Institute Technical Summer Project 2024
TEAM VARUNA – Autonomous Beach Cleaning Bot

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Abstract

Plastic Waste in the sea and ocean is a serious problem and it affects the ecosystems in the waterbodies in a negative manner, indirectly effecting us. This waste mainly enters the ocean from **beaches**. Our autonomous beach cleaning bot is designed to detect plastic bottles and pick them up without any **human intervention**. It replaces the hazardous condition faced by rag pickers, who often work without proper safety measures.

Tools Techniques Learned

- Using **Raspberry pi** and its camera module
- Training custom model using **yolov8**
- Using ultrasonic sensor and LCD display
- Writing **code** in python using different libraries specific to raspberry pi
- Using **SSH** to remotely control the bot
- **Cadding** and laser cutting
- Wood Works(Drilling and Cutting MDF)
- Flash forge to **3D print** the models made in fusion
- **Fritzing** software to design circuits

Objectives

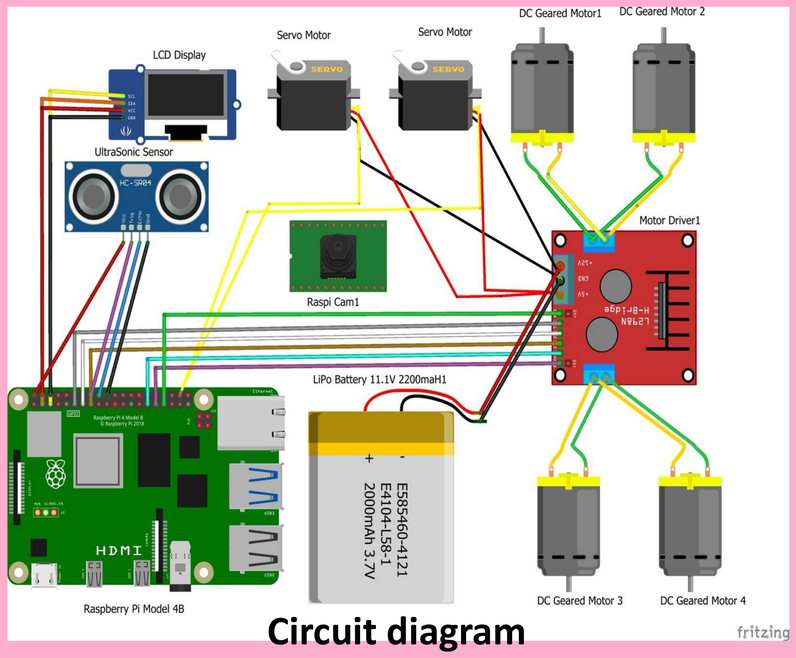
- To **automate** the process of picking up the plastic bottles and other trash from beaches with the help of computer vision.
- It gets the video feed from the RasPi Cam, processes the video feed using a custom model **trained** on 3689 images of plastic bottles and **detects** the bottle.
- The bot then moves to the trash and **picks** it up.
- This reduces **pollution** and protects marine life.

Future Plan

- **Enhanced Detection**: Currently the bot is only able to detect Plastic bottles. Going further we would like to train models to detect all types of trash.
- **Efficiency**: We would like to optimize the code for accurate pickup and we would like to deploy path planning algorithms for better movement of bot.
- **Mechanical parts**: Use better sensors and rotary encoded motors for precise movement and efficient pickup of the bottles.

Results

Our bot



Circuit diagram