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Marine Bot using Radar System

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***Abstract*— Surveillance is major thing when one goes to secure anything as it is tedious job. At present water bodies are contaminated due to debris deposition. This project demonstrates the steps of creating an experimental prototype of a marine robot for monitoring the presence of enemies and cleaning up aquatic debris of great interest to the ecosystems and marine life. In addition to this, different weather parameters such as temperature, pressure, humidity and pH of the water are measured. These parameters are plotted in the form of graph which shows temperature v/s time, pressure v/s time, humidity v/s time and pH v/s time respectively which is used to predict the environment issues like global warming using cloud computation. The robot is remote operated river cleaning machine, where the river cleaning operation is automated with help of a conveyer belt. This marine bot consists of ultrasonic sensor and servo motor which together acts as a Radar system. Radar system helps in identifying the movement of unauthorized person or object and we equip a servo motors for the movement of the ultrasonic sensor.**

Keywords—Ultrasonicsensor,DCmotors,Cleaningunit

INTRODUCTION

Today, many military organizations take the help of military robots for risky jobs. The robots used in military are usually employed within integrated systems that include video screens, sensors, grippers, and cameras. Military robots also have different shapes and sizes according to their purposes, and they may be autonomous machines or remote-controlled devices. There is a belief that the future of modern warfare will be fought by automated weapons systems. Military robots are usually associated with the following categories: ground, aerial, and marine, including those oriented on collective use of robots. Most military robots are still pretty dumb, and almost all current unmanned systems involve humans in practically every aspect of their operations.

This project is truly developed to provide military assistances with unmanned physical involvement. It can also pave the real way to massive use of advanced mobile robotics in human societies, military systems including and particularly.

The robot is also used to remove the water contaminants and sense the PH level of water. It helps in weather forecasting and monitor weather at different climatic conditions, when placed in water. Thus, robot is mainly concerned about four modes of operation- in surveillance mode, in weather forecasting, in water monitoring and as a cleaning unit.

The implementation of this project to resolve the problem of replacing human to surveillance robot, because of this we reduce harm of human resource. Robot are usually miniature in size so they are enough capable to enter in tunnels, mines and small holes in building and also have capability to survive in harsh and difficult climatic conditions for life long time without causing any harm. Military robots were designed from last few decades.

I. RELATED WORK

With reference to [1] Gu et al (2017) presented the detection and classification system in a cutting-edge surveillance sensor network, which classifies vehicles, persons, and persons carrying ferrous objects, and tracks these targets with a maximum error in velocity of 15%.

With reference to [2] Chitnis et al (2016) have presented the wireless line sensor network architecture for visual surveillance using Flex Board - line sensor node with Software-based line sensor. The proposed line sensor architecture is capable of capturing a continuous stream of temporal one dimensional image (line image). The associated one dimensional image processing algorithms are able to achieve a significantly faster processing result with much less storage and bandwidth requirement while conserving the node energy. The framework has been illustrated through a test bed using IEEE 802.15.4 communication stack and a real-time operating system along with one dimensional image processing.

With reference to [3] HanjiangLuo et al (2017) have proposed innovative ship intrusion detection with wireless sensor networks near a harbour facility. The solution depends on exploitation of the V-Shaped wave generated by ship movement on the water surface. They have used three-axis accelerometer sensors with iMote2 on buoys on the sea surface. The deployment uses a grid topology with predefined locations. Sensor nodes are time synchronized before deployment.

With reference [4] Anand Nayyar1, Vikram Puri2, Nhu Gia Nguyen- IoT is regarded as very complex platform facilitating the connection of things based on objects being tagged for their identification, but also includes sensors, actuating elements, and other technologies With reference to [5] V.V. Belyakov, P.O. Beresnev, D.V. Zeziulin, A.A. Kurkin,O.E. Kurkina, V.D. Kuzin, V.S. Makarov, P.P. Pronin, D.Yu. Tyugin and V.I. Filatov The paper presents the steps of creating an experimental prototype of an autonomous mobile robot for coastal monitoring and forecasting marine natural disasters With reference to [6] Sheikh Md Shahid Md Rafique1, Dr.Akash Langde this project emphasis on design and fabrication of the river waste cleaning machine. The work has done looking at the current situation of our national

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rivers where there are litres of sewage and loaded with pollutants, toxic materials, debris etc. The government of India has taken charge to clean rivers and invest huge capital in many river cleaning projects like "Namami Gange", ''Narmada Bachao'' and many major and medium projects in various cities like Ahmadabad, Varanasi etc. By taking this into consideration, this machine has designed to clean river water surface.

