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# GSM Based Embedded System to Control Robot for Wildlife Observation

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**ABSTRACT:** The main objective of this working concept is to observe and monitor the wild life for the secured preventing measures of the residencies. In this working model a robot is used for the monitoring purposes. The monitoring robot is been provided with the RF transmitter so that the information grasped from the forest location can be transmitted through it. After receiving the information from the transmitter through the camera it can be monitored by the users at the station. The robot consists of the GPS and the GSM module so that the communication is applicable flexibly without any deviation. The robot can be operated by the relay drivers interfaced into it. Through the GSM module the robots locomotion can be controlled and in case of any emergency the exact location of it can be examined further or periodically as per the user's convenience. The LCD display is used to describe the status of the working model and in case of the emergencies and critical situations the message can be send to the station through the GSM module.

**KEYWORDS:** GSM module , GPS , Arduino UNO (Atmel Atmega 328), Wireless camera, Relay drivers , Robot, RF transmitter and receiver, 16\*2 LCD, PC or Television.

### I. INTRODUCTION

Wildlife observers need to get a close footage of wild animals by getting into their habitats. Well it is not always safe to get close to all wild animals. So for this purpose we put forward this wildlife observation robot with night vision capability. This robot can be operated wirelessly by users using just their android or keypad mobiles. The robot also has a wireless camera that sends footage of wild animals by operating this robotic vehicle from a safe distance. This system consist of an Arduino(ATME ATMEGA 328) unit used for processing user sent commands. These commands are received by the system through a GSM module. The Arduino then process this data and passes on signals to driver motors. The driver motor now in turn operate the motors by providing desired signal outputs to drive the vehicle movement motors. Also when the Arduino receives the camera directional change signal through GSM module, it then forwards this signal to camera motor in order to achieve desired camera angle. Thus this wildlife observation robot is allows for safe wildlife observation using an android or keypad device control.

### II. RELATED WORK

Various researches have been made by different researchers in developing this project. However , they serve a different application and have different technologies implemented. Some of those papers are mentioned below stating their technology and application.

Paper1:Have configured an android smartphone which can control a robot via Bluetooth technology. The phone uses motion sensors and records the gestures send via an android mobile phone. It alo has an inbuilt accelerometer and Bluetooth module for controlling the moments of the robot.



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Paper2:Has developed android controlled robot automation. Main of his project was the transfer of information wirelessly between a smartphone and the robot and developing the robot and its communication system underneath a low price and open source philosophy. He used 3D design technique to style the structure of the robot with the facilitation of parametrical modelling software. The style, when fed to the 3D printer can print the parts of the robot in a layered manner one by one and can then use these parts to assemble the robot simply. He has used Arduino microcontroller and Wi-Fi technology in this robot.

Paper3:Have invented a pick and drop robot. They wanted it to be used for diffusing bomb remotely with safety. For the robotic arm, they used a pair of motors and another pair as the wheels of the robot for controlling the moment. Connectivity is established using Bluetooth. The microcontroller used is LPC2148. They had also attached a wireless camera for remote surveillance. They have worked on this project mainly for industrial and military applications.

Paper4:In his paper has projected design to develop a robotic system which has a wireless camera attached to it for surveillance. Bluetooth was implemented in his project for providing connection between robot and smart phone. Wireless night vision camera was used for providing remote surveillance. The video which is recorded by camera is then transmitted to TV unit through radio frequency signal. He used 8051 microcontroller for the robotic unit.

Paper5:Has evolved the method of Bluetooth technology by developing an android app for a robot which is driven by a microcontroller. The central idea of his work is to show that one android app can be operated using totally different electronic devices. Vito M Guardi has invented a communication protocol for android smart phone and a robotic platform over a Bluetooth.

Paper6:Have published a paper based on a project in which the smartphone is capable of IFLYTEKTEK voice as well as handwritten input. The design is therefore robust, suitable, and practical for use and it also ensures the reliability of the full system. For connectivity between the smartphone and robot, Wi-Fi is used. Use of Wi-Fi makes it easy and absolutely convenient for controlling the robot so that it can act according to the commands.

### III. EXISTING METHOD

In the existing method there were no automation for monitoring and controlling the instruction of the wild life behaviour instead sensors are incorporated along with the controller for preventing the animal or wildlife inheritance. The sensors can only detect the abnormalities in the parameters that are fed within them and it can only convey the message about the wildlife behaviour so there were no option to monitor and control the invading of the wildlife behaviour, so there occurred a necessity for a new proposal for preventing, monitoring and controlling the wildlife behaviour. The block diagram of existing system consists of Bluetooth module, an Arduino kit and a couple of motors for driving the car.

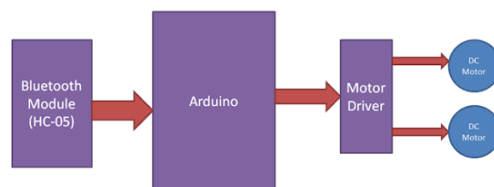


Fig1. Block diagram

### IV. PROPOSED METHOD

In the proposed method the robot which is controlled by the Arduino is deployed for monitoring and controlling the wildlife behaviour. The robot will be in its motion along the direction controlled by the controller and it can monitor the scenarios that are occurring in the forest through the camera interfaced within it. Those information can be sent or transmitted to the station or to the residences, which creates an awareness about the inheritance of the wildlife behaviour in order to take the precautions in the earlier priority. The implementation of wireless transmitter and receiver would take or carry the information as fast as possible. The recordings or the snapshot captured from the camera can be sent to the

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residences which can be monitored from the receiving end. Also, in the proposed method the image can be sent along with the location of the robot which is very much needed for the officials to track the location.

