

Robotic IP-Based Surveillance using IOT

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Abstract: *In contemporary world, the word "surveillance" has become increasingly important. Various articles with respect to expanding crime percentage has being eminent day to day, yet can't follow out because of absence of confirmations. . In such a circumstance, one must accompany extreme attention to detail and got with oneself, which can be given by Surveillance. Observation is only checking from a good ways through devices made by hardware, like even robots. IOT (web of things) stage associates these devices so clients can perform tasks with contraptions living anyplace on Earth. This canny security robot utilizing IOT will kept at central issues of home to really take a look at about the presence of any interloper. The camera fixed with robot gives the image of gatecrasher in a 'live-stream' strategy. The Node MCU joined GSM module tells about the presence of gatecrasher when PIR sensor connected to robot distinguishes a human and the bell at the client end begins sound in this way cautioning him against the gatecrasher. Every one of these are controlled, observed and directed under Raspberry pi board. With the given website page that connected to an IP address, one can work this robot by means of portable associated with Internet, which is a critical resource.*

Keywords: Raspberry Pi, esp8266, GSM module, PIRsensor, buzzer, webpage, IP address, Internet.

I. INTRODUCTION

Regarding security concerns, the term "surveillance" has become a very important and necessary part of everyone's life. We are learning about the news that the crime rate is continuing to rise daily. In order to implement surveillance, the main goals are to create high-level technology that operates at a rapid pace and to create a very sophisticated capability for controlling robots. To make them a reality, advanced control algorithms can be used to design a robot that is quick, accurate, and more intelligent. These technical advancements are also necessary to achieve high performance. Robots were previously managed using wired networks. They have been developed recently to make them more user-friendly, allowing user command to function. In order to meet the standards that we can use it in android as a multimedia control system for construction- related computer science Robotics operations and applications, as well as computer systems for controlling them. The accessibility and availability of low-cost, circuit board-style computers like the Raspberry pi have made it possible to build a finite number of low-cost automated and controlled systems. The intelligent robot employing IOT that is suggested in this study works in conjunction with the use of straightforward tools, wireless communication, and connectivity with the robot, as well as an effective control system and sophisticated controlled algorithm. Robotics is a discipline of engineering that entails developing a fine prototype, producing that prototype, and assigning an operation that may carry out an individual's or a group's activity. Even with basic mechanisms and parts, installation robotics using a robot that gets computerized or manually or automatically managed. The number one goal of this project is to reap a clever surveillance ecosystem in opposition to fake situations that happens. It is an interactive robotic with duplex communication technically i.e. it could talk with human, it can carry out the venture given through the consumer and informs the user about the appearance of intruders, if any. Robot is a gadget that was been assigned for doing particular task. It's far primarily based on program i.e. software program and hardware. Nowadays industry turning into present day and that they use automatic technology to carry out risky jobs. That is helpful to minimize lifestyles threat of human and animals. For domestic security in fashionable, we use digital camera, that's set up constant location which include doors, windows, partitions and ceilings also, however consists of some defects consisting of price efficiency, rigidity, infrastructure, being at a set role and robustness. Therefore, changing robotic with camera covers these defects at a most volume and performance. This robotic is manipulate by means of using laptop, Android cell or a laptop through internet site. The camera captures video and sends it lower back to controller's

tool through net and other techniques.

