
Mobile Operated Solar Powered Spy Robot

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Abstract

Use of renewable energy is one of the main concerns of the modern world. Solar energy is one of the greatest and effective sources of renewable energy. So using solar energy every kind of electrical or mechanical device or machine can be operated and here we are using the same concept to operate our spy robot. Spy Robot can be a multitasking embedded system which can be worked under several technologies to control its operations like RF signalling or DTMF technology. In this project solar power is used to provide power supply to the machine so that it can operate multiple tasks like live human detection, metal detection, etc. Each unit is consisting of its own typical circuitry which is to be controlled by the mother unit of the machine i.e., microcontroller. DTMF technology is been used for transmitting and receiving the command from base station to the operating station. The base station is nothing but just a mobile phone who's each key indicate a different command for the operating station i.e., the robot. One of the main features of the machine is its capability to operate in the night which is achieved by night vision camera.

Keywords: *DTMF, Renewable energy, RF signalling, Multitasking.*

INTRODUCTION

A spy robot can be defined as an embedded system which is made to full fill security and surveillances purposes. It can be made

for multitasking operations. We are working on a multitasking spy robot. For any multitasking embedded machine, the main issue is always the power consumption and

the source of that power to be provided [1]. As each unit may consume above 5v for its proper working it's hard to provide such voltages for each unit because it will make the machine bulky and inefficient. So the resolution that we have found in our machine is that to make solar energy as the prime source of power for the machine. It uses a solar panel of 12v to provide power for each unit and also it charge up the battery connected to the machine.

Another main feature is the DTMF (Dual Tone Multiple Frequency) technology. DTMF is the signal to the phone company that you generate when you press an ordinary telephone's touch keys. Using DTMF the range of the transmitting signal becomes very large. It extends up to the point where the phone networks are available [2]. So every key on the transmitting cell phone indicates a different command for the receiving module. To control all the sub unit of the robot microcontroller is being used as the mother unit of the system.

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LITERATURE SURVEY

According to Radhika N. Shringarpure and her team, during terrorist attacks, hostage situations or crimes like bank robbery, etc. where humans cannot enter the crime scenes, a robotic machine can move around such places and provide information to the rescue team. The videos can provide ample information to the rescue team. This entire work will be done on ARM processor with Linux operating system ported on it and a web camera [1].

According to Pema Chodon and her team, a PIR based spy robot can also be made. Passive Infrared Radiation (PIR) sensor detects the change in infrared radiation of warm blooded moving object in its

detection range. According to the change in infrared radiation, there will be a change in the voltages generated which was amplified and used to turn ON the webcam and lighting system through relay. Software was developed to capture and record the video [2].

According to Wai Mo Mo Khaing and Kyaw Thiha, spy robots are remotely controlled robots, equipped with a camera, transmitting video data to the intervention troop. They proposed a movable spy robot with a remote controller by using PIC 16F628A and PIC 16F877. The spy robot is made up of a wireless camera, an antenna, batteries and four movable wheels. The two different PICs are used to remotely Control along wireless system and to control Spy robot. CCD camera is used to capture information [3].

According to Dhiraj Singh Patel and his team, a spy robot can be used to avoid the attacks like 9/11. They proposed a robot which is in form of a vehicle mounted with a web cam, which acquires and sends video to a TV or PC. The movement of vehicles are controlled by microcontroller [4].

According to Aaruni Jha and her team, spy robot can be used in war zone to transmit real time videos. Their project focuses on building a RF based spying robot attached with wireless camera that can reduce the human victim. This robot sends the signal to the base station using wireless camera [5].

According to Mr. Lokesh Mehta and Mr. Pawan Sharma, a spy robot can also be controlled by using a computer system. It can act as a live telecast of audio and video information's from the surroundings and can be sent to a remote station through RF signals & also able to access information when surrounding have darkness because its include extra circuitry arrangement which detect darkness and automatically switch on its flash light [6].

TRANSMITTER & RECIEVER SECTION



Fig1. Transmitter (using DTMF)

At the transmitter end only a cell phone is required which uses DTMF technology to transmit its signal. Each key of the cell indicated different command which is to be fetched at the receiver end.

The receiver end receives the command send by the mobile phone at the transmitter end and act accordingly. The mother unit or

the central unit of the receiver side is the microcontroller unit which directly receives the input command signals and thus generate equivalent response for the sub units connected to it such as human detection, wireless night vision camera, metal detector as shown in the above block diagram and further explained in the below circuit diagram.

