



Night Vision Spying Robot Using IOT and Android Application

¹ Suryansh Verma, ²Shashank Pandey, ³Harshil Anand, ⁴Pranvesh Srivastav, ⁵Mr. Anuj Aggarwal

¹Student, ²Student, ³Student, ⁴Student, ⁵Assistant Professor

¹Electronics and Communication Engineering,

¹SRMS college of Engineering and Technology, Bareilly, India

Abstract: This Night Vision Spying Robot using IoT and Android application is meant to develop a night vision spying Robot which will be controlled using an Android phone and administered over IOT. The prototype consists of an Arduino Uno Board, microcontroller which is programmable in Arduino IDE, a battery source, motor drivers, motors, a RF module, camera, WIFI module, Temperature and PIR sensor. Reason for using Arduino uno is that it is much cheaper and reliable microcontroller. The robot is capable of moving forward, backward, leftward, and rightward directions. The wireless camera is able to take pictures in real time and process through image processing technique. An application called, "Arduino Bluetooth controller" is installed on the user's android device and the commands are given to the robot to move. WIFI module is used to connect the robot to the internet over cloud to be monitored over internet. Temperature sensor can detect temperature of surroundings. PIR sensors can detect presence of any human being.

Index Terms - Spy Robot, Arduino Uno board, Arduino Bluetooth control, Temperature sensor, PIR Sensor, Camera, WIFI Module, IOT, Android Application.

I. INTRODUCTION

The SPY ROBOT is a small robot which can be used in military spy work. It consists of two parts- robot and control panel. Communication between these two is achieved by RF link. Objective of the spy robot is mainly to cover and provide surveillance of areas which are not easily accessible. The surveillance provided can be of aural or visual nature. Mainly due to its small size in design, it will be able to explore and access areas which range from to a small crevice to a large planet. SPY ROBOT can be used in many fields of application, some being scientific, military and many more. Robots are meant for making the tasks easy and safer. Robots can replace the presence of a human and can do dangerous operations.

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II. LITERATURE SURVEY

The earlier Spy robots were remotely controlled robots which were equipped with a camera, transmitting video data to the intervention troop. They were made too small and compact so that they can be easily transported. They were designed small for spying, surveillances and inspection purposes. Human detection was done by using ultrasonic sensor which also contain a camera which was used to record, transmit and analyze conditions of human body. They used an ultrasonic sensor in order to detect the existence of live humans and a low-cost camera in order to acquire a video of the scene as needed. When detected a sign of a living human, the ultrasonic sensor triggered the camera to show live scene.

In this project we are using PIR sensor as it has certain advantages over ultrasonic sensors. Using ultrasonic-sensors we can detect both living and non-living objects but on the other hand the PIR sensors are specifically used for human detection. The PIR sensors are sensitive to the infrared radiations emitted by the human body which improves our project's accuracy and makes it more precise in a destructive environment. In addition to this, our project will also give us real time information of the climatic conditions. Other sensors include temperature, fire. This robot can further be operated using android application and monitored through IOT.

III. COMPONENTS REQUIRED:

1. Arduino Uno

It is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins, a power jack, 6 analog inputs, a USB connection, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), an ICSP header and a reset button. It contains everything needed to support the microcontroller. It is connected to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.[1]

2. Bluetooth Module:

Bluetooth module HC-05 is used which is a serial communication device. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.

These modules can be used at various baud rates such as 9600 to 460800 but the default baud rate is 38400. The module is typical -80dBm sensitive, has RF transmitter power up to +4dBm, operated at low power 1.8V, 1.8 to 3.6V I/O and it is PIO controlled, UART interface with programmable baud rate. [2]



Fig 1: Bluetooth Module

3. Battery Source:

Rechargeable Battery source of 12V is used and is reduced to 5V using Voltage Regulator 7805, as the components XLR8 and Bluetooth takes 5V and not more than that.

4. L298N Motor Driver:

The L298N is a dual H-Bridge motor driver which permits speed and direction control of two DC motor simultaneously. The module can drive DC motor that have voltages somewhere in the range of 5 and 35V, with a maximum current up to 2A..