II. LITERATURE SURVEY

Anas f. Ahmed, Ruaa h. Ahmeed, Tamara z. Fadhil "layout and Implementation of Surveillance robotic using ATmega328 Microcontroller" states that the human can't record video thoroughly in essential situations and environments. This paper presents plan and execution of a reconnaissance failed robot in light of Wi-Fi convention and windows working framework. The development headings of the mechanical tank are constrained by a GUI configuration utilizing visual studio improvement climate. The robot can send constant video to the expected beneficiary. Furthermore, it can pick and place objects utilizing 4-DOF automated arms. These incorporates a gripper with two fingers. The benefits of this robot are mechanical arms are utilized to get and put objects. The camera introduced on the support sends the pictures and gives the live feed persistently. The drawbacks are the battery duration is restricted. The automated arms can pick, without a doubt, extremely lighter things. Chinmay Kulkarni, Suhas Grama, Pramod Gubbi Suresh, Chaitanya Krishna, Joseph Antony "Reconnaissance Robot Using Arduino Microcontroller, Android APIs and the Internet" proposed a four-wheeled observation robot utilizing the Android OS based versatile and Arduino UNO Microcontroller. Their undertaking comprise of GSM, a camera and a GPS module. The use can be profitable through APIs (Application Programming Interfaces) accommodated the Android OS. Additionally, the structure cost get expanded to extraordinary degree according to the plan. It is been controlled from web empowered PC and a microcontroller-PDA interface dwelling on the robot. The camera contribution of the telephone is used to catch and file the live video by means of robot. The robot is been controlled in view of visual criticism from the portable. Four engines accomplished a zero turning span. The camera is been connected to a stepper engine, which makes it adaptable for scene catching. The caught video's quality is been expanded utilizing further methods of picture handling on the far off PC accordingly disposing of the requirement for extra DSP equipment on the robot. The benefit is as opposed to utilizing GPS, camera and GSM modules and so forth independently we utilize a cell phone, which accompanies every one of the above parts inbuilt. It makes the robot minimal expense. The restriction is the working of robot is restricted by the handling force of the cell phone.

G. Anandravisekar, Anto Clinton T. Mukesh Raj L. Naveen's "IOT Based Surveillance Robot" is tied in with fostering a robot that plays out the demonstration of reconnaissance even in homegrown regions. It is been meandered around and give general media data from the given climate and to send that data to the current client. As a piece of this undertaking, the robot could be constrained without help from anyone else with the assistance of an electronic gadget through Internet of Things (IoT) and the live web based of video could be conceivable both at day as well as around evening time with the assistance of remote camera that the robot sorted out with. The robot can be computerized or physically controlled with Arduino microcontroller. Different sensors have been utilized by the robot to gather information and lets the Arduino microcontroller to get it, through which the way of behaving of robot is controlled. However, a few drawbacks are been noticed.

III. PROPOSED METHOD

The flowchart displayed below represents the main algorithm of functioning of our robot i.e., Fig 1. The block chart of the robot is as displayed in Fig 2. The information from Ultrasonic and PIR sensors is given as contribution to Raspberry Pi. It sends and gets the information through Node MCU. Hub MCU will be in duplex correspondence. Yield signal is given to GSM module and ringer from Node MCU. Additionally, engine drivers runs by Arduino board's circumstances.

The functionality and procedure of working is explained below in detail:

- The proposed robot moves in a specific given way at a specific website through engine drivers fixed to case when worked by client through site page in portable.
- The Raspberry is the key functional board that directs the robot and parts that are associated with it.
- However long no obstruction has confronted, the robot continues taking the contribution from the client i.e., it enjoys giving live stream data and development according to the headings given by client
- When it went over any snag, ultrasonic sensor wakes up, alongside Passive Infrared sensor.
- Presently, the activity of PIR Sensor starts. PIR Sensor assuming been fixed in such a way that on the off chance

that the individual is human, it makes a motion to raspberry pi from which, Node MCU gets the sign.

- Hub MCU processes the sign to both the GSM module and alert bell.
- Then, at that point, GSM module communicates something specific like "Human identified" to the given individual telephone number. Alongside that signal at guard/individual starts to make sound for a particular time frame.
- On the off chance that the PIR sensor doesn't distinguished any human, then, at that point, then another sign will communicates to both the GSM module and ringer in regards to that it's anything but a human, so a message will be sent as "object recognized at x cm" to the getting cell phone. Additionally, the ringer rings.

However long the hindrance showed up for robot, working of engine drivers gets ended for some time.

