Study of Women Safety Night Patrolling Robot

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***Abstract*- This paper describes about a safety electronic system for women, built alone areas. This Project we propose a security patrolling robot that uses camera for securing any premises. The robotic vehicle moves at particular intervals and is equipped with night vision camera and sound sensors. It uses a predefined line to follow its path while patrolling. It stops at particular points and moves to next points if sound are detected. The system uses RF based Controlling Section for Control the Direction of Robot when parson is detected. It monitors each area to detect any intrusion using 360degree rotating camera. It has the ability to monitor sound in the premises. Any sound after company is closed and it starts moving towards the sound on its predefined path. It then scans the area using its camera to detect any human faces detected. It captures and starts transmitting the images of the situation immediately on sound or human face. Here we use RF 2.4 GHz for receiving transmitted images and displaying them to user. Thus we put forward a fully autonomous security robot that operates tirelessly and patrols large areas on its own to secure the facility.**

***Index terms*- Arduino, L293D, L293H, Motor, PIR sensor**

1. INTRODUCTION

Nowadays Women Safety is the biggest concern in many parts of the world. There is still a fear in alone areas for women as well as men. So here we propose a security patrolling robot using Arduino. The system uses cameras mounted on robotic vehicle for securing any premises. The robotic vehicle moves at particular path and is equipped with camera and sound sensors. It uses a predefined area follow its path while patrolling. It stops at particular points and moves to next points if sound are detected. The system uses RF based Controlling system for patrolling assigned area. It monitors each area to detect any problem using combination of cameras. It has the ability to monitor sound in the premises. Robot hears any sound after area is quite and it starts moving towards the sound on its predefined path. It then scans the area using its camera to detect any human. It captures and starts transmitting the images of the situation immediately to the Receiver Section. Here we use RF for receiving transmitted images and displaying them to user with alert sounds. Thus we put forward a fully autonomous security robot that operates tirelessly and patrols large areas on its own to secure the facility.

2. EXISTING PROBLEM

Women occupy almost half the globe. But their survival has always been Women are the subject of exploitation inside and outside the home say whether on roads, trains, cabs, schools etc.

- a question, when it comes to existence with honour and dignity.
- Women's empowerment in the country can be brought once their safety and security is ensure, either it may be at home, alone places or during travelling.

Solution to the problem:
The level of security can be increased more by safety robot, which can track the area , and ensure she has completed journey without any problems, this will not only make them safe but their parents, kids or husbands will also feel stress free.

3. SYSTEM DESIGN AND MPLEMENTATION

Blocks Description:

1. Base Station:

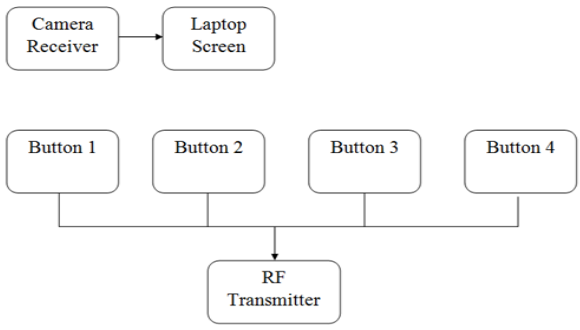

Fig1: Block of Base Station

The block diagram of the Woman security robot is shown it has two major sections:

1. Transmitter
2. Receiver and Motor Driver.

The transmitter circuit is built around encoder IC HT12E (IC1), 433MHz RF transmitter module (TX1) and a few discrete components. The receiver and motor driver circuit is built around Arduino, decoder IC HT12D (IC2), 433MHz RF receiver module (RX1), motor driver IC L293D (IC3), regulator IC 7805 (IC4) and a few discrete components.

