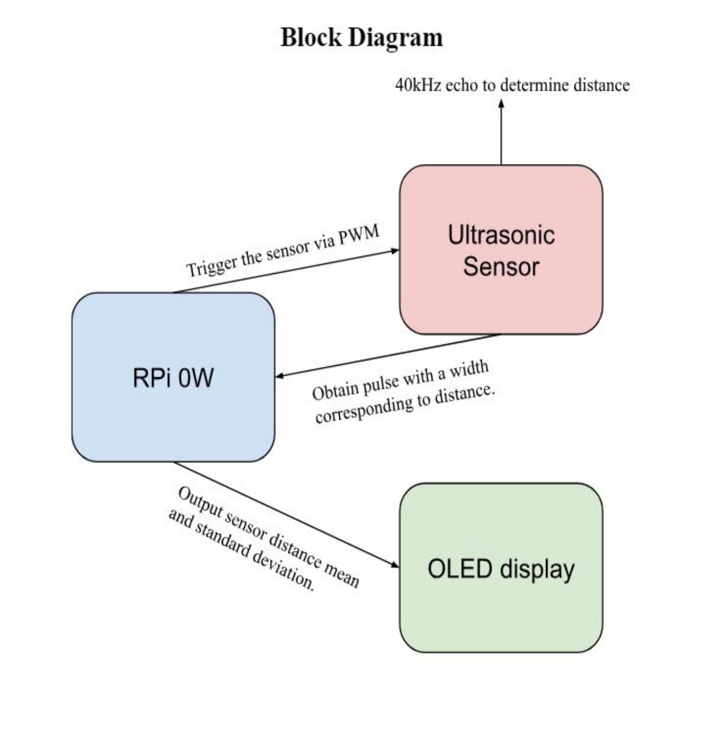
Design & Block Diagram

Hardware:

- Raspberry Pi 0W
- OLED Display
- Ultrasonic sensor module
- Solderboard
- Breadboard for initial prototyping
- USB Power Supply

Software :

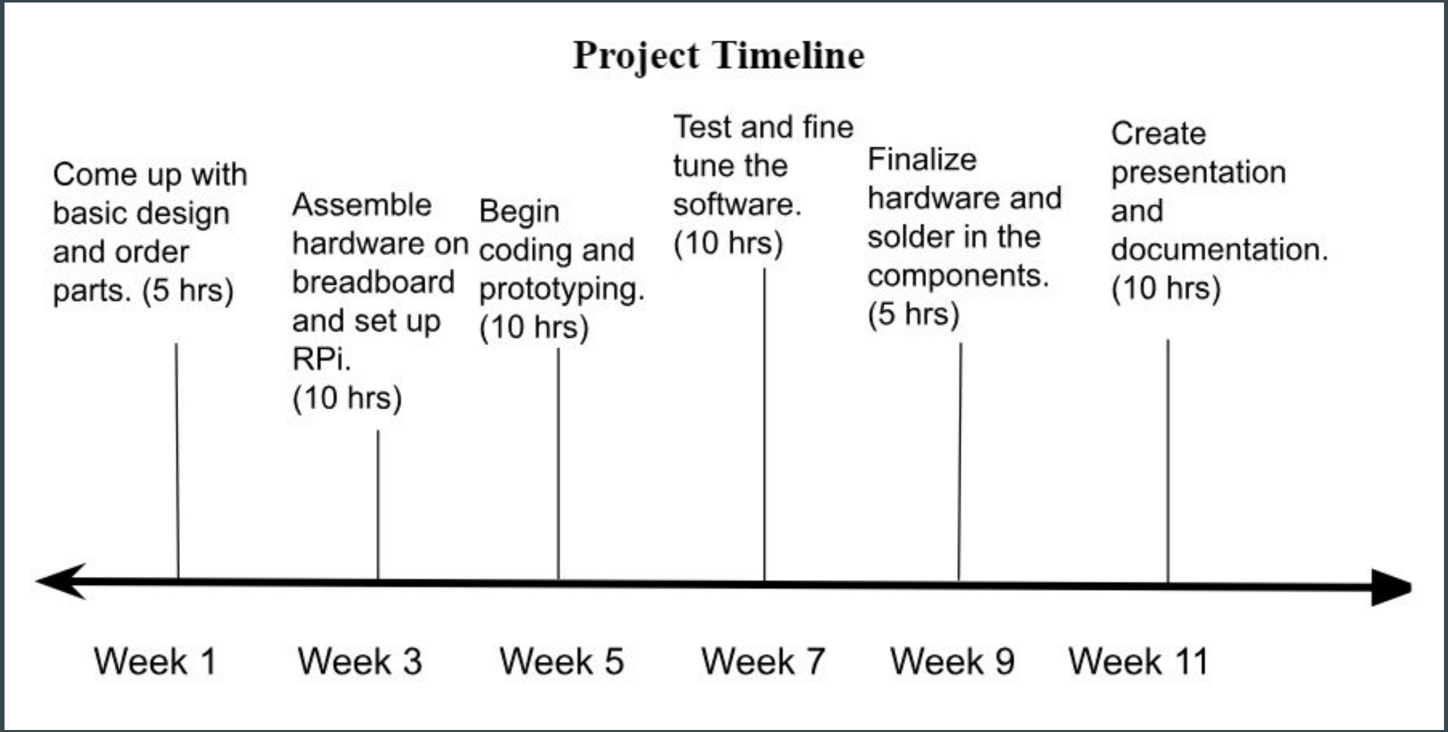
- The C programming language will be used to interface with components.
- A display library may be used due to the complexity of driving I2C displays.



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

Estimated Project Timeline



Project Progress

What is accomplished?

- Basic design and proposal
- Acquired hardware

What is left? (EVERYTHING)

- Attach components to the Pi
- Write software to interface with the components.
- Get a working prototype.
- Extensive testing to fine-tune the software.
- Solder the components.
- 3D print a case, if time avails.

Problems We May Need Help With

- We may need help setting up PWM on the Raspberry Pi.
- Finding a display library.

Thank You! Questions?