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IoT Based Vehicle Robot for Military Services

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Abstract *-- This paper presents a modern approach for surveillance at remote and border areas Tank, any heavily armed and armored combat vehicle. Tanks are essentially weapons platforms that make the weapons mounted in them more effective by their cross-country mobility and by the protection they provide for their crews. Now days the tank is controlling by the humans. Our aim is to control that tank using wireless media; We call it as War-Robot.*

Smart phones are becoming the latest sensation in our country. It currently has by far the biggest margins of any product in the tech sector. One of its important functions is wireless communication which is usually done by an IOT. In this project our aim is to use that IOT for controlling a War Robot. We are much successful in achieving our goal. Our robot runs well and it can be controlled by Android Phone or any compute. Through this project we are able to learn many things which will be very helpful in coming future.

I. INTRODUCTION

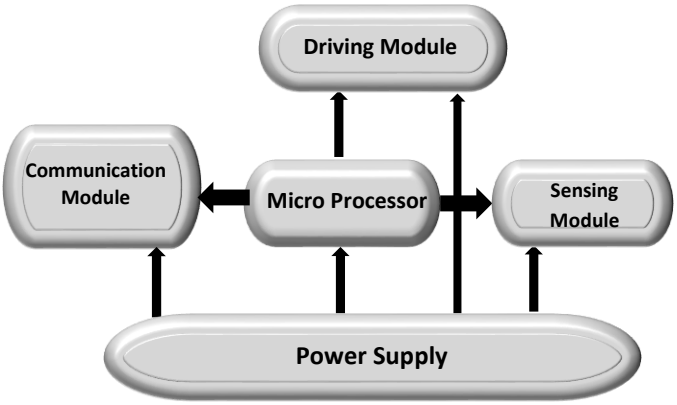
The robot for all intents and purposes is basically electro-mechanical machine or device that basically is controlled either by computer program or with electronic circuit to perform variety of for all intents and purposes physical task. In the today's life robot specifically are becoming indispensable part of for all intents and purposes human life. The robotic technology additionally provides automation in hospital, office and factory. Besides automation this technology withal utilized in Defense forces, Regalement, Space exploration, Security systems and many perilous mission executions.

As the terror is always remains India's first enemy so, the robots are going to utilize for preserving human life. Countries like India are still facing and confronting with customary threats from terrors. Both Kashmir and Mumbai terror attacks have consummated that as far as possible the future of warfare will be handle by robot and unmanned machines to bulwark human life.

In bulwark areas, Robot are customarily miniature in size so they are enough capable to enter in tunnels, mines and minute apertures in building and withal have capability to survive in astringent and arduous climatic conditions for perennial time without causing any harm.

A. Comparison with Existing Robotic Vehicles

- Most of the earlier robot used charged batteries as source of potency. Thus, it becomes inconvenient to utilize this robot for long period.
- Earlier surveillance robots sense only one or two physical quantities.



B. Need for Development

- Use of IOT will provide wide range of operation and manual control.
- Energy efficient by utilizing renewable resource for power supply.
- Used to explore hazardous areas and utilized for espionage purposes.

II. PROPOSED CIRCUIT DESIGN OF ROBOTIC VEHICLE

This multifunctional robot has disseminated into modules which have their own functionality. Due to advancement in technology, these surveillance robots are advent to utilize in remote and bulwark areas.

Fig. 1. Block Diagram of Robotic Vehicle

A. *Power Supply Module*

This robot uses Solar panel of 10 watt as renewable resource of potency supply. As the solar panel is not able to provide perpetual power to robot, a rechargeable 12V battery is utilized to provide consistent power to conveyance which is connected to solar panel through charge controller. Charge Controller is required to obviate over charging of battery in order to increment life span

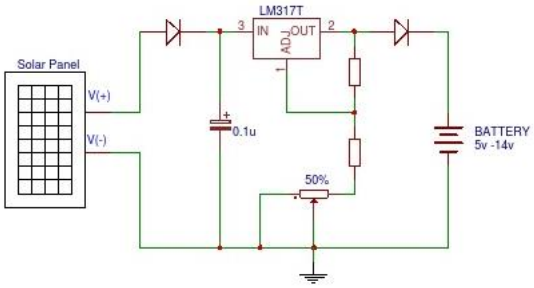


Fig. 2. Solar Panel Charge Controller

B. *. Obstacle Detection Module*

The autonomous robot is able to find the path by utilizing obstruction detection module. The ultrasonic sensor integrated with infrared sensor used to detect obstacles, as the facility of ultrasonic sensor to detect nearby objects is scarce as compare to infrared sensor. Ultrasonic sensor detects object by sensing the Echo signal which are received back after striking with object and withal determine distance of obstruction by evaluating the time between transmission and reception of object.