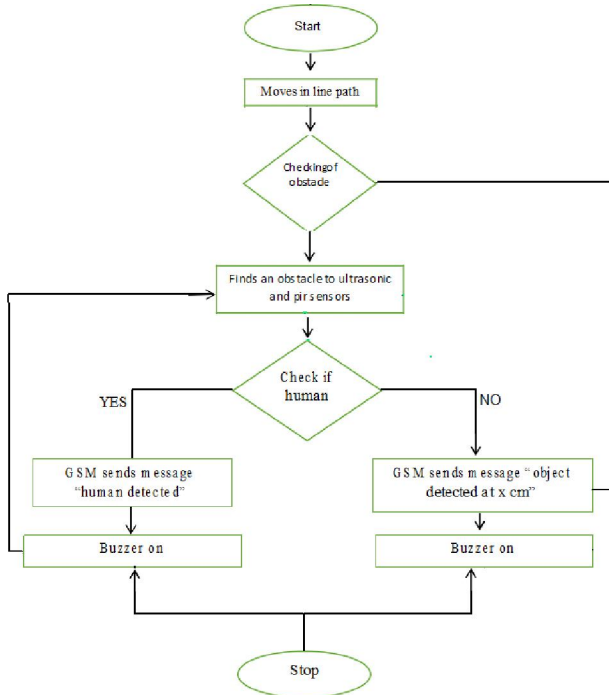


Fig 1. Flow chart of working system

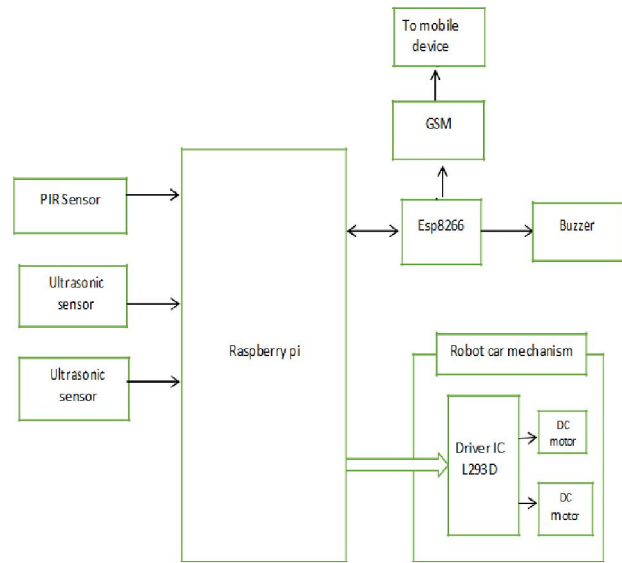


Fig 2. Block Diagram of working system

IV. COMPONENTS USED

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4.1 Raspberry Pi

Raspberry Pi, as displayed in Fig 3, is a little, charge card measured PC. It conveys all cycles that a work area conveys. Broadcom BCM 2836, processor of 900MHz clock speed with quad-center ARM Cortex A7Video Core IV GPU and with 1GB of RAM are given inbuilt. SD card had been used for the data storage. Also, this has an Ethernet port for network connection, USB port for connecting exterior USB devices, micro USB slot for power supply, HDMI port to connect to display and General Purpose Input Output (GPIO) pins to connect to other hardware devices.

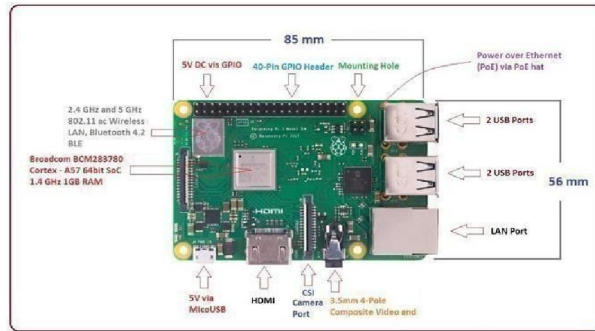


Fig 3. Raspberry Pi

4.2 Ultrasonic Sensor

A brilliant technique for dissecting the distance is given by the Ultrasonic sensor in Fig 4, through it made as a well-suited sensor for limited applications like distance examination between immobile or moving things. Communicating to a principal circuit board is a trigger. A solitary I/O pin for an ultrasonic explosion signal is been utilized by the trigger and afterward the reverberation return beat is tuned in. The time expected for the reverberation return is been estimated, and the worth is gotten back to principal circuit load up as a variable-width beat through a similar I/O pin. This is utilized to stay away from crash with obstructions.



