AMPHIBIOUS ROBOT

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ABSTRACT

To design and develop an amphibian exploring robot capable of operation in constrained mine environment puts a tremendous challenge to the system developers from both scientific and engineering perspective. Very few attempts have been made to fulfil these criteria of versatility in design, ***communication and control****. It can swim as well as crawl over basin floor effortlessly. It is capable of operating at a maximum depth of 10m and can swim at 1 knot. A number of field trials have been carried out for performance testing of the system to ascertain its capability in underground flooded mine tunnels. This paper presents the insight on the design of an* ***amphibian exploring robot*** *for mine safety and disaster mitigation with special features of low power consumption vis-à-vis high mission time.*

1. INTRODUCTION

There has been significant interest in development of robots capable of autonomous amphibious operations within turbulent ocean surf zones. Robot is a machine that can be controlled by computer which is designed to move, manipulate object and accomplish work while interacting with environment. Robots have been widely used to perform number of tasks which reduces the manual work specifically in remote areas where human accessibility is unimaginable. The main applications where the robots have exhibited their excellence include surveillance, tracking target for military purposes and also for disaster management like searching &rescuing victims. This system deals about evolutionary Nonhumanoid robot for surveillance with intruder protection capability. The unique feature of this robot is that it can travel not only on land but also on water surfaces. The amphibian robot is developed by four wheel and two propeller. This project consists of main unit that is mechanical section and remote unit that is microcontroller. The mechanical section consists of DC motors for movement of robot.

1.1 RELATED WORK

Amphibious Robots are not recent invention. The aim of this project is to build amphibious robot. The important things of the project are: to build an amphibious robot for outdoor robotic tasks, to use robot for fire detection
The Great Rann of Kutch is a seasonal salt marsh located in the Thar Desert in the Kutch district of Gujarat India and Sindh province of Pakistan. It is about 7,505.22 square km in size and is reputed to be one of the largest salt desert in the world. This area has been inhibited by kutcha people .So this is hazardous area for human being. We have designed one such robot that will collect sample from such area and send it in laboratory for further verification.

2. WORKING OF MAIN UNIT

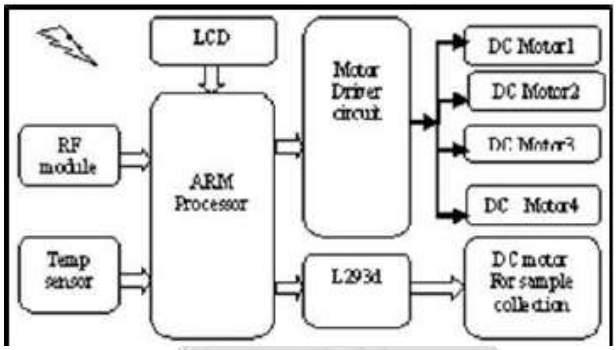

Fig -1 main unit

This system receives signals from remote unit through Module. ARM processor is main element in main unit LPC2138.LPC2138 is 64 pin IC with two ports. 16*2 LCD is used in this project, it simply display the commands & messages given by user. It is5v LCD. RF module operates at radio frequency. The frequency range varies from 30 KHz to 300 GHz. In this RF system, Amplitude Shift keying modulation is present. L293dis used as motor driving IC, provides bidirectional current up to 1A at voltages from 4.5V to 36 V. L293d contains two H- bridge inbuilt driver circuits. At the main side sensor, such as temperature sensor is interfaced to with ARM processor for weather condition monitoring. Robot moves according to Micro electro mechanical system. sensor movement. As per commands received from remote unit, motors on the output side get ON. If robot is performing sample collection task then DC motor will get ON, so the sample get fill into the syringe with the help of sample collection assembly and then sample dropped can be into container when robot comes onto land surface. 12V DC motor is used in this task.

2.1 WORKING OF REMOTE UNIT

Remote unit used to access the main unit. 8051Microcontroller, LCD, Keypad, RF module is main elements of remote unit. Microcontroller is used to control elements in our project. It is an 8 bit microcontroller with 40 pins. It gives various commands like right, left, forward, stop and sample collect, sample drop. 4*4 matrix membrane keypad is used. This 16pin keypad contains 4 rows and 4 column. When we pressed any button it simply display that particular command on LCD and according to that our main unit operates Through RF module remote unit communicate with the main unit. Commands will be displayed on LCD.RF module has frequency range of 30KHZ-300GHZ.

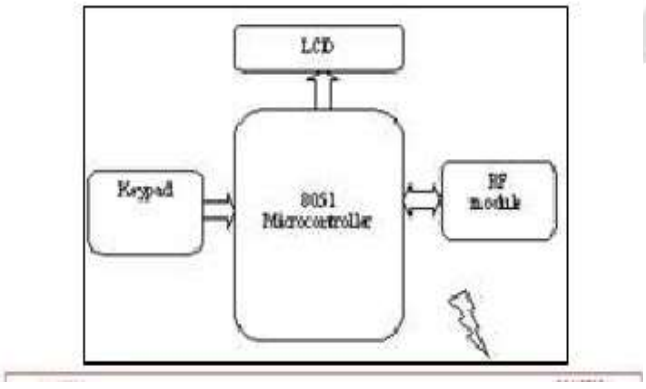

Fig -2:Remote unit

2.2 HARDWARE IMPLEMENTATION

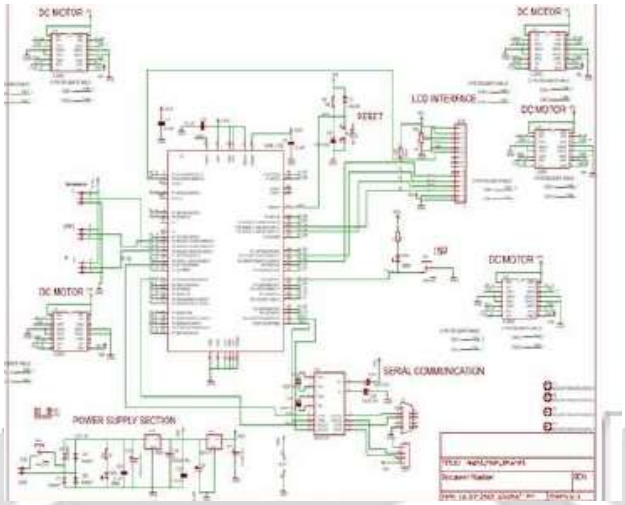

Fig-3: hardware block diagram

3.EXPERIMENTAL RESULTS

The table given below shows results of our project. We operate the robot using some commands like, forward, left, right, and stop.

COMMAND	**USE**
Amphibian Robot	Displays the name of project with temperature
Amphibian robot (land)	Shows robot is on land
Amphibian robot (water)	Shows robot is on water
forward	Moves robot in forward direction
right	Moves robot in right direction
collect	Collects the hazardous water sample

3.1 FUTURE WORK

Our experiment shows some limitations of the current prototype of our robot. Several improvements can be made to develop the next prototype. The speed and power of the motors have to be increased. The power of the motors has to be increased accordingly to produce necessary torques andcompensate the inertia and internal friction of the mechanics. We can also implement one waterproof camera on robot to see under water nature

4. CONCLUSIONS

This paper presents an amphibious robot capable of swimming and crawling. The main objective of this project is to collect sample from hazardous area (marshy field) and send them in laboratory for testing. The main contribution of this article is detailed characterization of how the frequencies, amplitudes and phase lags affect the speed of locomotion, both on water & ground. To the best of our knowledge, this study is the first of its kind. It should provide the useful information for future amphibious robot.

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