IoT Based Intelligent Robot for Military Application Using Raspberry PI

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Abstract - The system In this project we are making multifunctional robot for military application with Raspberry Pi 3 using MQTT protocol.This robot is more comfortable for military application such as surveillance of interested area. It will provide tactical advantages during hostage situation.This will prove important in application like robots for civil use and military robots.

Key Words: Robot, , Raspberry pi 3, MQTT protocol,Military

1.INTRODUCTION

In Today's world the situation is completely different from the past years because of COVID-19, The monitoring of military areas is essential due to high risk of attack from the enemies, to keep everything good we need surveillance and it is the most important thing which will result in increasing ratio of lives of the soldiers in danger.This will done more effectively by high quality video transmission.There are related products available in market, but the main difference lies in the usability of the product. The available products are mostly passive in nature with little interactivity.

These systems are capable of displaying the information on the screen. They have been designed mostly with Raspberry Pi, LCD (Liquid Crystal Display) or LED (Light Emitting Diodes) for information display. The proposed system is an interactive system which displays the date, time on the screen.

The display can be customized based on the requirement. The system accepts any of the commands namely voice, touch and mobile control commands and behaves interactively.Normal Cameras will be visible to intruder, but Smart mirror which just looks like an ordinary mirrorwill not catch an attention of the intruder. Thus, the camera fitted on top of the Smart Mirror will capturethe photo of an intruder and be able to send an alert of the intrusion without knowledge to the intruded.The intruder will never come to know that he is under constant surveillances. Home automation are mainly created using intelligent IOT devices, IOT is an integrated system of communicating devices in which each device is capable of carrying out tasks by themselves. Smart mirror for home automation have great potential to enhance user experience for accessing and interacting with information. This system is very useful for physically challenged people, old people and children. Everyone can easily access this system easily even while doing their daily chorus. This is one of the major advantages of the system.

We have created a borderline military mechanism that stops the large destruction of human lives. This mechanism also can be used for spying enemy territories throughout vital things within the border and it also can monitor the movements of enemies coming into our country. Since the mechanism is extremely tiny in size it will send to the enemy's camp to watch their movements.

2. SYSTEM DESIGN

The system consists of two major sections - one is the user section and other is the robot section. In that the user section can possess laptop or mobile for communicating with the robot end. Thus by using a laptop or a mobile the user section can be a portable one compared to those that uses a typical stationary computer system. The communication can be performed with RF technology or by using a Zigbee device or by using a Bluetooth technology, but that comes at the cost of limited range. Thus in order to implement the idea of increasing the range we can go connecting the user section with the internet which is the main concept of Internet of Things

BLOCK DIAGRAM
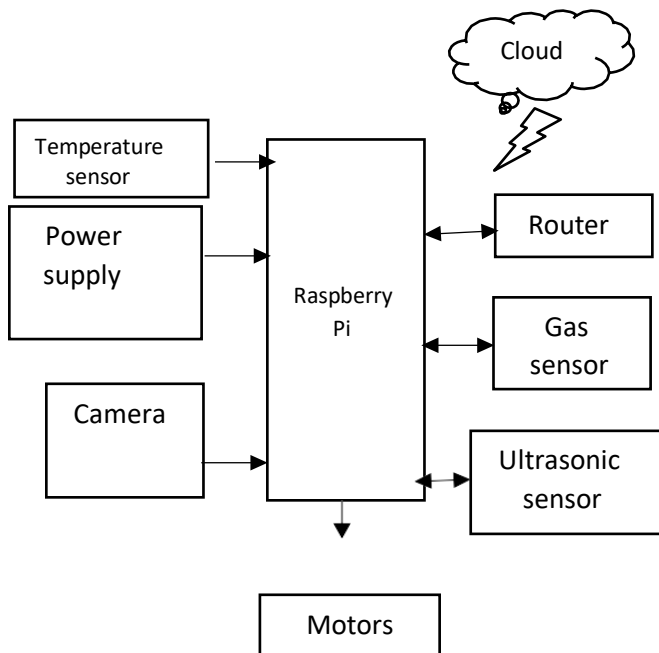
2.1 RASPBERRY PI

Raspberry Pi could be a credit-card sized pc factory-made and designed within the uk by the Raspberry Pi foundation with the intention of teaching basic engineering science to high school students and each different person inquisitive.

The Raspberry Pi incorporates a Broadcom BCM2835 system on a chip (SOC), that has associate ARM1176JZF-S 700 rate processor, Video Core IV GPU and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not embrace integral magnetic disc or solid-state drive, but it uses associate Mt. Rushmore State card for booting and long storage, with the Model B+ using a little Mt. Rushmore State.

2.2 TEMPERATURE SENSOR

Temperature Sensors measure the amount of heat energy or even coldness that is generated by an object or system, allowing us to "sense" or detect any.

The metric scale of measurement is beginning at zero.The scientist temperature sensing uses leader scale that's Kelvin scale.In politician scale temperature thought-about as 492 degrees.