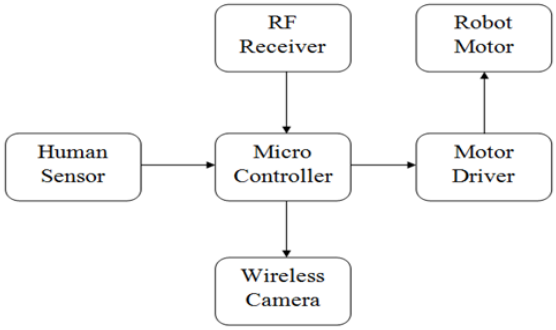

Fig2: Block diagram of Robot Section

3.2 SYSTEM IMPLEMENTATION

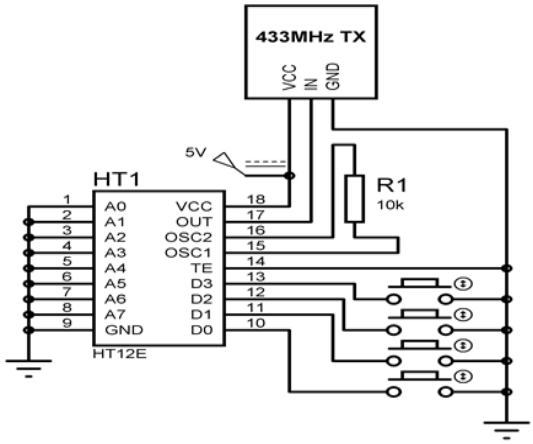

Fig3: implementation of Base Station

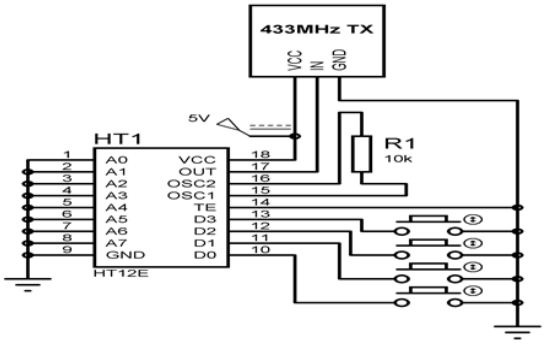

Fig4: Implementation of Robot Section

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources. The Arduino project was started in Italy to develop low cost hardware for interaction design. The Arduino hardware comes in several flavors. In the United States, Sparkfun is a good source for Arduino hardware. The Arduino board, you can wrprograms and create interface Tcircuits to read switches and other sensors, and to control motors and lights with very little effort.

Motor Driver IC L293D:

The L293D motor driver is available for providing User with ease and user friendly interfacing for embedded application. L293D motor driver is mounted on a good quality, single sided PCB. The pins of L293D motor driver IC are connected to connectors for easy access to the driver ICs pin functions. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. This device are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high voltage loads in positive-supply applications. All inputs are TTL compatible.

RF Transmitter :

This simple RF transmitter, consisting of a 434MHz license-exempt Transmitter module and an encoder IC, was designed to remotely switch simple appliances on and off. The RF part consists of a standard 434MHz transmitter module, which works at a frequency of 433.92 MHz and has a range of about 400m according to the manufacture.

The transmitter module has four pins. Apart from Data and the Vcc pin, there is a common ground (GND) for data and supply. Last is the RF output (ANT) pin. , for the transmission of a unique signal, an encoder is crucial.

RF Receiver :

The data is received by the RF receiver from the antenna pin and this data is available on the data pins. Two Data pins are provided in the receiver module. Thus, this data can be used for many applications. This circuit complements the RF transmitter. It is a CMOS compatible output.

IC HT12E:

The 212 encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12N data bits. Each address/data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger on the HT12E or a DATA trigger on the HT12A further enhances the application flexibility of the 212 series of encoders.

IC HT12D:

The 212 decoders are a series of CMOS LSIs for remote control system applications. They are paired with Holteks 212 series of encoders. For proper operation, a pair of encoder/decoder with the same number of addresses and data format should be chosen. The decoders receive serial addresses and data from a programmed 212 series of encoders that are transmitted by a carrier using an RF or an IR transmission medium.

3.3 Flow Chart

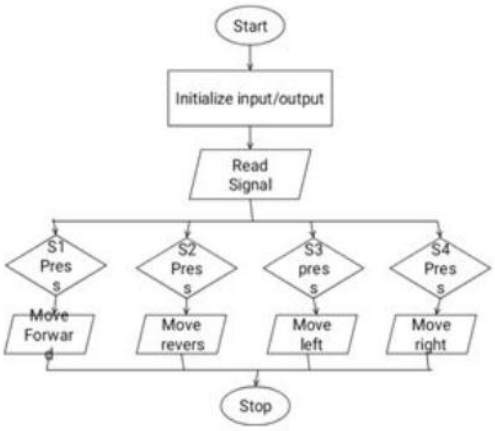

Figure 3.5: flowchart

IV. HARDWARE DESIGN

4.1 Arduino uno

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources. The Arduino project was started in Italy to develop low cost hardware for interaction design. The Arduino hardware comes in several avors. In the United States, Sparkfun is a good source for Arduino hardware. The Arduino board, you can wrprograms and create interface T circuits to read switches.

