



# ROBOTIC FISH

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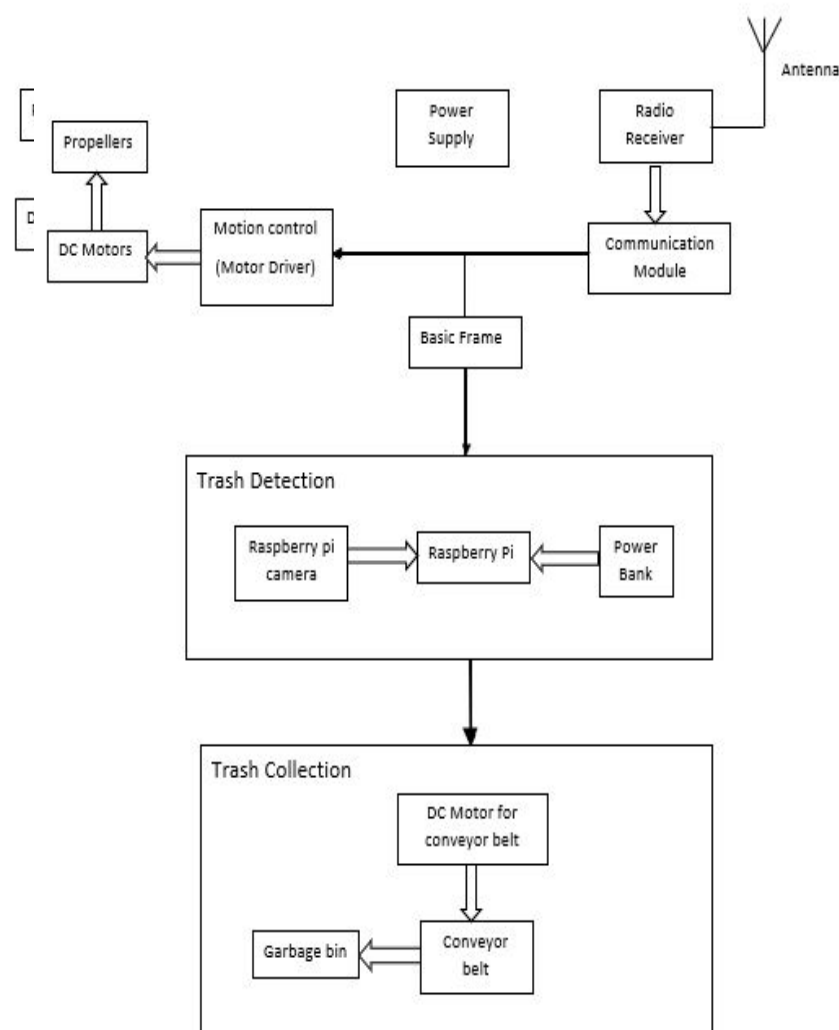
## INTRODUCTION

Removal of marine debris is required to maintain a sustainable environment. Detecting and collecting debris is hard due to unique difficulties of the water environment. A robotic fish which is a remotely controlled, pilot less vehicle, is used to detect floating marine trash and to remove them

## OBJECTIVE

- To design a robot to move smoothly on surface of water.
- To remotely control the robotic fish using RF technology.
- To make robot capable of finding and collecting certain kind of trash like plastic materials on the surface of water.

