
Long Range Solar Powered Mobile Controlled Spy Robot

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Abstract

The intention of this paper is to reduce human involvement in security and surveillance activities. This machine is developed for providing security excellence in favor of mankind so that more and more human life can be saved. The main function of this machine is to transmit real time video records to the base station where it can be visual. Base station is nothing but just a mobile which is used to give commands to the machine. This operation is achieved by a wireless camera located at the top of the machine. In addition to this it also have much more features based on sensors like live human detection, metallic body detection, and LED flasher. These features make this machine more compatible and acceptable to different categories such as military applications, industrial use and for social use also.

Use of renewable energy is one of the foremost concern of modern era and in this machine solar energy is effectively used to provide energy to the whole system by charging up the chargeable battery. Due to high range of controlling this machine can be operated wherever the mobile signals are available as it uses DTMF technology which is based on mobile keypad tone.

Keywords: *Renewable energy, DTMF, sensors, wireless camera, chargeable battery.*

INTRODUCTION

So far in the previous papers we have seen the comparisons of the different existing machines and also the working of each individual module of this spy robot [1] [2] [3]. Now this machine has taken its proposed look and almost ready to work in field. As it is a spy robot the users can make changes to its body and program accordingly to make it feasible for their application and purposes.

But the fundamental of this robot will remain same every time i.e., its basic purpose which is to transmit video records of the field to the base station without any human involvement in that. Other feature like human detection or metal detection can be used occasionally or either can be replaced by some other operation depending upon the application. This robot is consisting of a night vision wireless camera which can operate in the range of 200 m and can work in night also [12].

The range of the camera can be increased if the user wants by replacing it with high range camera. 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.

The main controlling unit for this machine is an AT80S51 microcontroller whose work is to control and provide commands to each working part of the machine. Solar powering is one of the main attraction of this machine. We are using solar panel to charge up the battery inside the structure. Further the deep working of the robot is explained in the below paragraph.

OPERATION

The whole operation of this spy robot can be understood by a flow chart in fig.2.

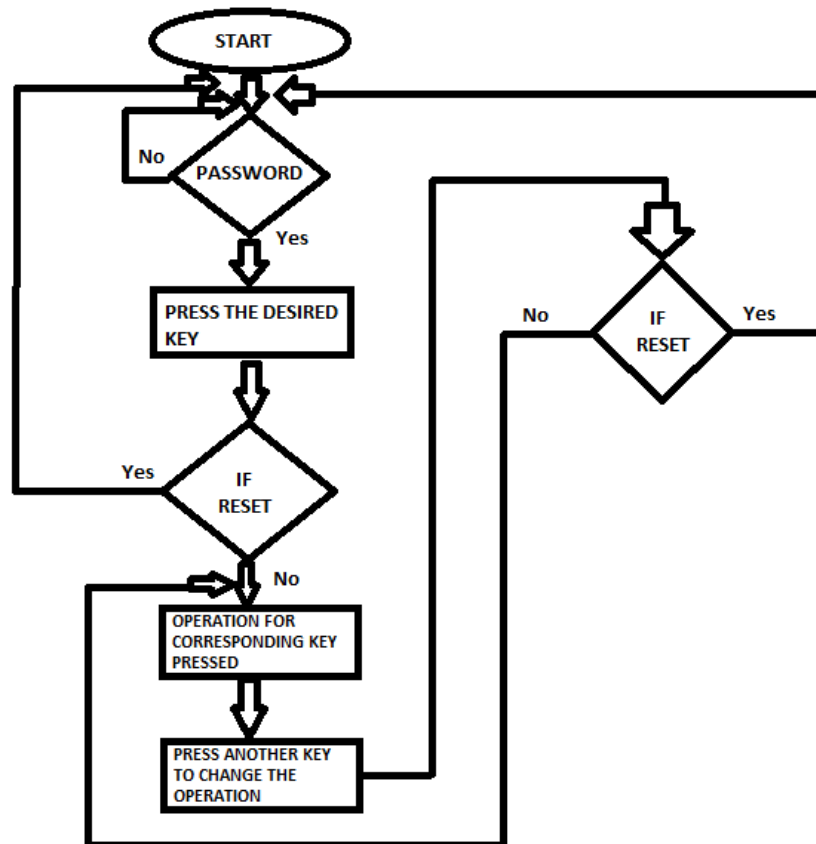


Fig. 1: Flow chart of the operation at receiver end [2]

From the transmitter end the command is send to the receiver end and the receiver side has to operate according to it, which is shown in the chart above. Each step of operation have some set of instructions for providing the best possible action and solution if any command is not accepted.