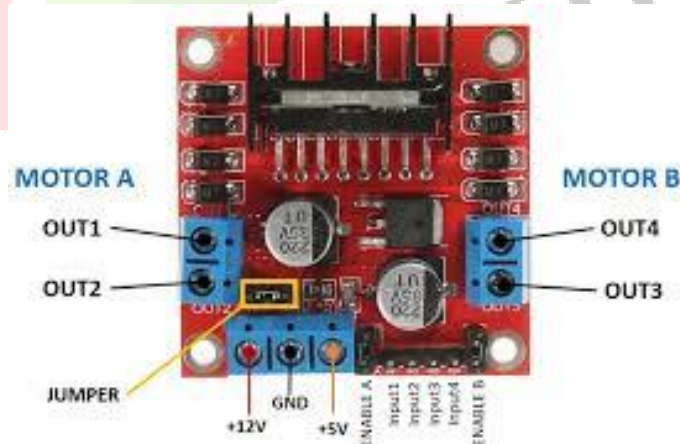


Fig 2: L298N Motor Driver

5. Temperature Sensor:

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μ A from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a -55°C to 150°C temperature range, while the LM35C device is rated for a -40°C to 110°C range (-10° with improved accuracy). The LM35-series devices are available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D devices are available in the plastic TO-92 transistor package. The LM35D device is available in an 8-lead surface-mount small-outline package and a plastic TO-220 package.

6. *Night Vision Wireless Camera*

The Night Vision Wireless camera has below mentioned features:

- Automatic Motion detection features.
- Minimum 100 meters transmission distance without block.
- Imaging Sensor 1/3 Inch-CMOS.
- CMOS Total Pixels:628*582(PAL)/510*492(NTSC).
- Minimum Illumination:1.5 lux
- View angle:62 Degree
- Camera Head weight: 15 gm.

Fig 3: Features of Wireless Camera



Fig 4: Wireless camera

7. *PIR Sensor*

A passive infrared sensor is an electronic sensor which measures infrared (IR) light radiating from objects in its field of view. They are used in PIR-based motion detectors.



Fig 5: PIR Sensor

8. *Node MCU*

Node MCU is a low-cost open source IoT platform. The name "Node MCU" combines "node" and "MCU" (micro-controller unit). It basically collect the data from the sensor and transfers the raw or processed data to a local or cloud-based server. Node MCU is an open source and LUA programming language-based firmware developed for ESP8266 WIFI chip. [3]

IV. WORKING:

STEPS INVOLVED IN CREATING THE BOT

1. FABRICATION OF BOT WITH WHEELS: The square (or rectangular) base is the most logical base when building your robot, rectangle can accommodate a 4- or 6-wheels configuration or even a tank tread.
2. SETUP OF ARDUINO – Install the Arduino software along with their libraries. Go on tools for the selection of Board and Ports through which our robot is connected. Go on tools for the selection of Board and Ports through which our robot is connected. Now select the ports. IN order to select the correct port its necessary to know from which port our robot is connected. After verification our interfacing program is ready to burn on microcontroller. For this we have to click on the UPLOAD option which directly loads our program on to ARDUINO microcontroller.
3. FABRICATION OF BOT WITH OTHER COMPONENTS: Interfacing of Driver Modules and Dc Geared Motors, camera module, ESP 8266 module, etc. with Arduino -
 - To control the DC Motor, it's important to control its speed and rotation direction.
 - Our goal is to interface the camera with Arduino with are much efficient, low cost and easy to configure
 - Sensor mounting process.
 - Relay unit fabrication on PCB.
4. FABRICATION OF POWER SUPPLY CIRCUIT.
5. IOT FABRICATION AND CONFIGURATION WITH DEVICES: In this project IoT is used for network connected devices embedded in the physical environment. These modules or sensors interconnects and provide information in terms of there output over internet, or to allow other systems to reach out and act on the world through actuators.
6. APPLICATION DESIGN FOR ANDROID PLATFORM.
7. SETTING UP OF RF TRANSMITTERS AND RECEIVER

The technology proposed in this project is INTERNET OF THINGS as well as microcontroller along with all these modules. In all the modules the C language is proposed to get into use for coding. AI based sensor systems. Bluetooth based system has also been used with application. Image capturing system has also been introduced in it along motion detecting and environment detecting modules. IOT plays an important role in data collection. There is android application Introduced as the robot can be also be monitored through android OS based devices. The robot is also designed for night time surveillance or without daylight using a basic easily available flashlight for the prototype.

