CRAGGED TERRAIN SCRUTINY

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ABSTRACT: The main aim of the work is to build a cost effective all terrain robot for surveillance. This work makes sure that the robot works in all type of terrains rather than working only on an uniform terrain. Therefore Special legs has been designed and implemented in this. This helps the proposed system to work in any terrain. This is programmed for surveillance purpose in cragged terrains which is a major challenge for humans. The proposed system is based on Raspberry Pi. A Pi camera is mounted for surveillance purposes in areas which are inaccessible to humans. It keeps record of the recorded details and can be used for future references. In addition to the Pi camera, temperature and chemical sensors are being used for further surveillance. This can be used both in rescue operations as well as wildlife monitoring.

Keywords: *Raspberry Pi, GPIO, LM35*

I. Introduction

Wireless Communication plays an important role in various applications like industrial automation, home automation etc. In some applications, humans have been replaced by automation. Generally human surveillance is done by engaging humans to monitor over the particular area. But this becomes a challenge when certain places becomes inaccessible to humans. Hence Surveillance using Wireless communication has been employed.

Robotics is a set of technologies with the goal of simulating and or replacing man in the development of daily activities or industrial production. The knowledge of control, programming, sensors etc. are to be known for designing a robot. The robots are designed as per human desire to ease off their work. Mobile robotics is a field that is currently thriving. Mobile robots have the capability to move around in their environment and are not fixed to one physical location. Mobile robots can be "autonomous" (AMR - autonomous mobile robot) which means they are capable of navigating an uncontrolled environment without the need for physical or electro-mechanical guidance devices.

II. Existing System

The proposed system presents the design and construction of a obstacle avoiding robot based on Arduino UNO, a Bluetooth module and programming tools. The robot avoids obstacles by the use of ultrasonic sensor. The ultrasonic sensor detects the distance of the object in

front of it and makes decision about its trajectory. When certain distance is being approached, with the help of Arduino UNO and bridge H the motors are being turned on and the robot avoids the obstacle. The bridge H helps the controller to turn the car whatever direction required.

III. Proposed System

The system consists of two units, the robotic unit and the remotely controlled unit. The robotic unit consists of the Raspberry Pi, camera, specialized wheels and sensors. The robotic unit is controlled by the through the remote from mobile devices, laptops etc. with the use of Internet. The DC motors are being used in the robotic unit.

Specialized legs have been designed and attached to the DC motors. The specialized legs are designed to order to avail the robotic unit to work in any terrain.

Raspberry Pi 3 is used for video processing and sending the processed video to the user PC with the help of Wi-Fi as well as internet. The sensors are also connected to the robotic unit through the Raspberry Pi.

IV. Methodology

The prototype is based on experimentations with electronic devices, using wireless communication and sensors to operate the robot.

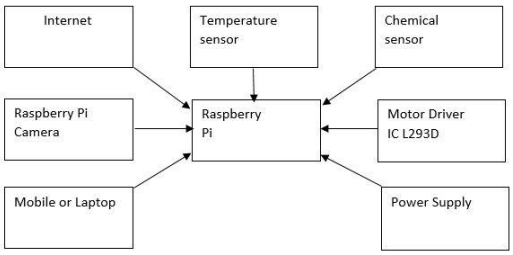

Fig.1. General Block Diagram

The materials used in the design are,

- Raspberry Pi
- Specialized legs
- Temperature sensor
- Chemical sensor
- Motors
- Motor driver
- Camera
- Battery

A. RASPBERRY PI 3:-

The **Raspberry Pi** is a series of small single-board computers. The boards have one to five USB ports. For video output, HDMI and composite video are supported, with a standard 3.5 mm tip-ring-sleeve jack for audio output. Lower-level output is provided by a number of GPIO pins, which support common protocols like I²C. A general-purpose input/output (GPIO) is an uncommitted digital signal pin on an

integrated circuit or electronic circuit board whose behavior—including whether it acts as input or output—is controllable by the user at run time. GPIOs have no predefined purpose and are unused by default.

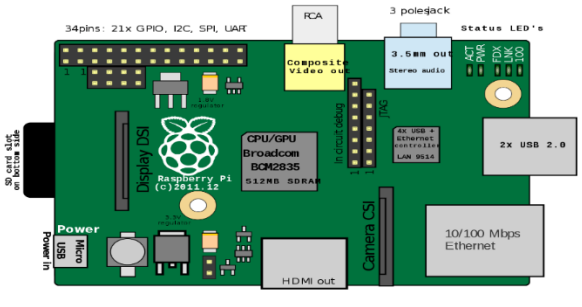

Fig.2. Raspberry Pi

B. SPECIALIZED LEGS:-

The specialized legs are exclusively designed to make the robotic unit work in any type of terrain. The design of the specialized legs is inspired from “Beetle”. The hind legs of the beetle helps it to move in any type of terrain. Hence the inspiration to design the specialized legs to make the robotic unit work in any terrain is obtained from Beetles.

