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Gesture Controlled Amphibian Robot for Effluent Testing

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Abstract
Industries produce a variety of effluent waste. Most of the waste is hazardous and needs proper treatment before letting it into the river. If the waste is not treated well enough then it may damage wildlife habitats & eventually contaminate the drinking water. Hence the industries must treat the effluent as per the government norms & keep a track on the effluent. This project will help the industry/government to test the effluent which is let into the river. This robot may also help the industry to check for chemical spills and water quality in various areas.
Keywords- *amphibian, MEMS(Micro Electro Mechanical Sensor)*

I. INTRODUCTION

Robots have been widely used to perform various kinds of tasks that reduces the manual work, specifically in remote areas where ever human accessibility is inconceivable. The main applications where the robots have exhibited their excellence include surveillance, military purposes, disaster management like searching and rescuing victims as well as examining gas leakage in industries or gaseous liquid spills in the ocean.

This proposed project will helps to perform variety of tasks which can be performed on land as well as on surface of water. It will be very useful for army, navy, military as well as industrial applications. It is an unmanned vehicle which can traverse on many varieties of surfaces like flat or rocky land terrains and various kinds of liquid surfaces. Robots capable of traversing on both land and water are of great use in military surveillance. Such robots are capable of patrolling in chemical industries where, on land and water surveillance is required. This robot is a manually operated robot, for the convenience of the operator gesture sensing remote control is provided. Such amphibious robot is designed in this project.

II. II. LITERATURE SURVEY

It gives the fundamental information about all the components used in the system. The purpose of this paper is to introduce the system to the reader. A literature survey or a literature review during paper writing is that section that shows the assorted analyses and analysis created within the field of your interest and also the results already printed, taking under consideration the assorted parameters of the project and also the extent of the project.

In this section we have mentioned the previous projects and research information related to our topic which helped us with the idea of the implementing the hardware and the use of software.

Mr. Kiran Patil et al [1] describes the normal technique of testing turbidity, pH scale & Temperature is to gather samples manually and so send them to laboratory for analysis. However, it's been unable to satisfy the stress of water quality watching these days. therefore a collection of watching of turbidity, pH scale & Temperature of Water quality has been developed. The system consists of turbidity, pH scale & Temperature device of water quality testing, single-chip micro-controller knowledge acquisition module, info transmission module, watching center and different accessories. Turbidity, pH scale & Temperature of water is mechanically detected below the management of single chip micro-controller all day. The controlling chip gets the information, and so processes and analyzes them. After that, the information is instantly sent to watching center by GSM network within the

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variety of SMS. If the water quality is abnormal, the information is sent to monitoring center and management department at an simultaneous time.

Meng Oingyi et al [2] within the paper introduces as on-line monitoring system of TDS in waste water supported by the optical absorption methodology. The system uses advanced processor STM32F103, advanced sequential injection platform, correct optical mensuration structure, economical pressure digestion methodology, high resolution quantitative chemical analysis module.

S.Harivardhagini et al. [3] describes the pH scale management method which involves a epitome model within which acidic and base-forming streams are mixed into never-ending Stirred Tank Reactor [CSTR] in correct proportions therefore on management the pH scale of the plant.

Adrian Korodi et al. [4] introduces the shortage of well-trained automation and SCADA works designers causes delays in project implementation and adds difficulties to supervise the developments for each the adviser and therefore the beneficiary. The paper proposes to integrate within the program of students a course material concerning the steps to be followed so as to provide correct automation and SCADA technical documentation. The paper divides the technical documentation considering the kinds of documents concerning.

III. PROPOSED SYSTEM

1. Overview

This project can facilitate perform style of tasks which may be performed ashore likewise as on surface of water. It'll be terribly helpful for army, navy, military likewise as industrial applications. it's associate degree unmanned vehicle which is {able to} be able to traverse on several style of surfaces like flat or rocky land terrains and numerous sorts of liquid surfaces.

Robots capable of traversing on each land and water are of nice use in military police work. Such robots are capable of patrolling in chemical industries wherever, ashore and water police work is needed. This mechanism are operated by hand mechanism, for the convenience of the operator gesture sensing remote is provided, such amphibious mechanism is intended during this project.

The project is largely divided into 2 hardware units i.e. remote unit and mechanism unit. This mechanism can report back the processed parameters from the sensors placed on the mechanism unit. The 2 units are described below.

2. Remote unit

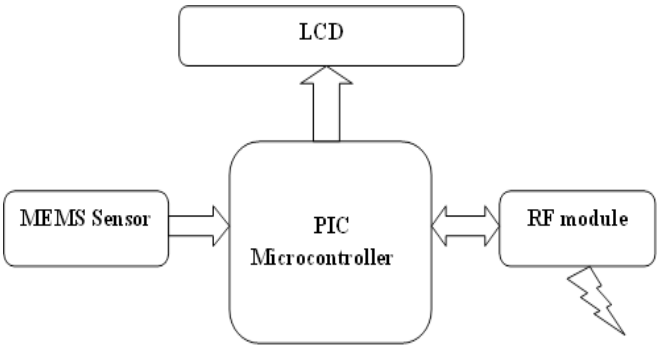

Fig.1 Remote unit

The remote control consists of MEMS [Micro Electro Mechanical Sensors], which will sense the gesture of our hand moments and provides the input signal to the microcontroller accordingly. On the remote controller side the output of the sensors and operation details are will be displayed on LCD. The PIC microcontroller used on the transmitter side, will send signals to the robot through RF module.