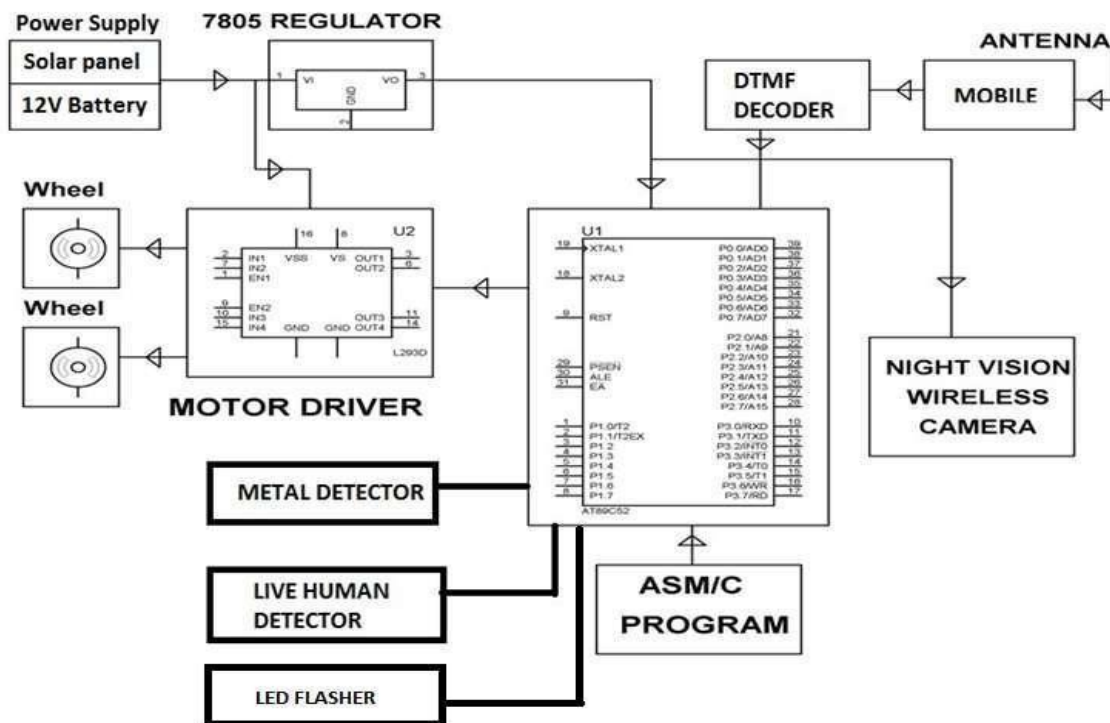


Fig2. Block diagram of the receiver end [2]

SIMULATED CIRCUIT DIAGRAM

The four main sub unit of the system are as follows:

1. Human Detection Unit

Human detection unit is based upon an electronic device known as PIR (Passive Infrared) sensor which indicates the presence of a human being by measuring the temperature difference in the surrounding. PIR is consists of several temperature sensors which calculate the radiation difference that is exerted by a human [14].

2. Metal Detection Unit

Metal detector works upon the principle of change in magnetic flux when in contact with a metal. Basically it consists of metal coil in which electric current is flowing so that a magnetic field is generated into that coil. When that coil comes into the contact to any other metal the amount of flux associated with the coil is changed and the system indicates that a metal is detected.