C. *Sensor Module*

The Sensor module comprises of sundry sensors used to detect intruder, inimical gases, fire and bombs at rescue and remote areas.

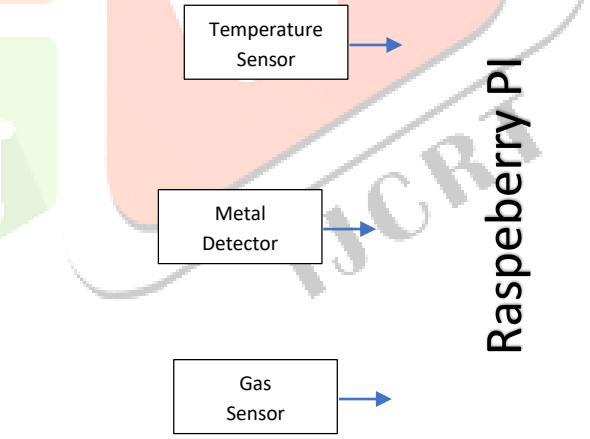
- Camera Sensor is utilized to detect movements of human Zone of Region by sensing heat radiation emitted by human using Image processing algorithms.
- Metal Detector predicated on the principal of electromagnetic induction to detect metallic objects in its circumventing.
- For hazardous weather conditions and fire at restricted areas, Temperature Sensor LM35 integrated with Flame sensor R2 686 used.
- Gas Sensor detects sundry deleterious gases like LPG, Propane and iso- butane when the gases exceed their voltage level.

D. *Raspberry Pi*

The Raspberry Pi is a very cheap computer that runs Linux, but it also provides a set of GPIO (general purpose input/output) pins that allow you to control electronic components for physical computing and explore the Internet of Things (IoT).

Raspberry pi is a powerful CPU coupled with Wireless LAN and Bluetooth 4.1 radio makes it an ideal candidate for IoT projects, because multiple sensors can be connected to it simultaneously. In addition, the Raspberry Pi has a 40-pin GPIO (General Purpose I/O) connector for interfacing with external sensors.

Fig. 3.1 Raspberry pi



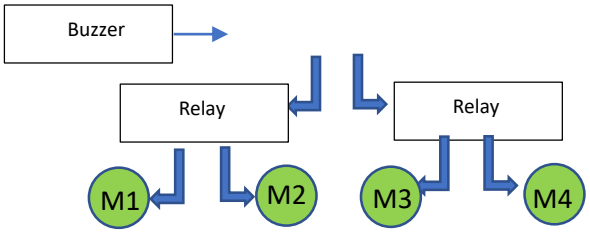
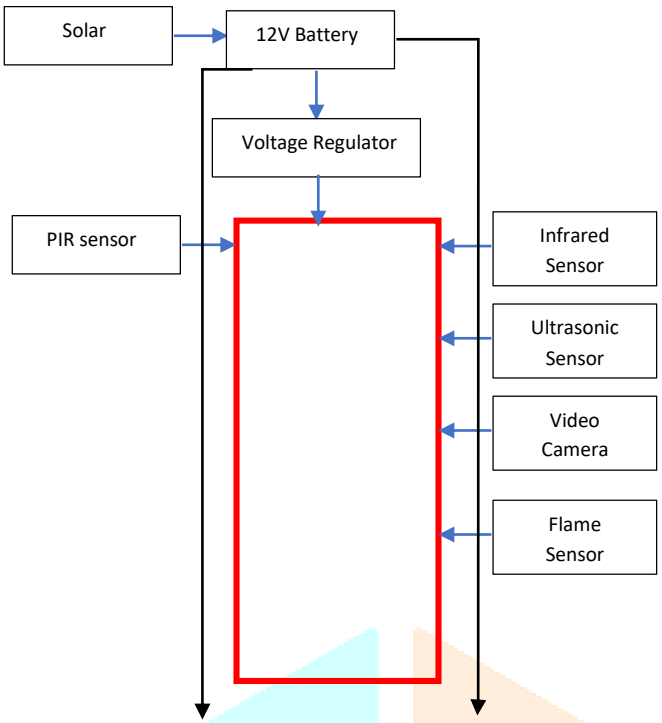