Fig 4. Ultrasonic Sensor

4.3 PIR Sensor

PIR sensor, as a rule, is utilized to recognize whether a human has moved in or out of the sensors range. They are little, modest, low-controlled, quick to utilize and doesn't break down. All PIRs, around, will have somewhat various details, however they have same working system. It sense the people that shows up inside its reach. In the event that anybody been found under the scope of PIR it sends the data to the raspberrypi. The design is as displayed in Fig 5. It has 3 terminals DC voltage (+5V), Ground, Output



Fig 5. PIR Sensor

4.4 Buzzer

Piezo buzzer, shown in Fig 6, is a tiny speaker in general, which can be fixed straightforwardly to the primary circuit board. This deals with the rule "Piezoelectricity", which is an impact where the state of specific gems gets changed when power is applied. At the right recurrence, the precious stone is made to sound by the use of an electric sign. Allow the sticker to be pulled off, if any. Ringer must be told to which pin the signal is on, what recurrence (in Hz) needed, and length (in milliseconds) that is needed to keep the bell loud. It is utilized to caution when obstruction or human is identified. It has 3 terminals VCC, I/O pin, GND.

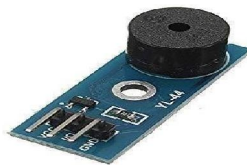


Fig 6. Buzzer



4.5 Node MCU

ESP8266, called as Node MCU, as displayed in Fig 7, is a Wi-Fi System on Chip delivered by Espressif Systems. Being profoundly coordinated chip to give full web connectivity in a small package, this can be sent in numerous ways like an outside Wi-Fi module, utilizing the norm AT Command set Firmware by interfacing it to principal circuit board utilizing the sequential UART, or straightforwardly act as a Wi-Fi empowered miniature regulator, by programming another firmware utilizing the gave SDK. The GPIO Pins permit Analog and Digital IO, positive PWM, SPI, I2C and so forth

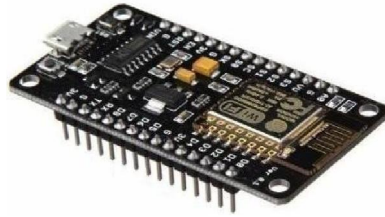


Fig 7. Node MCU

4.6 Chassis

Robot chassis, as shown in Fig 8, is a basic frill that especially upholds the creation of a robot. Case is an exceptionally fundamental part in building robots as well as for the majority mechanical gadgets. Principally, the PCB, embellishments and different parts, which got associated with it are get upheld by it as they sorts out on the undercarriage. It is been especially planned and sent in advanced mechanics and in numerous other mechanical designs. The parts that are communicated, are been taken care of by undercarriage. This have straightforward development with an acrylic plate and further openings are seen on the plate for interfacing parts and frill on it.



Fig 8. Chassis

4.7 GSM Module

A GSM module is a type of printed circuit board to establish communication between a mobile device or a computing machine and a GSM or GPRS system as shown in Fig 9. Here, the modem is a significant part. It is furnished with a power supply circuit and correspondence interfaces (like RS-232, USB 2.0, and others) for PC. A GSM modem can be utilized as a devoted modem gadget with a sequential, USB or Bluetooth association, or in basic, it very well may be utilized as a GSM highlights empowered versatile. Sending SMS to the user is utilized



Fig 9. GSM Module

4.8 Servo Motor

Servomotors are been proposed mainly for specific applications like motion control of a particular component. Here, we utilized a DC servomotor to control the movement of camera connected. In power appraisals, they are accessible. The rotor of a servo engine is planned longer long and more modest in width so it has low latency. Fig 10 addresses a servomotor in working condition. .It is been utilized to control the movement of camera.



Fig 10. Servo Motor

4.9 DC Motor

Dc motor, as shown in Fig 11, is a significant part utilized moving of the robot. Here we utilized engine of 500 rpm. It sorts out to the wheels through the engine drivers. Taking care of the power from them, these infuses the development into wheels according to the given command. These engines are utilized to give movement of the robot.



Fig 11. DC Motor

4.10 Camera

A camera, as shown in Fig 12, is a gadget that is utilized for video web based purposes. With Raspberry pi cam, yet additionally with an ordinary webcam, video web based is conceivable. This webcam gives a video fair quality alongside unpretentious association with principal circuit board. Webcam of any particulars can be installed with PCB utilized. The camera catches the pictures or it gives live streaming.