The robot can also be controlled by android device over Bluetooth using serial communication . This technology is fundamentally used to transmit the data among two devices considering the scope of the two gadgets. To provide the orders to the robot through the android application, it is necessary that the Bluetooth module is connected with the robot. 5]

PROPOSED BLOCK DIAGRAM

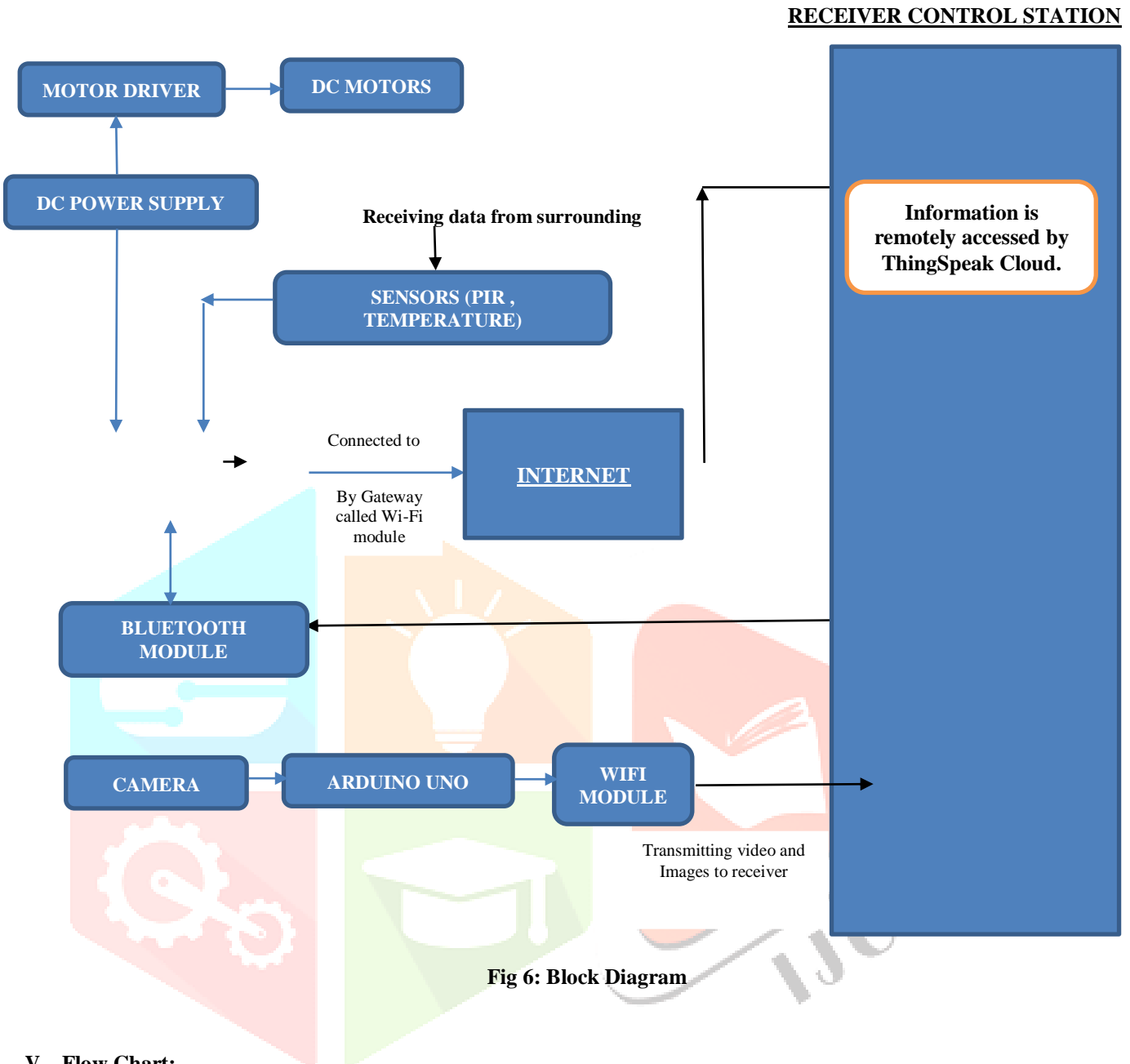


Fig 6: Block Diagram

V. Flow Chart:

When the power supply is switched ON, then all the sensor gets ON. Temperature sensor will permanently monitor the temperature of the environment. If any living object comes in the range of the PIR sensor, it will detect the human body and the camera gets ON.