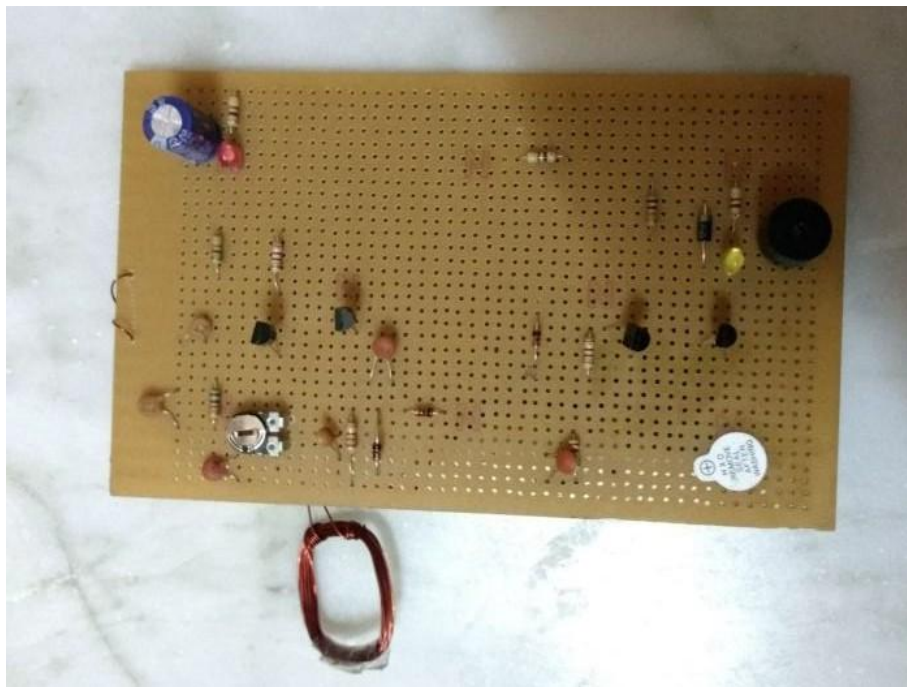


Fig3. Metal detector circuit

3. Wireless Night Vision Camera

Wireless night vision camera is one of the most exotic features of this system. Wireless camera robots are very useful especially in terms of security and surveillance. But every camera is not able to work in both day and night. There are especial types of cameras designed for working in the night

and are known as night vision camera. Vision is all about the spectral range and night vision camera is designed to work in the spectral range of the night light. Night-useful spectral range techniques can sense radiation that is invisible to a human observer.

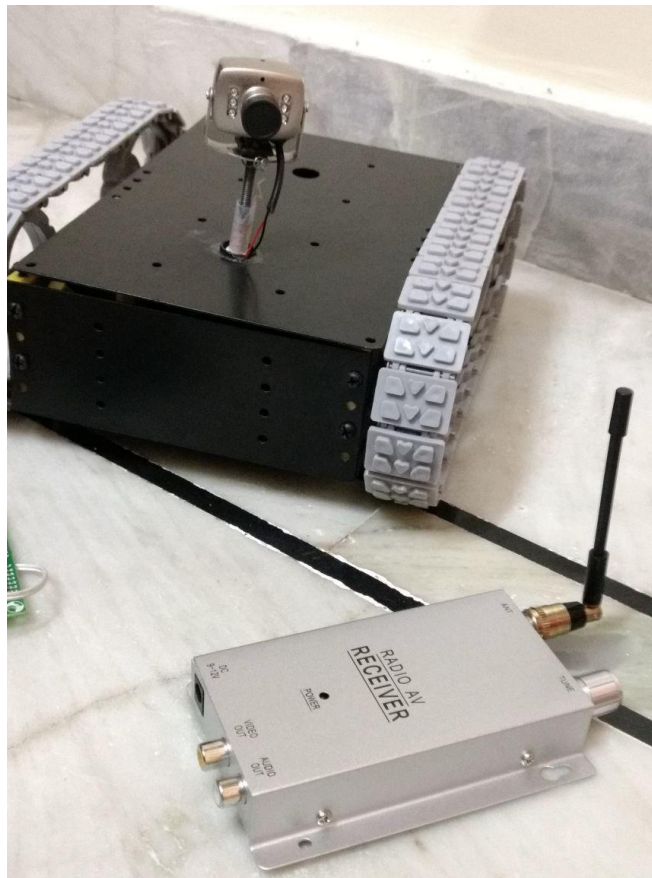


Fig4. Robotic boy with a wireless night vision camera

4. LED Flasher Unit

Basically a spy robot is made for spying purposes i.e., it should work without attracting any attention of its surroundings but at some instant it may happen that it needs to indicate its presence to someone known and for this possibility LED flasher can be used [2].

The circuit below illustrate the simulation of the purposed system. According to the circuit diagram each key of the transmitting cell phone is denoted as a switch. Before

starting the system one need to enter a password that is also denoted by the keys. Without this password the system will not start any operation. Once the password is entered then the user need to command and control the system by pressing appropriate key in the transmitting cell phone. During the entire time user can observe the motion of the robot by use of the video transmission that is performed by the wireless camera attached to the robot. To start any unit of the robot a key is specified i.e., after pressing that key that particular unit will operate.

