War Field Spying Robot and Fire Extinguisher with Wireless Night Vision Camera

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ABSTRACT: The intention of this paper is to increase security of the border and to reduce human victim in rival attack in the war field. To overcome this problem we have designed the RF based War field spying robot which involves wireless night vision camera along with the fire extinguisher. So, from this we can examine rivals when required. This robot can enter into enemy area and send us the information via night vision wireless camera in nights also. Fire sensor senses the fire in rival attacks in the war field and quickly sends the signal to the fire extinguisher and water pump will turn on when required. The moment of this robot is wirelessly controlled by a hand held RF transmitter to send command to the receiver mounted on the robot. This robot can also be used in shopping malls, star hotels and residential areas etc. where there can be threat from terrorist.

I. INTRODUCTION

In today's commercial and domestic world, automation plays an important role and robots are good example of it. Robots are intelligent machines that can be controlled according to our need. The robotics technology is a great step towards the security against terrorist attacks in the country like, Mumbai attack of 26/11. Basically, fire fighting is meant to be a risky mission to be carried out so, the most advantageous thing of using a robot is it can reach the way where a man does not venture. And as its name suggests it is a robot that can be used for the purpose of spying on enemy in a war field. In contrast, a robot functions or be controlled from a distance, that means fire fighting activities can be executed without letting the fire fighters lives at a risk by using robot technology instead. Consequently, the design of our project focuses on developing a robot based on RF technology for the remote operation connected with the wireless night vision camera mounted on the robot for spying purpose. The robot is embedded with 8051 microcontroller for desired operation which is generally used for spying purposes. Along with this, there is a wireless camera used for spying purpose also serves during night hours too using IR lightning. It will send real time audio and video signals which could be seen on a LCD display and action can be taken accordingly. It can secretly enter into enemy area and send all the information through its' tiny camera eyes.

Keeping in mind the war field scenario, our project includes a fire extinguisher model. It is not always possible for people to tackle fires in the field of war. In this paper we seek to explore the hardware and software components used to build a firefighting robot. The techniques used for detection of source of the fire and the movement of the robot towards the source of fire. Wherein, our paper the robot can move through for the detection and extinguishing fire which is done with the help of a sensor and a water jet. With the invention of such a device, people & property can be saved at a much higher rate with relatively minimal damage caused by the fire. Eventually, it aims at minimizing air pollution. Apart from the war field, it can be used in industrial as well as domestic use for example, in oilfields and in kitchens.

Technologies used are:

1. RF technology
2. C language

II. RELATED WORK

1. **Hardware requirements:**
    8051 Microcontroller, Encoder, Decoder, Push Buttons/Switches, RF(tx-rx), Resistors, Antenna, NPN Transistor, Diodes, , IR emitting Diode, LED's (Light Emitting Diode), Crystal Oscillator, Electrolytic and ceramic Capacitors, Operational Amplifier(firefighting circuit), power supply, Motor driver IC, fire sensor, night vision wireless camera, zener diode, thermistor, variable pot, LED, female connector,male and female plug stick.

2. **Circuits includes:**
    *   Transmitter circuit
    *   Receiver circuit
    *   Fire extinguisher circuit
        The block diagram and circuit diagram of the transmitter and receiver both are explained further in the paper.

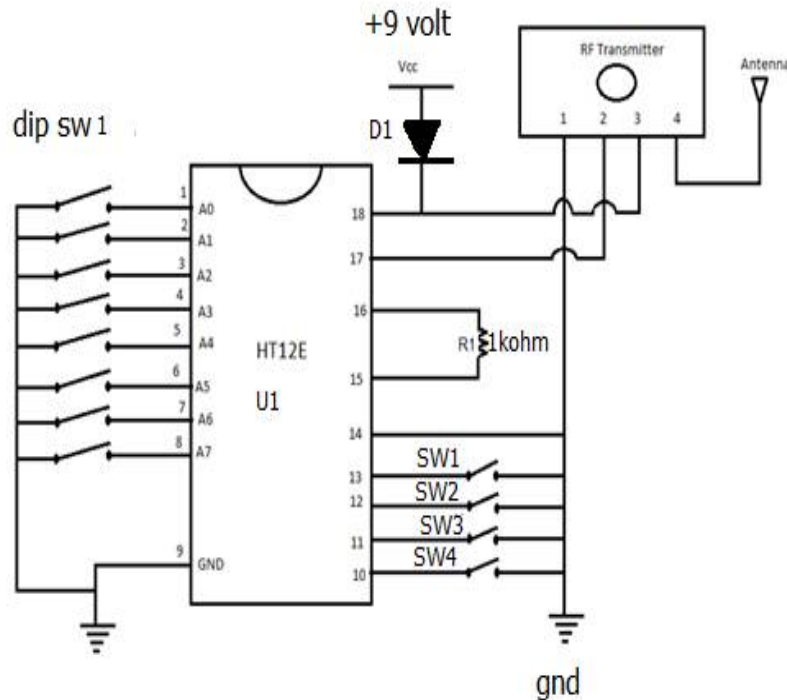3. **Block Diagram of Circuit**

    3.1 Transmitter

Fig.3.1. Represents the Block Diagram of Transmitter

Fig 3.1 represents the transmitter section which transmit RF signal in free space through antenna. At port number 4 of RF transmitter the RF antenna is connected. Pin number 16 and 15 of encoder are short together using 1k-ohm resistor.