Camera captures the data and sends it over the IOT Platform.

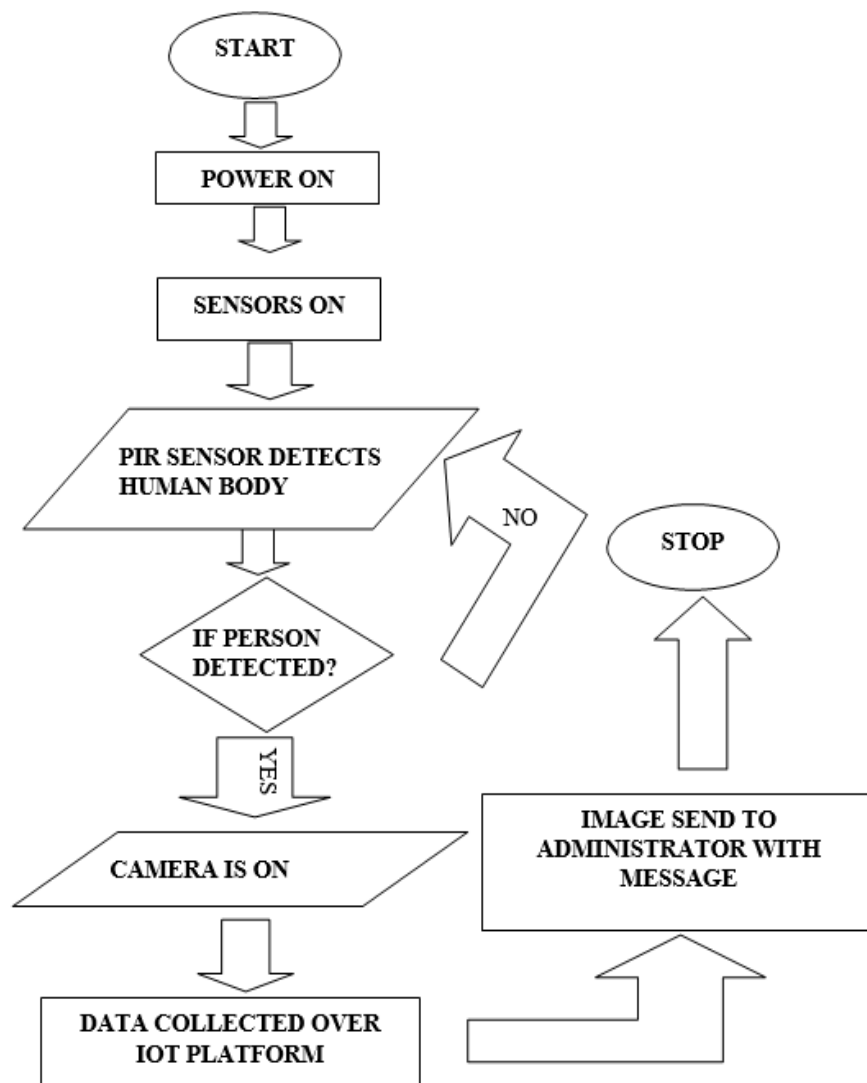


Fig 7: Flowchart

VI. APPLICATIONS

- It can be used in Military operations.
- It can be used in Surveillance along border.
- It can be used for Search and Rescue Operation during any natural calamity.
- Moving in dangerous environment.

VII. FUTURE SCOPE

The size can further be reduced to desired size. Since the Bluetooth is used in this project so the scope of this robot is little because of which it can't be worked over far distances. This limitation of range can be solved by using modules with much bigger and secured range like zigbee and WIFI. In future, the robot functionality can be enhanced by embedding much sophisticated modules and sensors to monitor the environment more precisely. It may also have a bomb disposal kit to diffuse bombs in the war field without manual intervention. It can be used as:

- Industrial Robot: As an Industrial Robot it can be used to pick heavy machinery which can be operated using an Android application. [5]
- Bomb Defuse Robot: A person can defuse a bomb using this robot even by staying far from the bomb. A camera is used for the user visibility of the bomb.[5]
- Flying Robot (in drone form): This robot can be turned into flying robot so that it can easily cover the harsh environment conditions.
- Fire Extinguisher Robot: This functionality can also be added.

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