

Secure Surveillance Using Virtual Intelligent Agent with Dominating Influence

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Abstract: As it is known embedded system is a special-purpose computer system designed to perform a dedicated function. As a spice we also included robotics domain and achieved this project successfully. In this project, an automation surveillance system is achieved using PIR sensor which detects the human. Also the robot consists of a weapon detector. Once the intruder has been detected, the location will be tracked using GPS and is sent as a message to nearby police station through GSM modem placed. Mean while the robot follows the intruder with the help of ultrasonic and infra red sensor, and a camera is used for capturing the images and transfer it to CCTV.

Keywords-component; weapon detector; automation surveillance;

I. INTRODUCTION

The main fields involved in this paper work are communication and digital robotics. The main purpose of this design deals with the security system. This robot is mainly designed to secure the industries or any other sectors without the presence of the governing body and to get updated things happening in the sector for security purpose. This works can be implemented in two ways using GSM and GPS. The GSM deals only with data network and can be advanced by using the future generations like (3G, 4G...) in the mobile communication sector. The GPS helps out to track the person when the concern is closed. The part of the details will be transmitted for emergency purpose to the local police station and to the user's mobile.

II. REQUIREMENT

A. Hardware requirement

- a) ATMEL
- b) GPS
- c) GSM
- d) UART
- e) Metal sensor
- f) PIR
- g) relay
- h) Robot
- i) Camera
- j) Ultrasonic sensor
- k) IR sensor

B. Software requirement

- a) EMBEDDED C
- b) KEIL cross compiler

C. Field requirement

- a) Communication
- b) IT
- c) Embedded systems

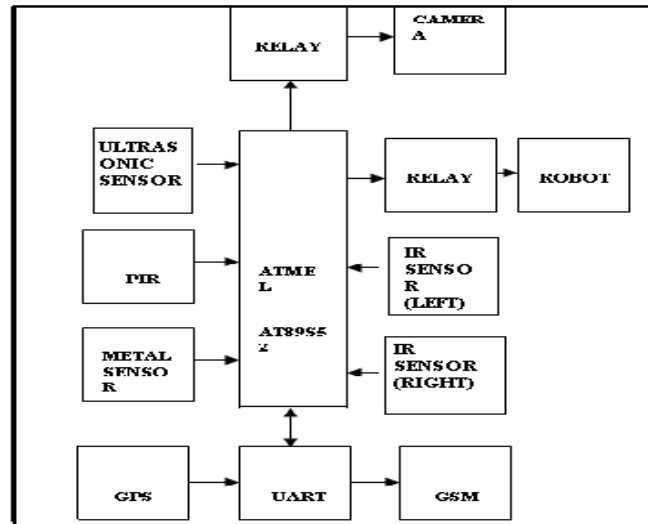


fig (1)- Block diagram

III. THE DEVICES AND PERIPHERALS USED

The following are the devices or peripherals attached to the microcontroller and the specification for why it is beginning used here.

A. ATMEL MICROCONTROLLER

The AT89S52 is a low-power; high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory along with this it also provides the 256 bytes of RAM and Full Duplex UART Serial Channel. These are the main features for which ATMEL AT89S52 microcontroller is used in this project.

a) Relay

A relay is an electrically operated switch. The function of the relays in the control unit is for controlling the movement of robot's base with respect to the on or off position of the two infrared sensors and an ultrasonic sensor. There are five "JQC-3FC (T73)" relays in which the two of it controls the left and right motion of the robots movement whereas the next two controls forward and backward movement. The rest one relay is used for controlling camera which is in on position only when ultrasonic sensor is on

B. RS232

As UART, universal asynchronous receiver / transmitter is responsible for performing the main task in serial communications with computers or other peripheral. In order to achieve serial communication "RS232" is used, which is a 9-pin plug and over here in the project "female DB-9". RS232 in this project in used to connect the control unit and the robot base and also it is used for connecting GSM and GPS modem with the control unit so that as programmed in the controller once when intruder and bomb is detected a message is transmitted to the user's mobile.

C. Transformer

The transformer used here is a step down transformer where the 230 v is converted into 12v. There is two such transformer which produces AC voltage where both its supply are joined together and one is connected to the four diodes whereas the other is connected for the sensor's supply, in order to operate it successfully.

D. Ultrasonic sensor

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar. Here WTS601 ultrasonic sensor is used in this project for the following factors

- As detection of the object is up to 12m.
- The frequency at which it is operating is 40 kHz.
- And the power consumed by the sensor is (+ or -) 5v of DC.

It works on the basis of the following condition to detect the distance of the object from the robot.

$$\text{Distant to object} = \text{speed of sound} * (\text{time it takes to hear echo come back}/2)$$

E. PIR sensor

A Passive Infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Here “DYP-ME003” pyro - electric device is used because of the following features

- a) As detection range is up to 15 feet on short settings whereas for long settings it is 30 feet.
- b) Power of 3 to 6v DC is required.
- c) And communication is about single bit high/low output.