3.2 Receiver

Fig. 3.2 represents the receiver section of our system which receives the corresponding signal from transmitter.
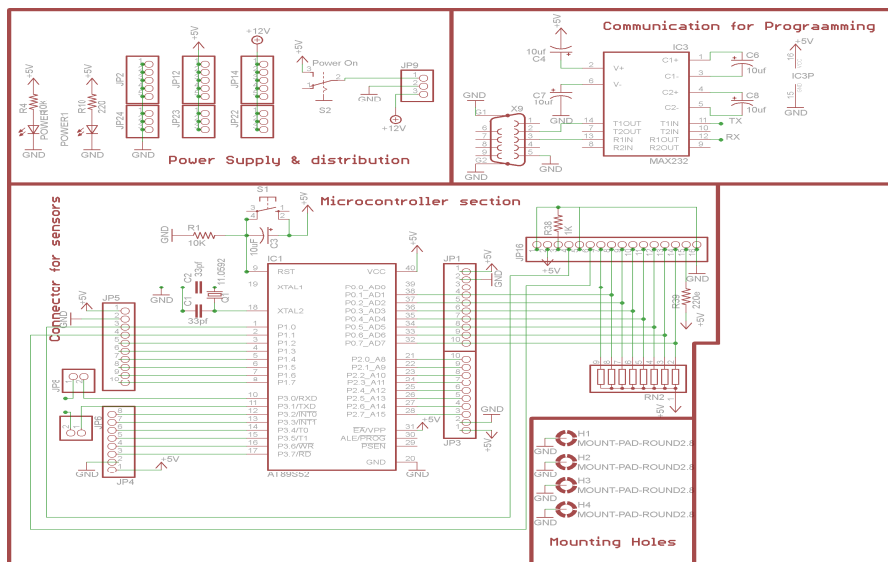

Fig.3.2 Represents the block diagram of Receiver
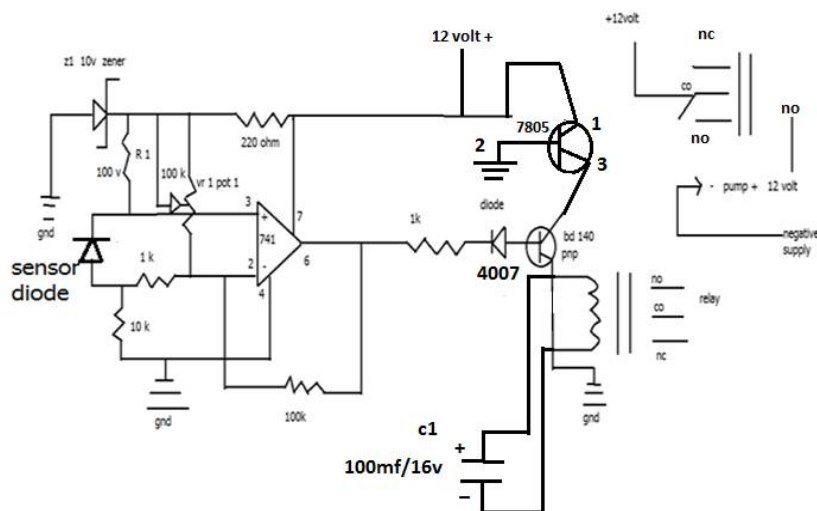
3.3 Fire extinguisher

Fig.3.3. Represents the Block Diagram of Transmitter

IV. THEORY OF OPERATION

This section consists of two parts one is transmitter side and another one is receiver side because of remote controlling of water pump. At the transmitter side only switches and RF module are used. Switches are used for send the specific signal to control the motor pump at remote places. At the receiving section RF receiver are used to receive the RF signal. Here fire sensor is used to sense the fire present in the auto mode. Here 89s52 controller is used for main processing as per the instruction comes to drive the water pump by the help of relay driver circuit. And as per the circuit operation mainly divided into two part. One part is used for Manual mode and another one is in auto mode. This are two set by the using tactile switches. By pressing Switch s1 the circuit now will be works in Manual mode and by pressing S2 the circuit will be works in auto mode.

4.1 Manual Mode
In manual mode the whole circuit working depends on the user. According to user requirement we can drive the water pump as per the given instruction by the user. To work according to the user requirement we need to press the specific switch at a transmitter side for circuit working. Now to operate the circuit we need to press S3 for to start the water pump at a particular time. The signal are encoded by the Encoder IC (HT12E) which is used with the RF transmitter. This RF transmitter sends the signal at a remote place where RF receiver section and water pump are placed. The RF receiver section receive the signal from the remote place and Decode (HT12D) IC are used for to decode the signal and this signal are given to the microcontroller (ATmega8) and through the relay driver circuit the water pump will be on by the controller. As the user wants to stop/off the water pump than user need to press the stop switch and this signal are send to the receiver side by the RF transmitter side. Now this incoming signal is processed by the microcontroller and the water pump will be stopped by the relay driver section. So by according to the user requirement we can control the water pump from the distance or remote place.