Fig. 3.2 Circuit Diagram of Robotic vehicle


Solar
12V Battery
Voltage Regulator
PIR sensor
Infrared Sensor
Ultrasonic Sensor
Video Camera
Flame Sensor

E. Driving Module

The celerity of robotic conveyance depends upon the Size and RPM (Rotation per Minute) of DC motor. In order to drive the motors a relay module is used to provide to rotate the motor in both clockwise and anticlockwise direction.

III. SOFTWARE DESIGN

We implement the security robot by programmed it in python designed for Raspberry PI. It provides different features such as instinctive IDLE, prevailing compiler with involute optimizations, plenty of hardware and software libraries, and extra implements that provide avail to the utilization.

The following steps to taken to control the movement and functionality of robot shown in Fig. 4.

- The military robot initiates in automatic mode by default.
- Button "A/M" uses to switch from automatic to manual mode.
- During autonomous operation if ultrasonic sensor and infrared sensor detects any impediment, it rotates left or right according to algorithm.
- The alert messages send to user via IOT transmission after the activation of any sensor.
- In manual mode to change the path of robot, user initiates video camera equipped on the robot.
- The video footage provides the live view of surrounding in order to change the path a direction of robot.
- In auto mode it initializes the path finding algorithm and Human detection algorithm to kill the enemies.

IV. Flowchart

This section describes path orchestrating algorithm to probe collision free path. The main issue to design an autonomous robot is navigation, in which path orchestrating is an essential aspect of autonomous robot. So, path orchestrating techniques are habituated to minimize the distance, chance of collision and fuel consumption.

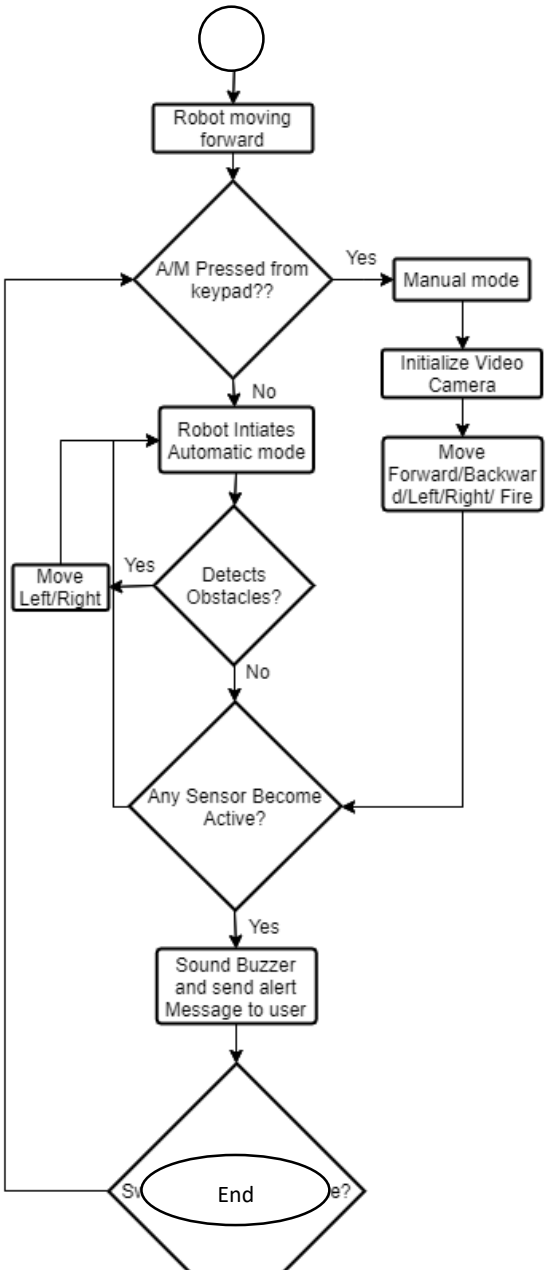


Fig. 4. Flowchart of Entire Design

As the technology proliferates expeditiously, IOT would integrate incipient dimension to world of Information, technology and communication. Currently, the utilization of Internet aggrandizes in our quotidian life and it would lead to development of technique in which

machines, RFID tags, Sensors and Things communicate with each other through Internet of Things (IOT). As IOT is emerging technology has certain challenge which includes providing unique address to each thing, so it has ubiquitous access over the cyber world.