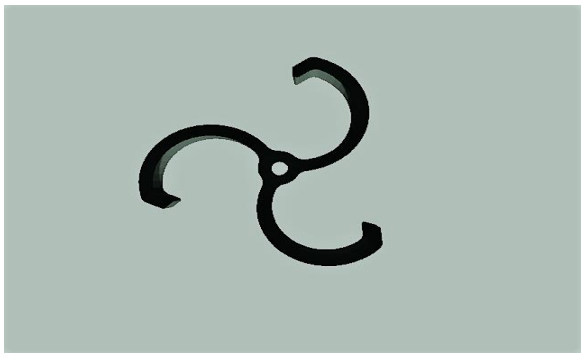

Fig.3. Wheel Diagram

C. TEMPERATURE SENSOR:-

LM35 is a temperature sensor that outputs an analog signal which is proportional to the instantaneous temperature. The output voltage can easily be interpreted to obtain a temperature reading in Celsius. The advantage of lm35 over thermistor is it does not require any external calibration. The coating also protects it from self-heating. Many low-end products take advantage of low cost, greater accuracy and used LM35 in their products. It’s approximately 15+ years to its first release but the sensor is still surviving and is used in any products. LM35 can measure from -55 degrees centigrade to 150-degree centigrade. The accuracy level is very high if operated at optimal temperature and humidity levels. The conversion of the output voltage to centigrade is also easy and straight forward.

LM35 has three pin outs which are:

PIN 1: Vcc, it used as input at this pin we apply +5 V input voltage.

PIN 2: At this pin, we get output voltage.

PIN 3: This pin is used for ground.

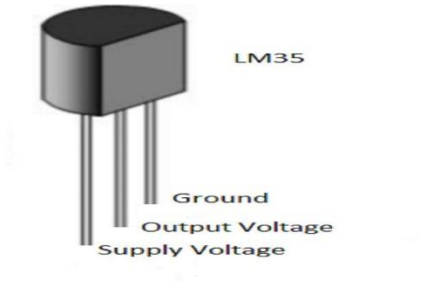

Fig.4. Temperature Sensor

D. CHEMICAL SENSOR:-

This is a simple-to-use Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can detect CO-gas concentrations anywhere from 10 to 500ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance.

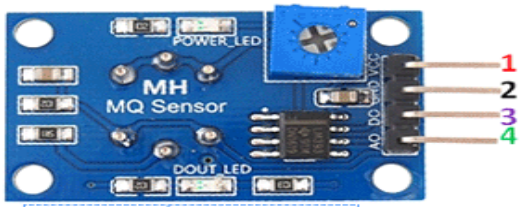

Fig.5.CO sensor

E. CAMERA:-

The 5MP Raspberry Pi 3 Model B Camera Module Rev 1.3 with Cable equips flexible cable for attaching with Raspberry Pi 3 Model B. The 5MP camera module is perfect for small Raspberry Pi projects. The high-definition 5MP camera delivers outstanding photos but can also shoot video, ideal for drones or a CCTV project.

MQ7 has 4 pin outs. They are,

Pin 1- VCC (+5v)

Pin 2- Ground

Pin 3- Digital Out

Pin 4- Analog Out

Fig.6. Camera

F. MOTOR DRIVER L293D:-

The L293D is quadruple high-current half-H drivers. It is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive supply applications.

Fig.7. Motor Driver

V. Result

It was possible to make the robotic unit work by the use of Raspberry Pi programming. The robotic unit was navigated with the use of Internet in uneven terrain, making it possible to work in forest areas etc. It was also possible to understand the Raspberry Pi programming.

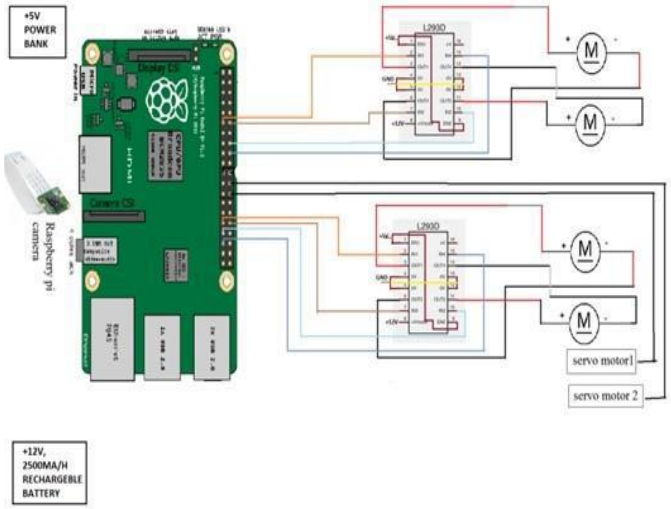

Fig.7. Overall Prototype

VI. Conclusions

It was possible to make a robot that can work in any type of terrain unlike the conventional flat surface.

This type of robot can be handy in technological developments since they would be of low cost and great benefits.

References

[1] Mayank Dharaskar et al "IOT BASED SURVEILLANCE ROBOTIC CAR"

[2] Widodo Budiharto "INTELLIGENT SURVEILLANCE ROBOT WITH OBSTACLE AVOIDANCE CAPABILITIES".

[3] B. Bharathi1 et al "SURVEILLANCE ROBOT".

[4] S Vijayanand & Shantha Selvakumari, R. (2018). Noninvasive method of epileptic detection using DWT and generalized regression neural network. Soft Computing. 10.1007/s00500- 018-3630-y.

[5] S Vijayanand, & Dr R Shantha Selvakumari, "Epileptic Seizure Detection of EEG Signals Based on Support Vector Machine and Db4"" International Journal of Applied Engineering Research, Vol.10, Issue No.20, pp. 19567-19603, April.2015.