F. IR sensor

Infrared sensor “MOC7811” is used in this project in order to provide the following features

- a) As it can also modulate the IR to achieve better distance and immunity.
- b) The receiver diode has a very high resistance
- c) And also when IR is incident upon it, the resistance decreases sharply to the order of a few kilo Ohms or even lesser.

There are two such sensors used here as it is responsible for the movement of the robot in left and right position respectively. This movement is based on the infrared emitted from the human or object in order to follow its position.

G. Metal/ Bomb detector

The inductive proximity will sense all metals. The exact point at which a target will be detected is influenced by the type of metal, its size and surface area. The “LM18-3008PA” metal detector is used in this project and it can sense metal/ bomb within the 2m. The voltage used is about 12-30v.

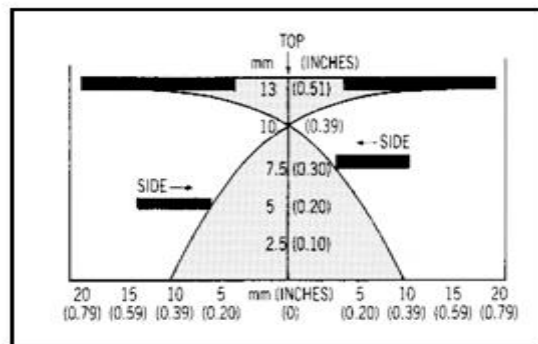


Fig-2 operation of the inductive proximity sensor

H. Robot base

The base of the robot consists of four wheels and two sets of motors. The base carries the control station along with it for sensing intruder and detecting bomb. This part plays a vital role in the movement of the control station. The base of the robot consists of four wheels in which two at the back are meant for free movement without motor. The motor in the front two wheels are connected to the motor driving circuit with the help of RS232 female pin where it consists of four relays based on the on and off position of the relay which in turn based on the infrared sensors detection. The motor used here is 200RPM 12V DC geared motors is used as it is very easy to use and available in standard size. Nuts and threads on shaft to easily connect and internal threaded shaft for easily connecting it to wheel and more over it weighs 125gm weight with No-load current of 60 mA(Max), Load current of 300 mA(Max). The base plate of the robot where wheels are mounted to is made up of soft steel material and it can bear up to 1kg of weight on it.

I. GSM and GPS modem

GSM Modem provides full functional capability to Serial devices to send SMS and Data over GSM Network. The “FARGO MAESTRO 20” modem is used of the band range of 900 and DC of 5-3v with 450mA. GPS modem of range of band 1600 and DC of 5 to 3v with 450mA. The receiver measures the transit time of each message and computes the distance to each satellite. Geometric tri- alteration is used to combine these distances with the satellites' locations to obtain the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units also show derived information such as direction and speed, calculated from position changes.

Three satellites might seem enough to solve for position, since space has three dimensions. However, even a very small clock error multiplied by the very large speed of light—the speed at which satellite signals

propagate—results in a large positional error. Therefore receivers use four or more satellites to solve for the receiver's location and time. The very accurately computed time is effectively hidden by most GPS applications, which use only the location. A few specialized GPS applications do however use the time; these include time transfer, traffic signal timing, and synchronization of cell phone base stations.

Although four satellites are required for normal operation, fewer apply in special cases. If one variable is already known, a receiver can determine its position using only three satellites. (For example, a ship or plane may have known elevation.) Some GPS receivers may use additional clues or assumptions (such as reusing the last known altitude, dead reckoning, inertial navigation, or including information from the vehicle computer) to give a degraded position when fewer than four satellites are visible.

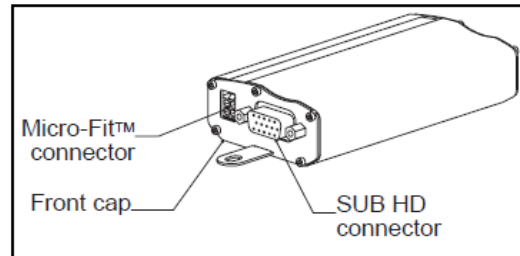


Fig-3 side view of the GPS and GSM modem with RS232

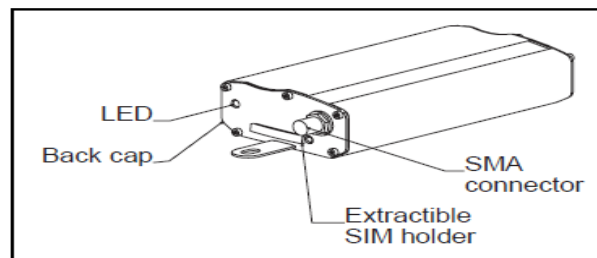


Fig-4 side view of the modem with SIM holder

Two messages are sent, they are as follows

- a) *Intruder detected with latitude and longitudinal position of the person*
- b) *Bomb detected with also latitude and longitudinal position of the bomb/metal*

IV. OPERATION

In this project, an automation surveillance system is achieved using PIR sensor which detects the human. Also the robot consists of a weapon detector. Once the intruder has been detected, the location will be tracked using GPS and is sent as a message to nearby police station. Mean while the robot follows the intruder with the help of ultrasonic and infra red sensor, and a camera is used for capturing the images and transfer it to CCTV.