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1. Robot unit

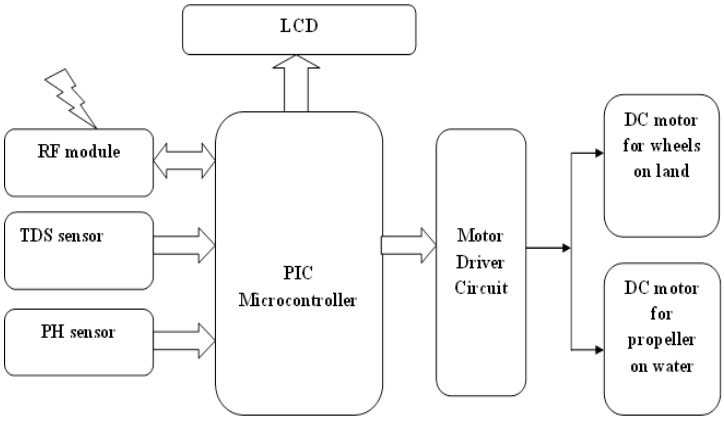

Fig.2 Robot unit

On the robot side RF module is used for receiving the signals, transmitted by the remote control. The signals then will be provided to the microcontroller for processing the data.

The microcontroller will control the robotic movements by controlling the DC motors on the basis of the received signal. This robot is further divided in two parts, one that works on land surface and other works on the water surface. The robot runs forward & backward on land with the help of two subsequent wheels and respective motors. For turning robot to left direction, the right wheel rotates in forward direction and left wheel rotates in backward direction. For turning robot to right direction, the left wheel rotates in forward direction and right wheel rotates in backward direction. Thus we get a quick axial turn. The robot runs on water with the help of propellers. The propellers provide the thrust for the robot to move on the water surface. The propellers are mounted on the rear part of robot body.

This project will be able to collect the important and urgent parameters of the water necessary for the control over the water treatment plant. All the other parameters of the effluent water that are to be tested at the laboratory. For this testing, water samples will be collected by the robot with the help small water pump and a container. This water sample will be taken to the laboratory for the further processing.

2. Sensors

PH sensor

A pH meter is an instrument that is used to measure the hydrogen-ion activity in water-based solutions, indicating its acidity or pH expressed in pH. The pH meter measures the distinct electrical potential between a pH conductor and a reference conductor, and then the pH. Hence meter is usually mentioned as a "potentiometric pH meter". The difference in electrical potential relates to the acidity or pH of the answer. The pH meter is employed in several applications starting from laboratory experimentation to internal control.

TDS sensor

A TDS meter indicates the overall dissolved solids (TDS) of an answer, i.e. the concentration of dissolved solid particles. Dissolved ionizing solids, like salts and minerals, increase the electrical physical phenomenon (EC) of the liquid. As a result of it's a volume live of ionizing solids, world organisation are often accustomed estimate TDS. Dissolved organic solids, like sugar, and microscopic solid particles, like colloids, don't considerably have an effect on the physical phenomenon of an answer, and aren't taken under consideration.

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IV. IV. RESULTS

MEMS Gyro-sensor measurements:

Axis	Action
X>180 degree	Forward
X<150 degree	Reverse
Y>180 degree	Left
Y<150 degree	Right
X=150-180 & Y=150-180	Stop