IV. RESULTS

A. Power Consumption of Robotic Vehicle

The power consumption of Robotic Conveyance in manual waypoint by making this waypoint location as current location and perpetuate this process until reach the final location. mode is scarcely more than automatic mode, as the Video Camera is utilizing for live streaming.

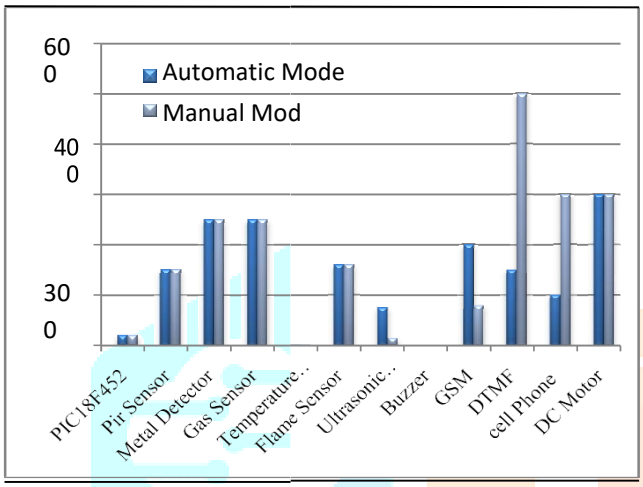


Fig. 5. Power Consumption by Robotic Vehicle

B. Speed of Robotic Vehicle

The speed of robot depends upon Wheel Diameter and RPM (Rotation per Minute) of selected DC Motor.

Distance travelled per rotation

= Wheel Diameter X 3.14

= 10 X 3.14 = 31.14cm

Speed of Robot per Sec =

(Distance travelled per rotation * RPM of motor) /60 sec

= (31.14 * 100)/60

= 51.9cm/sec

Speed of Robot in m/sec = 0.51m/sec

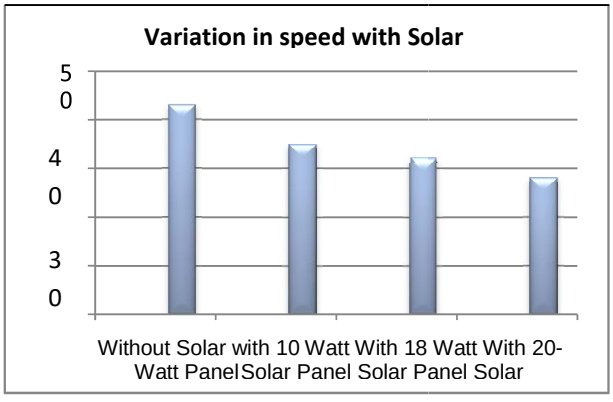


Fig. 8. Variation in speed of robotic vehicle

V. Future Scope

Irrespective of certain advantages of this system require certain amendments which requires wide coverage range, monitor and control through internet and more utilizer cordial.

A. AI in Robotics

Both military and commercial robots will in the future incorporate 'artificial intelligence' (AI) that could make them capable of undertaking tasks and missions on their own.

B. Self-reconfiguration

Self-reconfigurable systems are for long-term missions or wars. In this they require long-term self-sustaining robotic ecology that can handle unforeseen situations and may require self-repair. They want the ability to handle tasks that are not known a priori, especially compared to fixed configuration systems. Sending a robot system that can reconfigure to achieve many tasks may be more effective than sending many robots that each can do one task.

VI. Conclusion

The type of communication technique enhances its range of operation, where the utilizer can control the movement of robot from any component of world by getting live video of circumventing as feedback, compared to earlier robots work on local networks like Bluetooth and ZigBee with constraints have circumscribed operational range. Utilization of renewable source of energy. This robotic conveyance with different sub modules can widely be utilized as surveillance robot for security purport and emergency rescue operations where human cannot footpace and utilizer will be able to alert prior to intruder in his premises.

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