With reference to [7] Yu Wang1, Rui Tan2, Guoliang Xing1, Jianxun Wang3, Xiaobo Tan3, Xiaoming Liu1, and Xiangmao Chang1,4Monitoring aquatic debris is of great interest to the ecosystems, marine life, human health, and water transport

II. METHODOLOGY

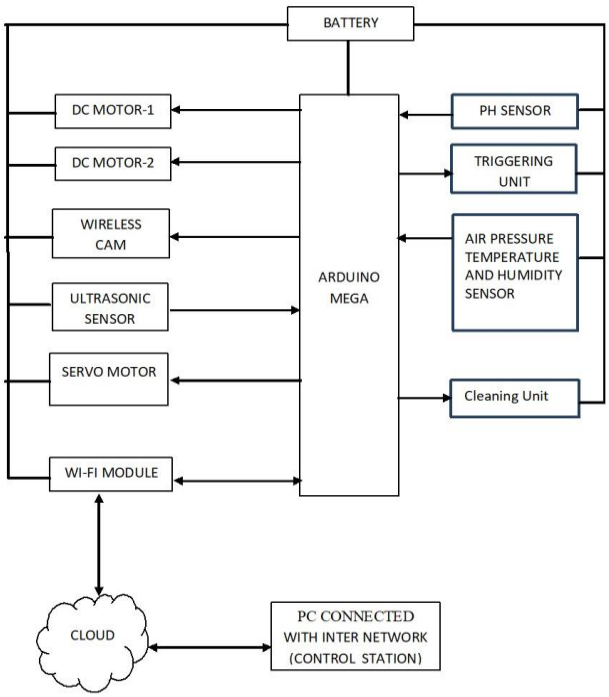

Figure 1: Block Diagram

Design and implementation of the Floating robot with multi applications.
The system consists of-

- RADAR system, which is constructed by ultrasonic sensor and servo motor.
- Wireless camera unit, which captures the live video and send it to base station.
- Remote controlled Weapon/Triggering unit, to destroy the enemies or suspicious things.
- Weather monitoring system, to monitor the environment conditions like Air Pressure, Temperature, and humidity.
- pH level monitoring to check if the water is potable. Based on the output of the PH sensor value water is used for agriculture, industries or drinking purpose.

Using conveyor belt, waste materials can be collected and that reflects the collecting unit, which is monitored by the base station.
Overall Robot application is controlled from base station.
Robot wings are made up of plastic and dc motor, for robot movement.

The proposed system is shown in the block diagram Fig 1. In this system an Arduino Mega is used as the microcontroller. It can work manually. Circuit consist of a Servo motor, an ultrasonic Sensor, two DC motors, a cleaning unit and a Battery, Temperature, Humidity, Air Pressure, PH sensors, and Wi-Fi module. Ultrasonic sensor is used for obstacle detection and Servo motor with Ultrasonic sensor constitutes a RADAR system and user itself operates the robot and direction can controlled by user changes in the lane is controlled by Bluetooth mobile app.

The operation of the model is based on four modes:

A. Surveillance mode

First surveillance mode the RADAR system in which the servo motor rotates 180 degrees and ultrasonic sensor detects any spy or object the message is sent to the mobile, through camera the live video is captured and accordingly action is taken by triggering unit.

B. Cleaning Unit

The cleaning unit used, where there is waste debris in the water body which are to be removed. This unit consists of a nylon mesh and waterwheel driven conveyer mechanism which collect & remove the wastage, garbage & plastic wastages from water bodies.

C. Weather monitoring

Sensor BMP180 is used wherein the Temperature, Humidity and air pressure is detected and displayed and these values can be updated onto the cloud via Thinkspeak app.