WORKING

Transmitter

On the transmitter side we are having just a cell phone which is used to give commands to the operating/receiver side to perform different tasks. Cell phone uses DTMF technology to transmit its signal. Each key of the cell indicates different command which is to be fetched at the receiver end [3].



Fig. 2: Transmitter (using DTMF) [3]

Receiver

On the side the whole machine is operated, in fact the machine itself is the receiver end. Initially to start the circuit operation, first we enter the password at the transmitter end which we have already defined. Here, in for this robot we use the password is “*#”. After entering the password, the circuit becomes on. Now, we can press any corresponding key for the operation according to the requirement. Firstly we grounded the pin no. 1-9 of encoder than pin no. 10,11,12,13 are connected to push

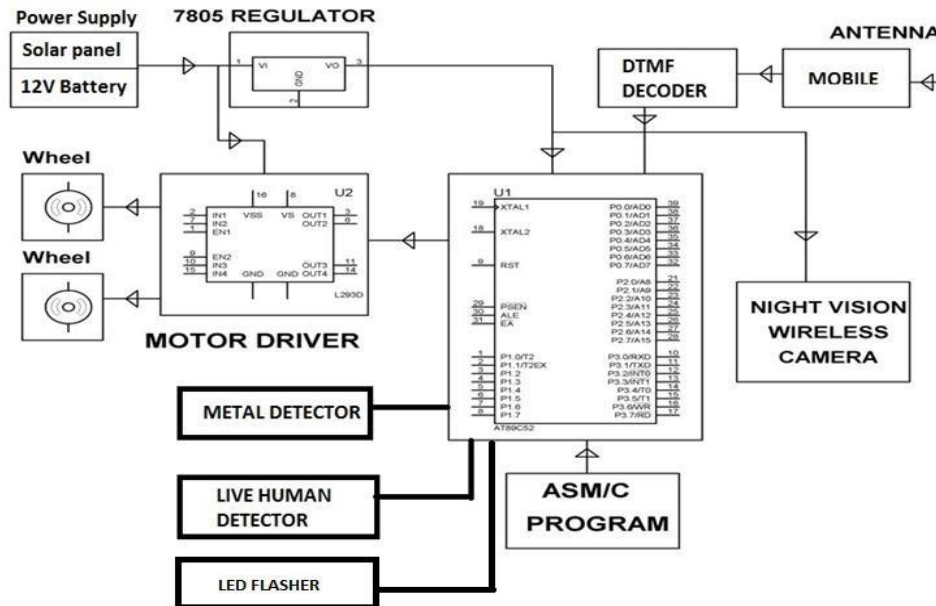
buttons or switches through resistors and then grounded it.

The parallel input is provided to the encoder through the switches. The encoder encodes the parallel input into serial data which is obtained at pin 17 of the encoder than the Pin no. 14 (Transmission Enable) is Grounded (Active Low).than we connect pin 15 and 16 (Oscillator input and output) through a resistor. The external 1 ohm resistor connected at the pins 15 and 16 is used to generate oscillations in the encoder of a particular frequency. So the 4 bit serial

data is fed to the transmitter module at the same frequency. Pin 17 (Serial data output) is connected to 2nd the serial data wirelessly to the RF receiver at the receiving end.

Once the data reaches the data pin i.e. pin no 2 of the RF Module then the data is transmitted through it, the transmission of data is through a very high frequency carrier, the data is further transformed into a

suitable type and then it is transmitted out through antenna connected to the RF Module pin no 4 than to Pin 18 we supplied with 9 V DC voltage through a battery. Than the receiver antenna picks up the serial data sent by the transmitter. Antenna is connected to one of the pins of the receiver. And this data is further processed through the receiver module.



Pin no. 1-8 (Port 1) are not used and are left unconnected of microcontroller than its Pin 9 (Reset Pin) is supplied with an active high through a capacitor. A resistor is also connected in series which is further Grounded. Pin no. 10-13 (Port 3) is used as input port and is connected to output pins (Pin no.10-13) of the decoder.

The output from decoder is given as input to the microcontroller which in turn executes the program. Its Pin 18 and 19 is used to connect a crystal oscillator to provide the clock signal to the microcontroller and are further Grounded through capacitors. Its Pin 20 is Grounded than the Pin no. 21-28 (8 bit

Address Pins: Port 2) is not used and is left unconnected. Pin 29 and 30 are left unconnected. Its Pin 31 (External Access Enable) is given a +5 V power supply. Microcontroller Pin 32-39 (Port 0) is used as output port. Pin 36-39 are individually connected to the bases of four NPN BC547 transistors through diodes and resistors. The output from these pins determines the current flow to the base of the transistor. These four NPN transistors regulate the current flow to the further connected transistors.