4.2 Auto Mode
In auto mode the whole process depends in the automatic mode. By pressing the switch S2 the whole circuit process comes in the Auto mode. Now this signal received by the receiver section and now the controller start works in the auto mode. As the instruction comes for the auto mode controller continuously takes the output of fire sensor value then, controller gives the instruction to on or off the water pump through relay driver section. In this way we can control the water pump automatically.

4.3 RF Transmitter and Receiver:
The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.
This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (TX/RX) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

4.4 Fire Extinguisher:
RF robot will be used as a fire extinguisher i.e. it sprinkles fire.RF is a frequency of rate of oscillation within the range of 3Hz-300GHz.

4.5 Driver circuit

The signal from microcontroller is insufficient to operate the relay. The driver circuit amplifies the signal from the microcontroller so that the relay should be operated.

4.6 Microcontroller

When it receives the signal from sensor, it starts counting the time. When it receives the signal again the counting will be stopped. The time required for crossing these two signals are calculated by microcontroller and thus the speed is calculated. If the speed is calculated by microcontroller gives logic S1 signal to operate the relay, the microcontroller used in our project is 80S52. Its features are:

1. This microcontroller belongs to 8051 family.
2. Very few external components are required for its working.
3. The RAM, EPROM, etc. are built in.
4. Easily available in the market.

V. RESULTS

It was quite hard to program the robot to do the things. The base implementation in the state machine and behaviour was rather sturdy, and never had to be changed much from the original idea. The main problem was tuning the receiver circuit to have the vision on the television. Also, sometimes the robot had a tendency to stop way too easy, and sometimes way too late. This problem was also related to the fact that robot had its own mind. Eventually, the fire sensor in the fire extinguisher found a problem because it senses the sunlight as sun is a fire ball.

The different behaviour turned to work together well, although most of the time it was same behaviour that got its way, and our wishes were suppressed. These to be built in were taken into consideration with economic point of view. This robot is more efficient and less expensive than the previous results that we have of earlier research even though we have the robot working as a fire extinguisher. Finally, we made it to work successfully.

Figure (a) shows the vision on television screen shows the momentary view of the robot. The robot facing the view is being pictured on the television screen in order to collect the information on the field.

Fig.(a) : Displayed picture on LCD captured by wireless night vision camera.

The displayed picture/video gives information which is useful to make us to know an even alert of any unnecessary movement going on the border. Also, when used for any other commercial purpose it can give out a better vision to conquer.

Figure (b) shows the robot with wireless night vision camera and along with its flexibility to move around in any direction and any plane capture the view on the field which according gets displayed on the system screen.
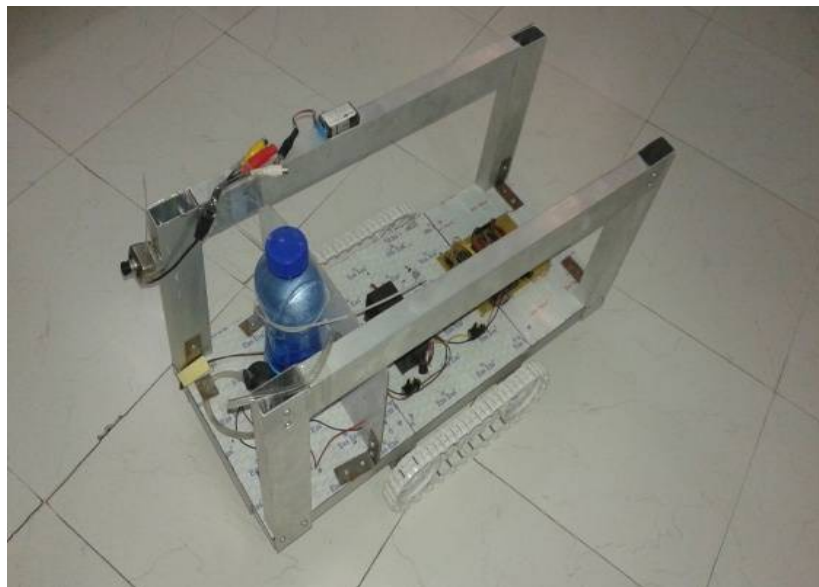

Fig.(b) : War field spying robot and fire extinguisher with wireless night vision camera.

Since, it's a wireless camera it reduce the complexity and cost of the project and can move along anywhere which helps out to collect the view of the robot's movement.

VI. CONCLUSION

The paper comprises of achieving both war field spying robot and fire extinguisher together such that both the operations could take place simultaneously depending on the situations. This can be applied in the drought or disaster affected areas where humans fail to reach and helps to find out the persons caught under heavy loads during earthquake. It also help to extinguish fire in very less span of time and reduces the risk of lives of the fire fighters. Fire fighters would be free to risk their lives by entering into fire affected areas that comprises of harmful and dangerous gases. It is also efficient for finding out naxalites and foreign enemies on borders.

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