A. Algorithm

Step-1: connect the supply

Step-2: microcontroller is active now

Step-3: sensors which are included in kit (ultra sonic, PIR, metal, IR sensors) are active now. The switching on/off of the sensors is achieved using the relay circuit.

Step-4: if human is detected by the passive infrared sensor then

- a) *The location will be tracked using GPS and is sent as a message to nearby police station and to the authority of the concern.*
- b) *Else the sensor is inactive.*

Step-5: if the intruder has any sort of weapons with him then

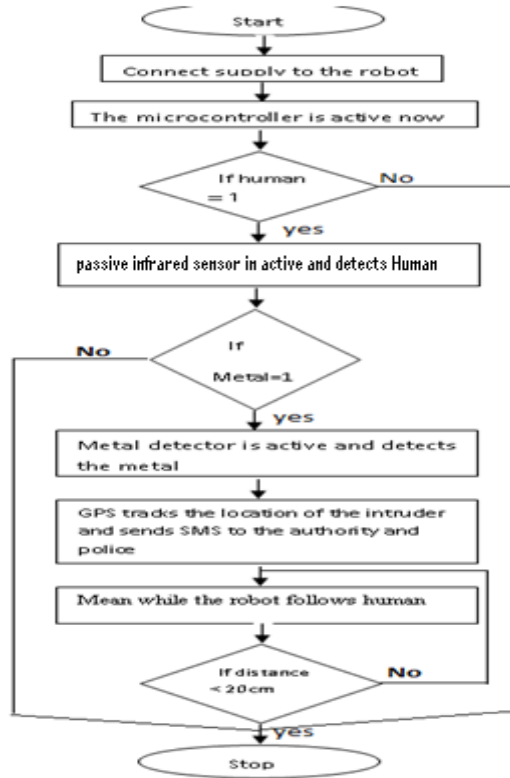
- a) *The metal detector senses it and sends the details through GSM to the authority and police.*
- b) *Else the detector is inactive.*

Step-6: in between the robot follows the intruder with the help of ultrasonic and infra red sensor.

Step-7: a camera is used for capturing the images and transfers it to CCTV.

Step-8: stop.

B. Flow chart



C. Output

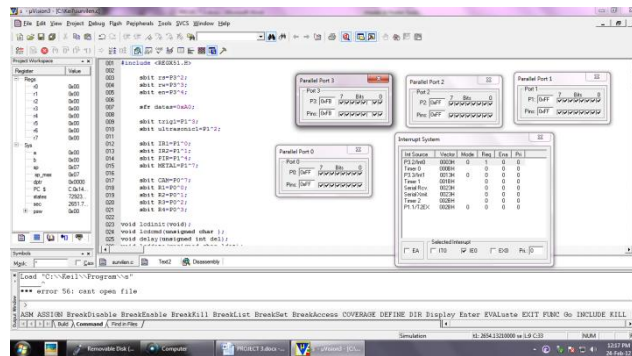
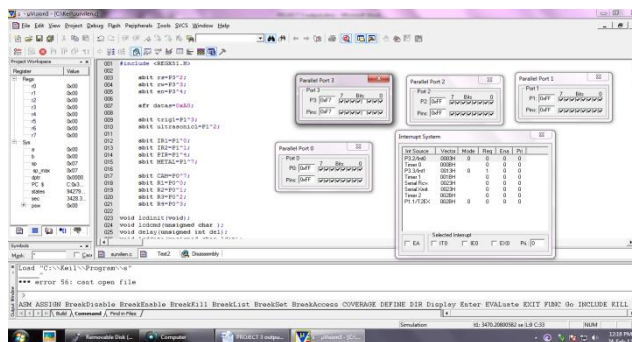


Fig-5 output waveform for serial interrupt



V. APPLICATIONS

- a) The main purpose for designing this robot is that to implement it in defense sector to sense human and detect weapon/ bomb with the human or buried in the place where human cannot fetch for it.
- b) The sensors with smaller range frequencies are sufficient to install this robot in residents.
- c) The sensors with very high frequencies are required to install this robot in the IT industries.

- d) *This robot can be installed in banks, especially in the places where jewels are kept (locker area).*
- e) *In the educational institutions, this robot can play a vital role in the areas of library and laboratory where valuable equipments are kept.*

VI. CONCLUSION

Thus the full paper work deals for the secure way of governing our properties in the absence of the authorized person. Though the design and architecture of the robot resemble strange yet is an effective way of security system. Thus it is an evidence to prove that robots can assist human effectively without any difficulty.

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