The eight NPN transistors form two H-bridges. The input to base of each transistor determines the On/Off state of each transistor which in turn determines the direction of rotation of DC motor connected to the collector of the transistors. Pin 40 is supplied with +5 V power Supply than the Pin no. 1-8 (8 bit Address pins for input) of decoder are Grounded. Pin no.9 is also grounded. Decoder Pin No. 10, 11, 12 and 13 (4 bit Data/Address pins for output) are connected with Microcontroller input port (port 3).

The output from decoder instructs the microcontroller to execute the program. Decoder Pin 14 (Serial data input) is connected to 2nd received and converted into parallel data by the decoder. The serial data received at data in pin i.e. pin no 14 is internally converted in parallel form and the 4 bit data available at the 4 data out Pins of the decoder is similar to the status of data at data in pins of the encoder.

The decoder IC will provide the data to the micro controller unit and the micro controller unit will recognize the signal and will respond accordingly as per the program fed into it. Decoder Pin 15 and 16 (Oscillator input and output) are connected

through a resistor. Pin 17 is unused (Data Pin) of RF receiver. The serial data is Pin 18 is supplied with 5V DC voltage through a voltage regulator. The input to the voltage regulator is 12 V DC supply through a battery.

RESULT

All the operations are working as per the requirement and according to the subject of

the spy robot. Working of solar panel is also been up to mark and the password authentication process is also working properly.

The thing yet not done is the video screen upon which the recording output will be shown and also the output of different sensors outputs will be visual on the same screen.

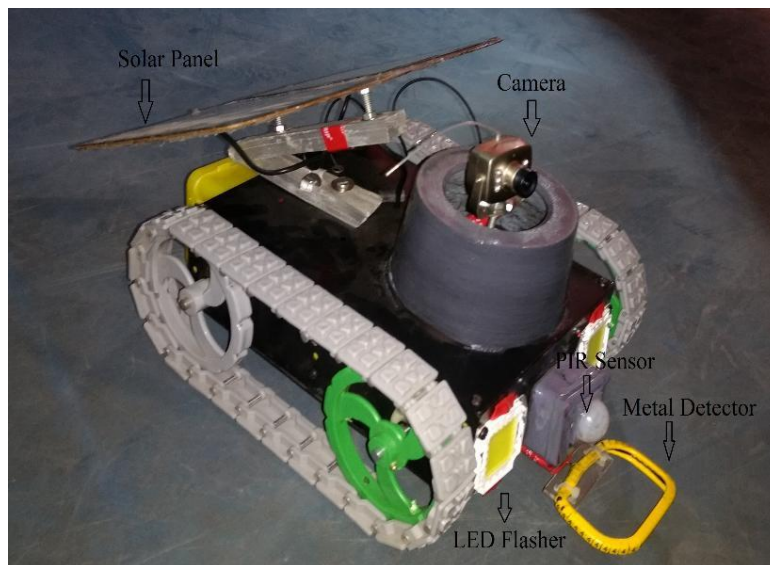


Fig. 4: Front view of working model showing Camera, PIR sensor, LED Flasher, Metal detector and Solar Panel

The above fig. 4 is showing the night vision camera, LED flashers, PIR sensor and the metal detector.



Fig. 5: Rear view of working model

The above fig. 5 is the rear side image of the robot showing the inclination of solar panels.

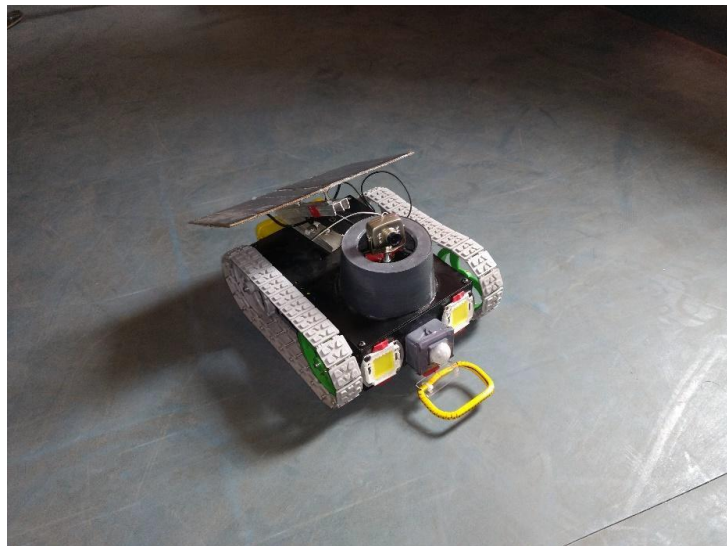


Fig. 6: Top view of working model

Fig. 6 is illustration the look of the robot from the top.