## (1) BLOCK DIAGRAM

The block diagram of our system consists of a GSM module, an Arduino kit, GPS, Sensor and a relay drivers for the robot.

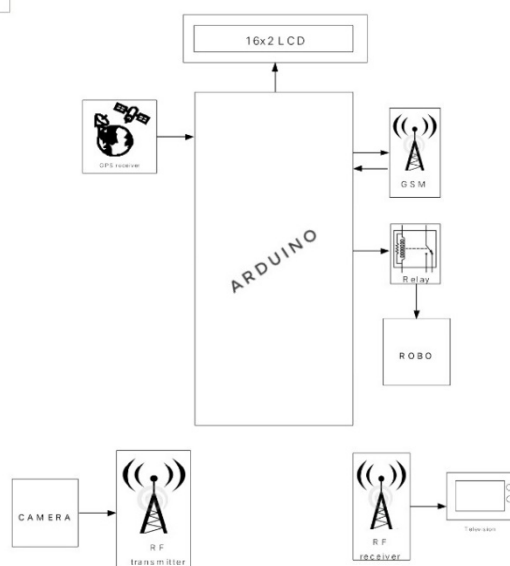


Fig 2.block diagram of the circuit

## (2) ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header ,and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATmega8U2 programmed as a USB-to-serial converter .



Fig 2.1 Arduino Uno (ATmega328)

## (3) GSM MODULE

GSM (global system for mobile communications: originally from group special mobile) is the most popular standard for mobile phones in the world. GSM is a cellular network, which means that mobile phones connected to it by searching

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for cells in the immediate vicinity there are five different cell size in a GSM network –macro, micro, pico, femto and umbrella cells. The coverage area of each cell varies according to the implementation environment.



Fig 2.2 GSM module

### (3.1) Subscriber Identity Module(SIM)

One of the key features of GSM is the subscriber identity module, commonly known as a SIM card. The SIM is the detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets. Alternatively, the user can also change operators while retaining the handset simply by changing the SIM. Some operators will block this by allowing the phone to use only a single SIM, or only a SIM issued by them; this practice is known as SIM locking, and is illegal in some countries.

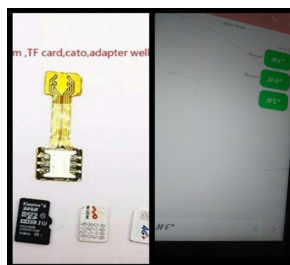


Fig 2.3 SIM slot and messaging

### (3.2) Android Application

An application was developed in the software android studio. App can be installed on an android smartphone to control the RC unit. The app shows buttons for movement of the car in different directions. These commands are as follow: left, right, backward, forward and stop. The code for the app is written in java.

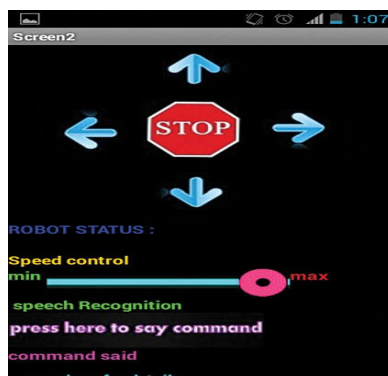


Fig 2.4 Android application



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### (4) GPS (GLOBAL POSITIONING SYSTEM)

The GPS is a space age navigational system that can pin point your position anywhere on the Globe, usually within a few yards or meters. This amazing technology is available to everyone, everywhere, day and night, and best of all, at no cost for use of navigational data. GPS uses a constellation of 24 satellites in precise orbits approximately 11,000 miles above earth. The satellites transmit data via high frequencies radio waves back to earth and, by locking onto these signals; a GPS receiver can process this data to triangulate its precies location on the globe.



Fig 2.5 diagram for GPS

### (5) RELAY DRIVERS:

A relay is a switch worked by an electromagnet. It is useful if we want a small current in one circuit to control another circuit containing a device such as a lamp or electric motor which requires a large current, or if we wish several different switches contacts to be operated simultaneously. When the controlling current flow through the coil, the soft iron core is magnetized and attracts the L-shaped soft iron armature. This rocks on its pivot and opens, closes or change over, the electrical contacts in the circuit being controlled it closes the contact.



Fig 2.6 Relay drivers

### (6) WIRELESS CAMERA

Wireless security cameras are closed-circuit television (CCTV) cameras that transmit a video and audio signal to a wireless receiver through a radio band. Many wireless security cameras requires at least one cable or wire for power; refers to the transmission of video/audio. However, some security cameras are battery powered, making the cameras truly wireless from top to bottom.

Digital wireless camera is the transmission of audio and video analog signals encoded as digital packets over high-bandwidth radio frequencies.

## V. CONCLUSION

The progress of science and technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day. We can imagine about the future in which thing we may occupy every place. The proposed system based on arduino microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform several tedious and respective tasks. Though it is designed keeping in mind about the need for industrial and domestic applications it can extended for other purposes such as commercial and research applications. Due to the probability of this technology “GSM BASED ROBOT USING ARDUINO FOR WILDLIFE



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OBSERVATION” system is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

## VI. FUTURE WORK

The future work for this working model can be enhanced by the employing several securities as robot models at the borders of the forest locations which can be preventive measure in greatest aspects for a secured life of residencies. The incorporation of sensors along with the robot model would be a preventive measure for the robotic models and their employments within the border levels in order skip and escape from the attacks of the wildlife behaviours.

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