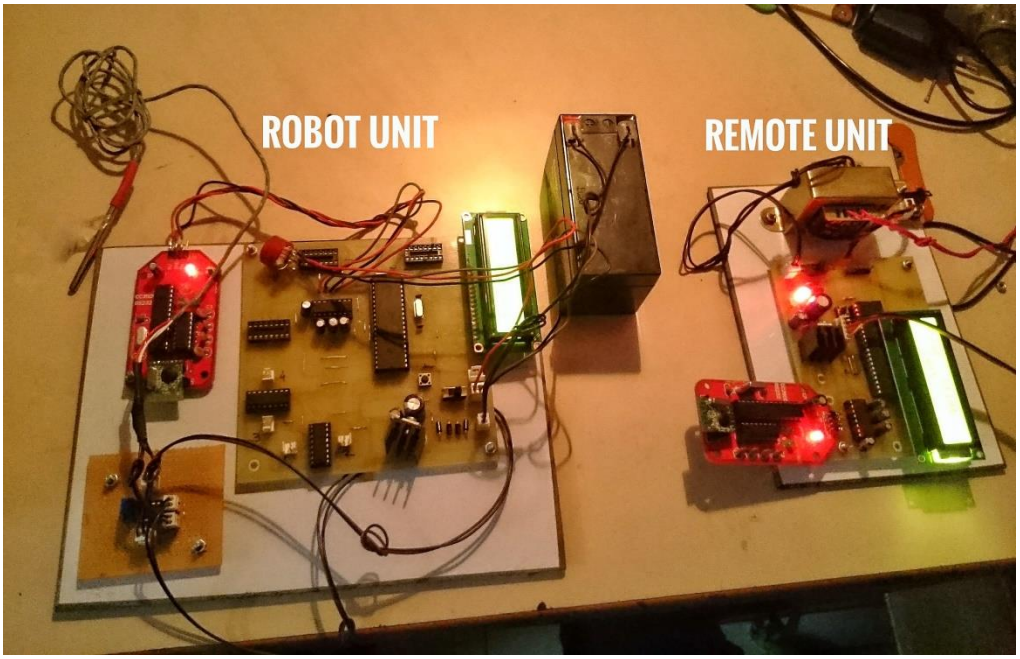

Fig 3. Electronic circuit of robot and remote unit

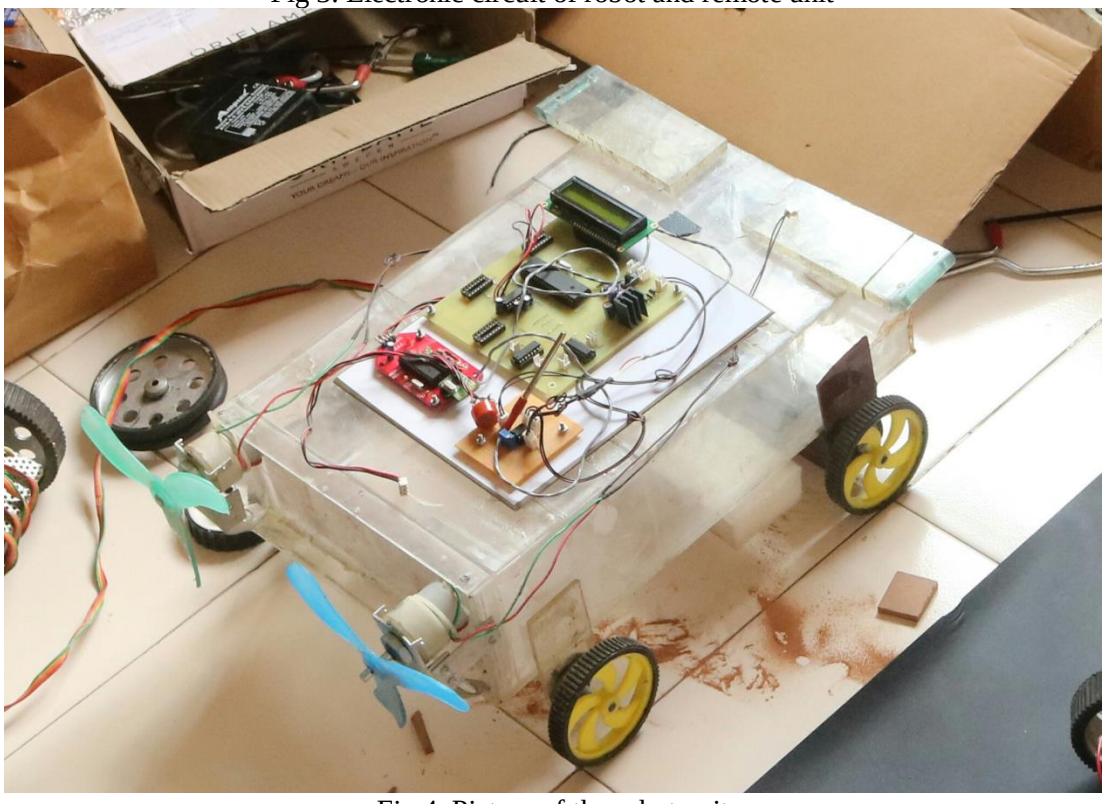

Fig 4. Picture of the robot unit

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V. CONCLUSION

This project will be capable to control the Robot using hand gesture with the help of MEMS sensors. The robot will be able to run on land using the DC motors and swim on the water due to its hollow body and manoeuvring propellers and also collect the information of total solids dissolved in the water as well as the pH level of the water. It can be also used to collect the sample of the water and store it in air tight container for further testing in the lab.

This system can be equipped with the task specific sensors for various purposes in an industry. This system can perform tasks in the huge water or chemical tanks or the areas where hazardous chemical spilled accidently. The live camera will send the video data to the user for easy operating and giving information of nearby obstacles. The RF module helps in communication over a long distance, about few hundred meters. We will be able to see the live readings of the sensors on the LCD after pressing the button on the remote unit which will in instant decision making In the effluent treatment plant. Thus helping the industry to maintain the effluent waste standards.

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