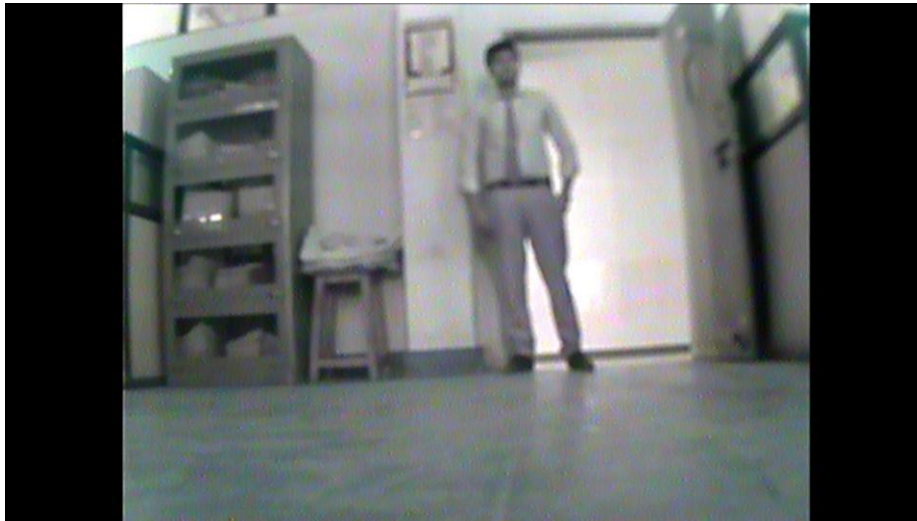


Fig. 7: Camera view of a person standing in front of the robot

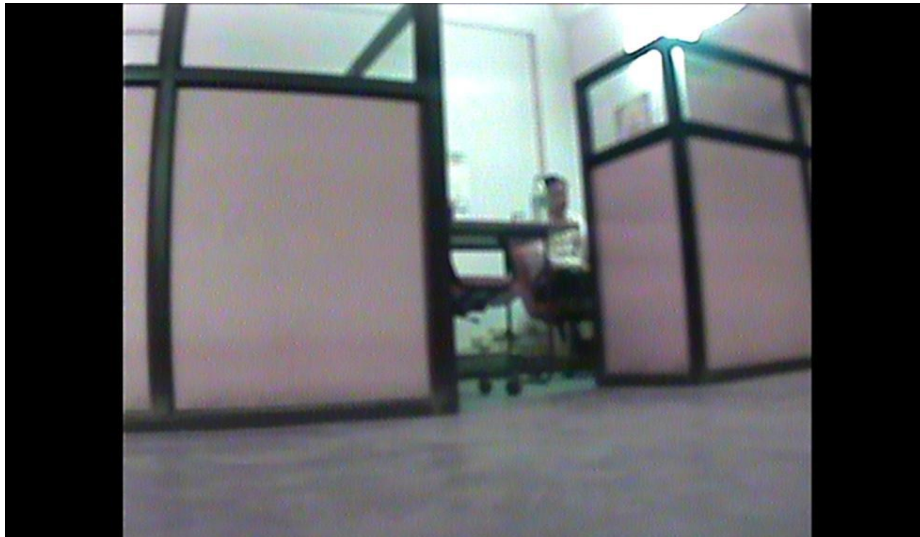


Fig. 8: Camera view inside an office

Fig. 7 and fig. 8 showing the camera view's from the robot camera.

CONCLUSION

Finally the desired goal is achieved in the face of solar powered long range spy robot. All the functioning is appropriately working according to the user command and also every part of the robot is working properly. All the issues those were generated during its manufacturing phase are now being fixed properly. 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.

As discussed in the early of this paper this is just a prototype model. The organization which is going to use it can make the desired changes accordingly for more feasibility. Us of solar panel is efficiently achieved and being effectively used in the charging operation of the battery. We are working on the screen issue to generate the output on the screen just one TV tuner is required and then it will be done.

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