2.3 POWER SUPPLY

The power supply requirements differ by Raspberry Pi model. All models require a 5.1V supply, but the current supplied generally increases according to model. All models up to the Raspberry Pi 3 require a

microUSB power connector, whilst the Raspberry Pi 4 uses a USB-C connector.

Two 6V batteries are connected in series to provide a 12V power supply for the motors. From these batteries power supply is also given to the arduino and other parts that require power supply for their effective performance.

2.4 ULTRASONIC SENSOR

Ultrasonic sensor is a device that can measure the distance to an object (obstacle) by using sound waves at a particular frequency. It provides a 3cm to 3m range. It can work in any lighting conditions. Thus the robot easily dodges obstacles present on its way.

2.5 GAS SENSOR

Monitor the surrounding air in an easy and efficient manner with sensors. A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave.

2.6 DC MOTORS

Motors that operate on 12V DC power supply are used. These are rotary electrical machine that converts direct current electrical energy into mechanical energy. The motors used are of 30 rpm speed of operation.

SOFTWARE USED

CAYENNE SOFTWARE

It is an object relational mapping (ORM) framework. It allows a programmer to work with objects abstracted from databases. It is used to design prototypes and IOT based applications as it is a drag and drop project builder thus allowing devices to get easily connected to the internet. Through this software we can easily control the robot with the help of the buttons present in the software. Both manual and automatic mode can be performed with this software

WORKING

We are using four motors in this project with help two driver modules. Raspberry pi is controlling the direction of robot with help of motors. Which is having four directions like forward, reverse, left and right sides.

The Ultrasonic sensor is used to detects the object. When the object is detected then the robot will move

backwards and take right side with help of Ultrasonic sensor. Temperature sensor is sensing the temperature in the present weather conditions and shows temperature on the LCD display and cloud.

RESULT

INTERFACING FOUR MOTORS WITH RASPBERRY PI:

The interfacing 4 motors with Raspberry pi as show in fig. The four motors are connected to the pin 7, pin 11, pin 13 and pin 15 of the Raspberry pi through the L298N driver module. The four pins are control the movement of robot. The movement of robot as some directions like forward, Backward, Left-side and Right-side.

The circuit as need continues power supply. So, we can use 12V Rechargeable Battery. And also use 12V to 5V converter module.
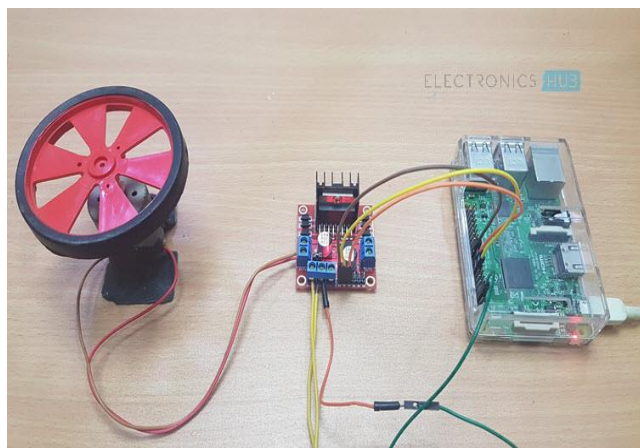

Fig -1: Figure

INTERFACING CAMERA AND SENSORS WITH RASPBERRY PI:

The camera is interface with Raspberry Pi by the USB. The Ultrasonic sensor trigger and echo pins are connected to the pin 16 and pin 18 of the raspberry pi. The Gas sensor is not connected to the directly with the Raspberry Pi because, sensor is produce Analog out So, we can use ADC module. The temperature sensor is used to measure the temperature of the nature and that data send to the Cloud server.
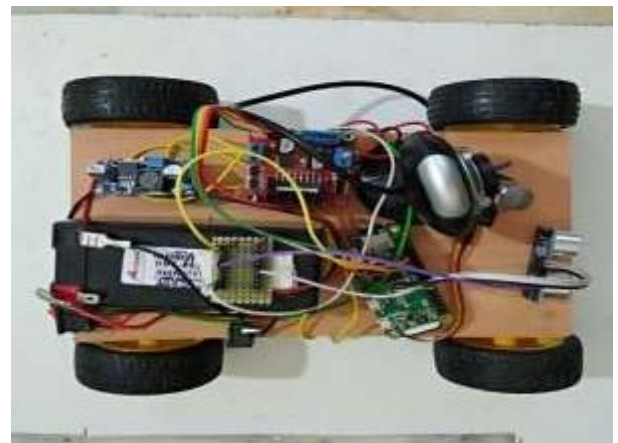

Fig -2: Figure

3. CONCLUSIONS

In this paper, the framework for making a robot for surveillance purpose is proposed. It overcomes the problem of limited range surveillance by using the concept of IOT. We can control the robot with the help of laptop/mobile manually. Automatic monitoring can also be done. Our proposed robot is small in size thus maneuvering into area where human access is impossible.

The moving object in the path of the robot is determined applying the SAD algorithm. The robot takes its path by avoiding the object position to reach the target. The path planning is depending on the image processing and microcontroller based embedded system. The surveillance robot gives us live streaming video according to that we give the command.

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