Fig 12. Webcam

V. RESULT

Apart of Hardware that's been used, IP assumes a significant part in interfacing robot to UI's. For this, IP Address of Active Raspberry Pi is utilized. The Supply is given to Raspberry Pi to which the wide range of various parts are associated and code is put inside RPi. Here, we utilized "High level IP Scanner" to identify the IP Address of RPi. From that point, to design the code and virtual correspondence, a device called "VNC Viewer" is been utilized.

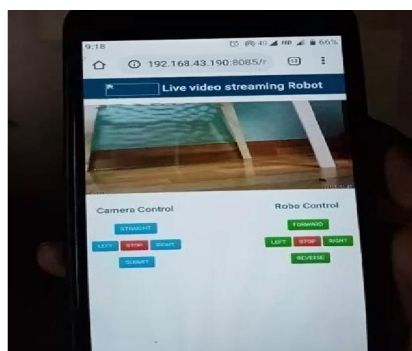


Fig 13. User Interface of Webpage



Note a point that a Strong Internet Connection is been given to robot through nearby Wi-Fi of which the certifications are known. Fig 13 shows the UI of website page that had been associated with the IP address. With the IP Address, one can get to the robot from any spot, as long as the client is been given a decent web association alongside the robot, which must be in ON condition. As displayed in Fig 14 and 15, parts that are required are been modified and associated on the undercarriage gave. Robot functions according to the order given by client as displayed in Fig 16.

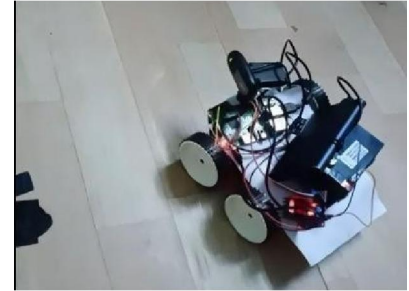
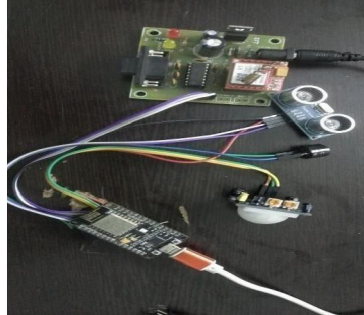
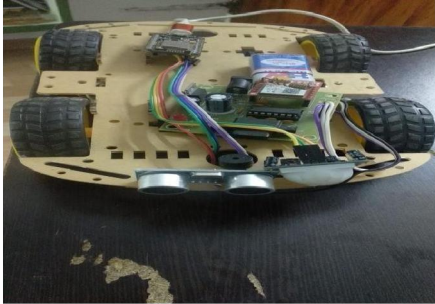


Fig 14. Chassis of robot

Fig 15. Connection between key components

Fig 16. Equipped Robot

VI. ADVANTAGES

- Remote observation can be exceptionally valuable in situations where it is perplexing for the links to be laid - Museums, Heritage structures, Industrial plants, and so on.
- Framework of Wireless observation framework is modest somewhat to introduce and keep up with, when contrasted with wired network including Fiber Cables.
- Remote Networks are quick and brilliant in data transmission.
- Indoor observing of stockroom, grounds observation to actually look at the inappropriate exercises.
- Making video observation of any calamity impacted region where individuals can't go to protect the people in question.
- Field view observation of indoor and open air like business buildings, manufacturing plants and government associations. For homegrown purposes, where people can't proceed to look for something, these robots can be utilized.
- Fundamentally, these sort of reconnaissance robots assists in regions with loving gated networks where the security is earlier especially in evening.

VII. CONCLUSION

This can be presumed that we can foster a convenient observation robot to work in homegrown purposes. We can involve this as spying robots at evening particularly where it tends to be useful to manual security particularly at gated local area type regions. These robots can be made even with straightforward parts and sensors subsequently diminishing expense and intricacy. By furnishing the robot with Raspberry Pi which emerges all the center capabilities, controls and prepares accordingly making it Robust inside, Surveillance is likewise made productively functionable. In this report we made sense of the most common way of planning and executing a model of brilliant observation robot which can be involved in any event, for outrageous open air application. Utilizing Internet of Things idea, this observation robot turns out to be a lot of productive, as live real time video and duplex kind of correspondence gave.

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