D. Water Quality Monitoring

Testing the values of PH whether the water is Basic, Neutral or Acidic the potablity of the water can be tested these values are also displayed on the phone.
The flow of the proposed system is shown in the figure 2

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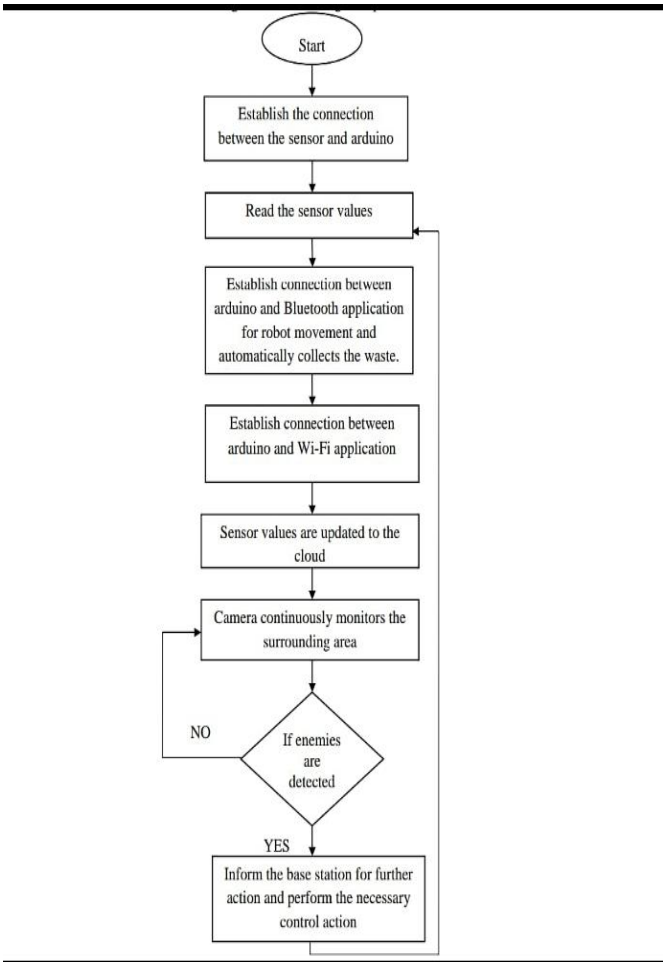

Figure 2: Flowchart

The main objective of the project is to provide coastal security. Once the operation is started there is a connection established between arduino and sensors, the sensor values are read and there is establishment of the connection between arduino, Bluetooth, the bot movement and the wifi module. The obtained sensor values are updated on to the cloud. Camera continuously monitors the surroundings if there is spy detected inform the control station for further action else there is continued monitoring.

III. RESULTS AND DISCUSSION

In the Surveillance mode, as the ultrasonic sensor senses the presence of any intruder, the surroundings can be checked and monitored using wireless camera. The live stream is captured that helps the person in the base station to perform further actions.

In the river cleaning mode, the raw materials were easily collected at the bin kept in the backend of the model. The conveyor belt is made up of cotton fabric and is explained in the figure 9. The figure 9 depicts the image of robot collecting waste from the water.

In the weather forecasting mode, temperature humidity and pressure values are known from the air pressure sensor. The values are used to monitor weather changes and assist in reducing global warming.

In the water quality monitoring mode, the pH values are obtained using the pH sensor. The pH values are then used to check whether the water is potable or not.

Now all these values are visualized in the form of charts by uploading them to cloud. Here the cloud is thingspeak.com, a channel “marine robot” has been created using the email id. Different fields of temperature, humidity and pressure are measured with respect to time. The analysis of the charts can be exploited from the cloud. The figures 10 and 11 demonstrates the chart patterns of pH, pressure, temperature and humidity values.

1. The DC motors for the movement of bot, is interfaced with Arduino mega. The figure 3 depicts the Interfacing of DC motor with Arduino.

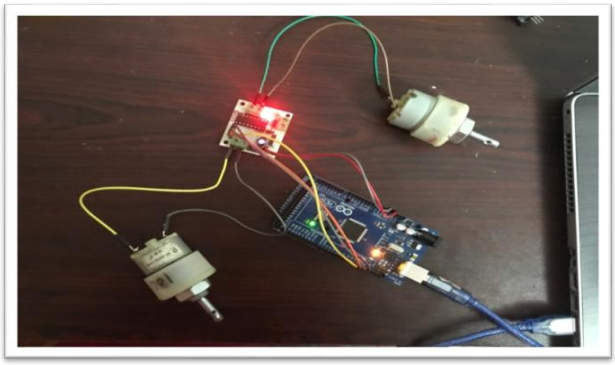

Figure 3: DC motor interfaced with arduino

OUTPUT-DC motors rotated in forward, backward, right and left direction depending upon the switching of pins.

2.The servo motor along with ultrasonic sensor, that acts as the radar system has been interfaced as given in the figure 4.