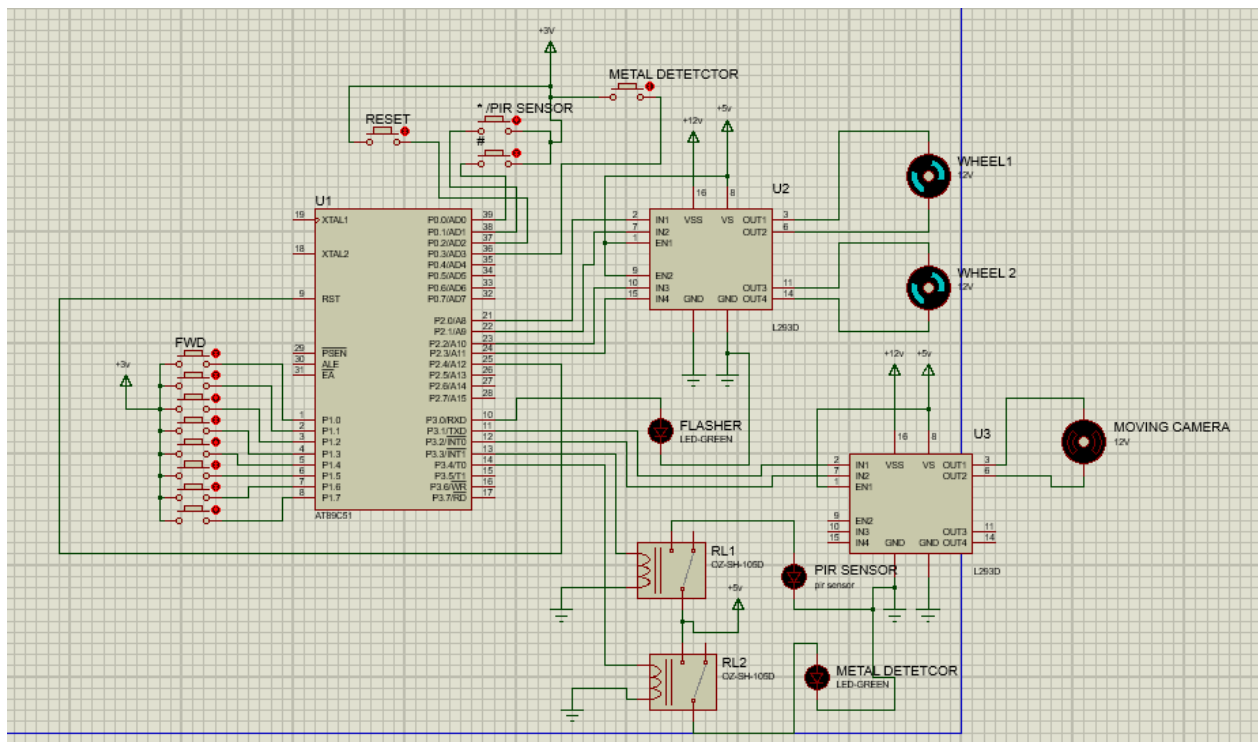


Fig5. Simulated Circuit diagram of the system

IMPLEMENTATION ISSUES

Following are the issues faced while implementation of the system:

- 1) Power generated by the solar panel is not sufficient to drive the whole circuitry together.
- 2) Accuracy of the metal detector is still to be enhanced.
- 3) Proper working of PIR is still to be achieved.
- 4) How to show the output of the metal detector and the human detection unit to the user.

EXPECTED RESULTS

All the sub units have been simulated successfully and the hardware is expected to work properly and according to the subject of the system. Working of solar panel is also been up to mark and the password authentication process is also ready. So this features are expected to work efficiently in the hardware system. Hence we can now start the hardware building process of the system. This system is expected to work efficiently in rough terrains also.

CONCLUSION

So finally the theoretical and sub practical part is completed and the goals of these have been achieved as the simulation and the sub hard units have been tested successfully. One of the issues that were arising in the start was password authentication but now its coding has been tested and simulated results are appropriate. Also this robot can work in tough terrains due to the tank chain type wheeled body. Its operating range is very large due to the use of DTMF technology while the camera range is quite a short. But as it is a prototype model it is bearable. When an organization will adopt it, they can expand the range of the camera by using high range cameras. This system will be applicable and adoptable for industrial, military and social applications in terms of security and surveillances.

FUTURE SCOPE

This spy robot can be modified according to the need of the user. The working terrain will not be an issue as it uses the tank chain system for its movement. For military purposes it can be unleashed with more features like bomb placing. As it is a multitasking machine it is controlled by the programming so by changing the program

and few components more features can be added to its working. The use of Solar Energy is the main feature of this machine which can be enhanced by placing more efficient panel which is more costly. Industrial surveillance process can also be modified and enhanced using this spy robot.

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