Figure 4.1: Arduino uno board

What You Need for a Working System

1. Arduino uno board
2. USB programming cable (A to B)
3. 9V battery or external power supply (for stand-alone operation)
4. Solder less breadboard for external circuits, and 22 g solid wire for connections
5. Host PC running the Arduino development environment. Versions exist for Windows, Mac and Linux

Connecting a Battery

For stand-alone operation, the board is powered by a battery rather than through the USB connection to the computer. While the external power can be anywhere in the range of 6 to 24 V (for example, you could use a car battery), a standard 9 V battery is convenient. While you could jam the leads of a battery snap into the Vin and Gnd connections on the board, it is better to solder the battery snap leads to a DC power plug and connect to the power jack on the board. A suitable plug is part number 28760. Here is what this

looks like. Disconnect your Arduino from the computer. Connect a 9 V battery to the Arduino power jack using the battery snap adapter. Con_rm that the blinking program runs. This shows that you can power the Arduino from a battery and that the program you download runs without needing a connection to the host PC Moving Reboot your PC because sometimes the serial port can lock up If a Serial portal ready in use error appears when uploading

Figure 4.2: Arduino board with battery

4.2 Motor Driver IC L293D

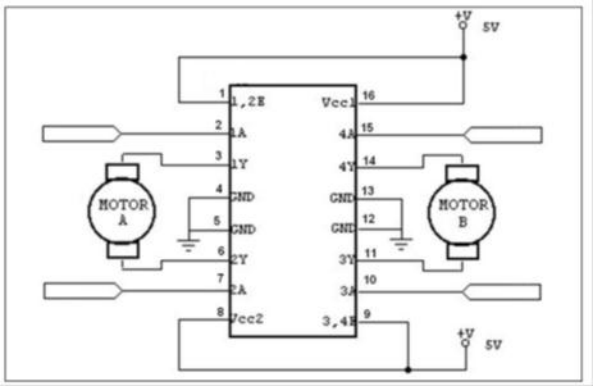

Figure 4.3: Ic l293D

The L293D motor driver is available for providing User with ease and user friendly interfacing for embedded application. L293D motor driver is mounted on a good quality, single sided PCB. The pins of L293D motor driver IC are connected to connectors for easy access to the driver ICs pin functions.

The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. This device are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1, 2 EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are o_ and in the high impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

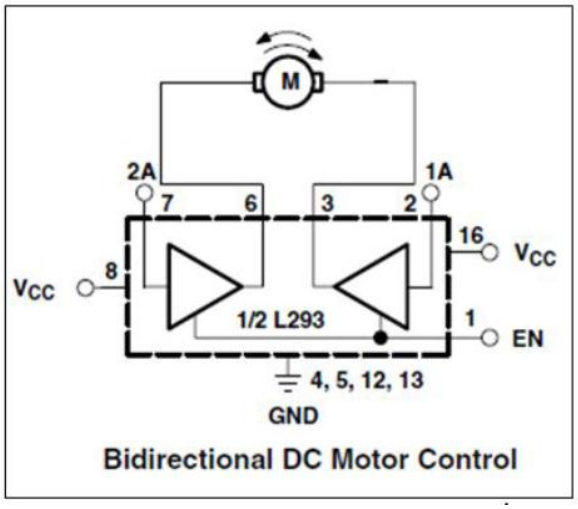

Figure 4.4: Pin dig of IC L293D

EN	1A	2A	FUNCTION
H	L	H	Turn right
H	H	L	Turn left
H	L	L	Fast motor stop
H	H	H	Fast motor stop
L	X	X	Fast motor stop

L = low, H = high, X = don't care

Table 4.1: Function of motor

4.3 RF Module

4.3.1 RF Transmitter STT-433MHz

This simple RF transmitter, consisting of a 434MHz license-exempt Transmitter module and an encoder IC, was designed to remotely switch simple appliances on ando_. The RF part consists of a standard 434MHz transmitter module, which works at a frequency of 433.92 MHz and has a range of about 400m according to the manufacture.