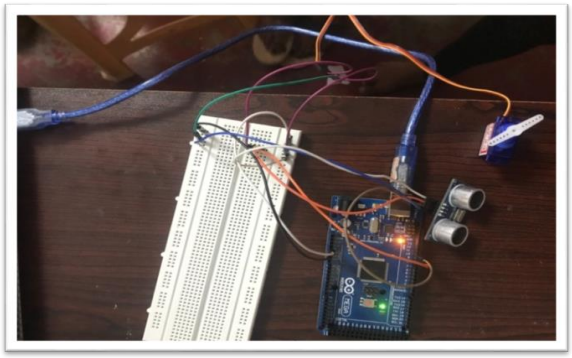

Figure 4: Servo motor interfaced with arduino

The output of the radar system is shown in the figure 5.

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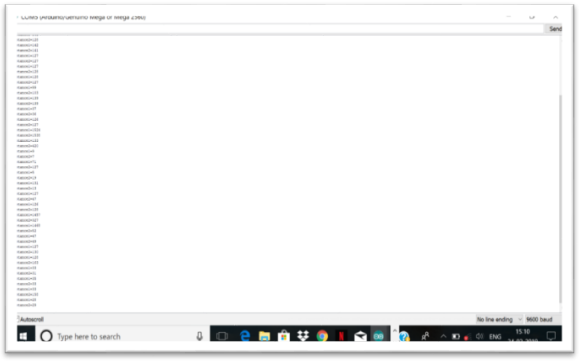

Figure 5: Output of servo motor

3. The air pressure sensor is interfaced with Arduino mega as shown below in 6.

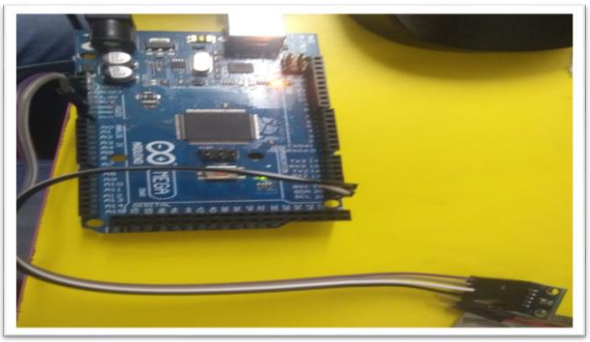

Figure 6: air pressure sensor with Arduino

Output- the figure 7 gives the output of air pressure sensor in the serial monitor. The values of humidity, temperature and pressure in its surroundings have been provided.