## SYSTEM OVERVIEW



## METHODOLOGY

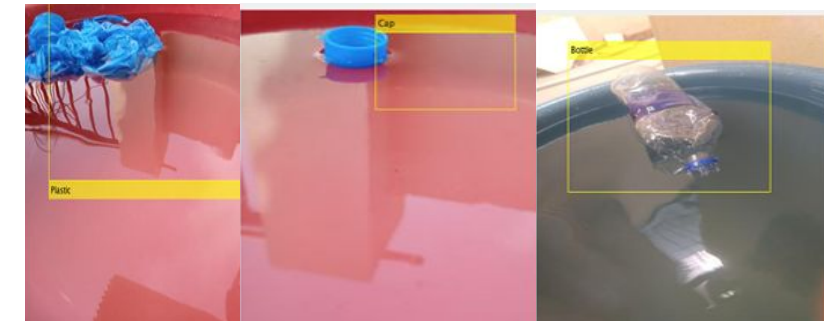
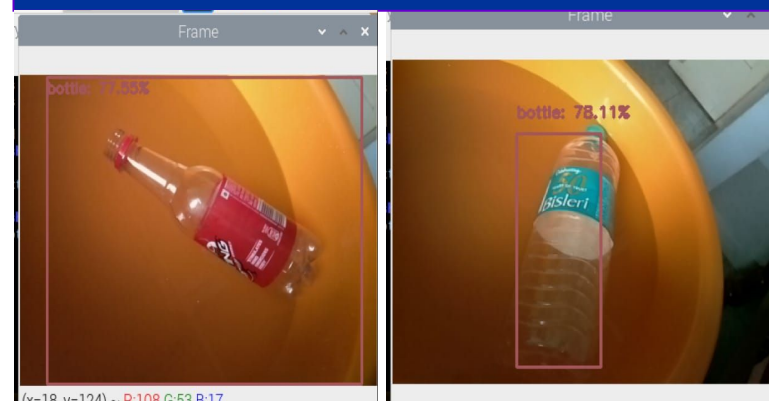
The proposed system has mainly three parts. First part is the robot design which includes motion control of the robot. Propulsion is achieved using pair of mechanical propellers fitted to either sides of the robot. The movement of the robot is controlled using the remote module. Transmission and reception of control signals is through radio signals. Second part is to detect the plastic debris like water bottles using YOLO model and the third part is to collect the debris floating on surface of water using conveyor system. Conveyor system consist of two pulleys and mesh-like conveyor belt. This system transfers the floating trash into the garbage bin.



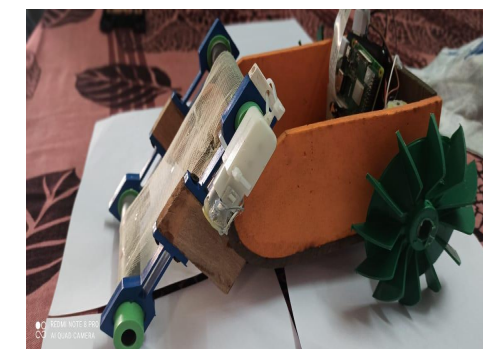
## OBJECT DETECTION IN MATLAB

- 1) Preparation of dataset: 440 images of Bottle, Plastic and Caps.
- 2) Divide the dataset into training (85%) and testing (15%)
- 3) Apply Data Augmentation .
- 4) Load the SqueezeNet network, pre-trained on Imagenet data set.
- 5) Create the yolov3ObjectDetector object.
- 6) Set the training options and train the model.
- 7) Test the model using detect function.

## PYTHON AND MATLAB DETECTION



## EXPERIMENTAL RESULTS



Specification	Value
Weight	600 grams
Load weight	500 grams
Overall size	32*25*18 (cms)
Size of garbage bin	14*15*10 (cms)

- 1)The robot system is tested in tank with calm water.
- 2)Once the system is powered, system starts to move with command received by the user through remote module.
- 3) Conveyor belt smoothly transfers the trash from the water surface to the garbage bin.

## CONCLUSION

Robot is capable of detecting trash like water bottles, plastic caps and plastic bags floating on the water. The model collects small sized trash like small plastic covers and bottle caps. The detection of trash is achieved through YOLO model which is based on deep neural network. The conveyor system aids in collecting the trash.

## REFERENCES

- 1] Junzhi Yu, Min Tan, Shuo Wang and Erkui Chen, "Development of a biomimetic robotic fish and its control algorithm," in IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics), vol. 34, no. 4, pp. 1798-1810, Aug. 2004, doi: 10.1109/TSMCB.2004.831151.
- 2] M. Fulton, J. Hong, M. J. Islam and J. Sattar, "Robotic Detection of Marine Litter Using Deep Visual Detection Models," 2019 International Conference on Robotics and Automation (ICRA), Montreal, QC, Canada, 2019, pp. 5752-5758, doi: 10.1109/ICRA.2019.8793975.