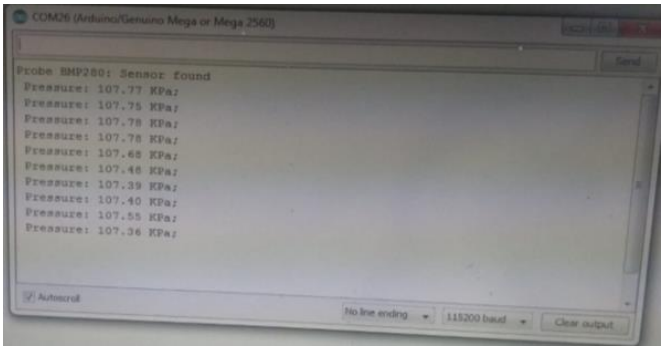

Figure 7: output of air pressure sensor with Arduino

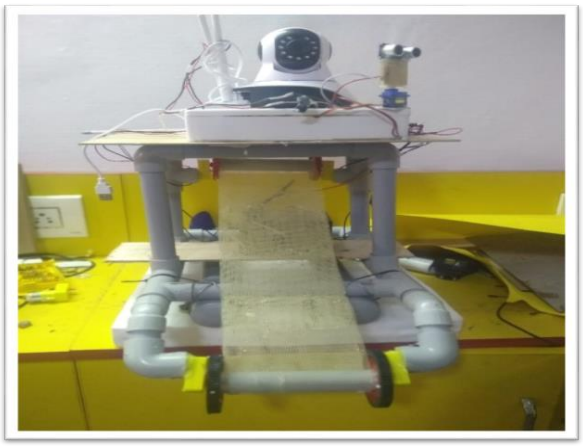

Figure 8: Implemented model

Figure 9 :waste collection

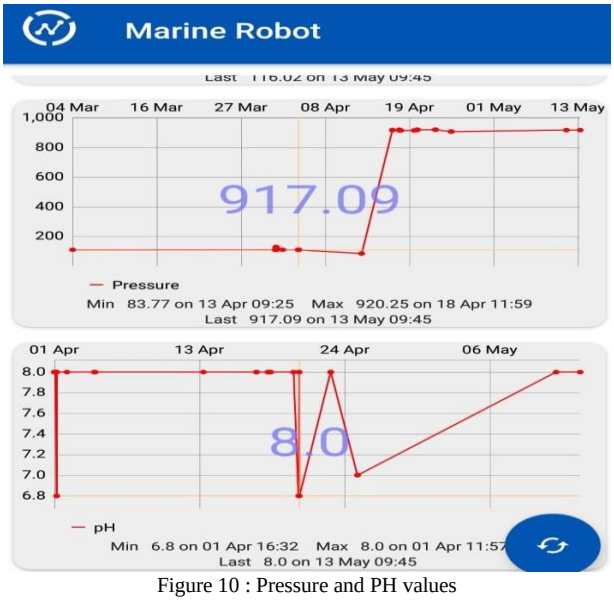

Figure 10 : Pressure and PH values

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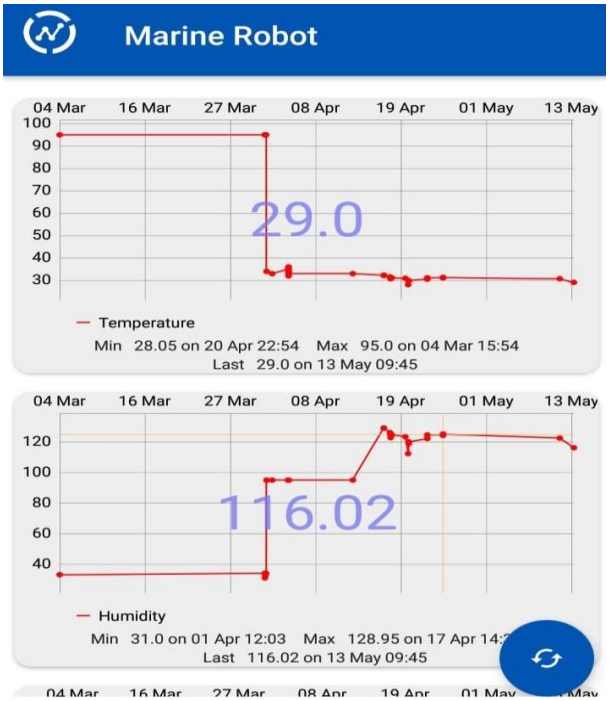

Figure 11 :Humidity and Temparature values

IV. CONCLUSION AND FUTURE SCOPE

There are many security methods to safeguard our coastal regions, yet implementation of android-based robot for coastal region security could be more helpful. It reduces human involvement in the coastal region. This method reduces the risk in the lives of our soldiers. This marine bot consists of ultrasonic sensor and servo motor which together acts as a Radar system. Radar system helps in identifying the movement of unauthorized person or object and servo motors helps in the movement of the ultrasonic sensor. Alert message "object detected" is sent to the base station, and the surroundings are monitored using wireless camera. With the usage of live streams captured, further actions like triggering can be performed.

There are more applications to increase the efficiency of the robot. Water cleaning, weather monitoring and water quality monitoring are the other tasks that are performed.

The various parameters measured are plotted in the form of graph which shows temperature v/s time, pressure v/s time, humidity v/s time and pH v/s time respectively which is used to predict the environment issues like global warming. The data is also stored in the cloud, which can be used for further data analysis.

Future scope

Open CV

Open CV is computer vision library to perform the Face detection and recognition. Robot with the help of camera get face recognition and according to That manually one can give the command to the robot. By utilising other advanced microcontroller, open CV can be installed and compiled. The addition of the same, is the future scope of this project.

Laser Gun

The project is mainly concerned to be an unmanned system, it is necessary that the robot is ready to self defend and provide major protection. Thus the use of laser gun is of great importance. The laser gun with the help of open CV and wireless camera detects the enemy and shoot according to mode of operation i.e automatic and manual mode.

There is also an interactive mode so that one can control it manually from the keyboard.

This project is small, lightweight and entirely battery operated. Motion Detection uses open CV and computer vision to track moving targets in front of the camera.

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