The transmitter module has four pins. Apart from Data and the Vcc pin, there is a common ground (GND) for data and supply. Last is the RF output (ANT) pin.

Note that, for the transmission of a unique signal, an encoder is crucial. For this, I have used the renowned encoder IC HT12E from Holtek. HT12E is capable of encoding information which consists of N address bits and 12N data bits. Each address/data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF transmission medium upon receipt of a trigger signal. Solder bridges TJ1 and TJ2 are used to set the address and data bits. The current consumption with a supply voltage of near 5.4V is about 10 mA. Since the current consumption is very little, the power can also be provided by standard button cells. Recommended antenna length is 17 cm for 433.92 MHz, and a sti_ wire can be used as the antenna. Remember to mount the antenna (aerial) as close as possible to pin 4 (ANT) of the transmitter module.

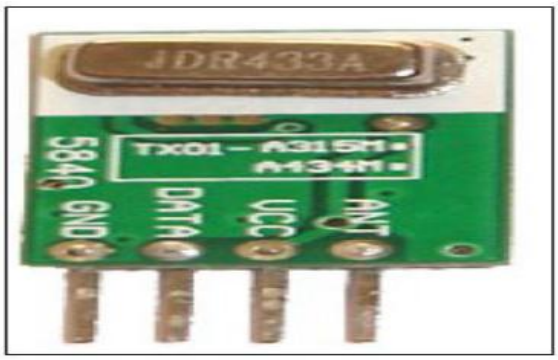

Figure 4.5: RF transmitter

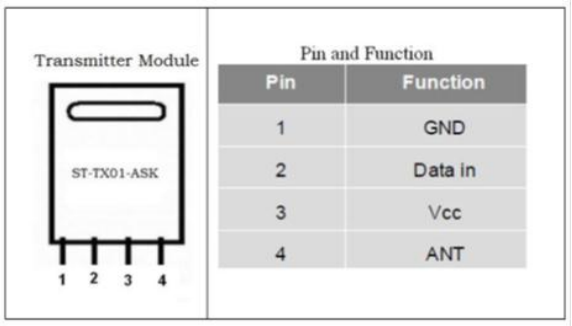

Table 4.2: Function of RF transmitter

4.3.2 RF Receiver STR-433MHz

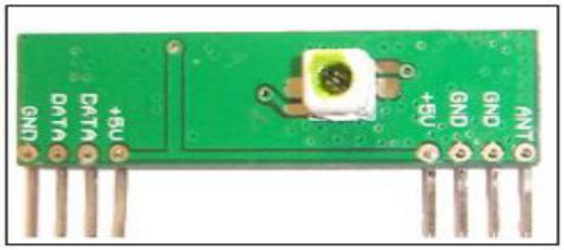

Figure 4.6: RF receiver

The data is received by the RF receiver from the antenna pin and this data is avail-able on the data pins. Two Data pins are provided in the receiver module. Thus, this data can be used for further applications. This circuit complements the RF transmitter built around the small 434MHz transmitter module. The receiver picks up the trans-mitted signals using the 434 MHz receiver module. This integrated RF receiver module has been tuned to a frequency of 433.92MHz, exactly same as for the RF transmitter.

434MHz receiver module The miniature 434MHz RF receiver module receives On-Off Keyed (OOK) modulation signal and demodulates it to digital signal for the next decoder stage. Local oscillator is made of Phase Locked Loop (PLL) structure. Technically, this is an Amplitude Shift Keying (ASK) receiver module based on a single-conversion, super-heterodyne receiver architecture and incorporates an entire Phase-Locked Loop (PLL) for precise local oscillator (LO) generation. It can use in OOK / HCS / PWM modulation signal and demodulate to digital signal.

The receiver module has eight (4+4) pins. Apart from three ground (GND) and two Vcc pins, there are two pins (one for Digital Data & other for Linear Data) for data output. Last is the RF input (ANT) pin.

4.5 PIR Sensor

What is a PIR Sensor?

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation. For numerous essential projects or items that need to discover when an individual has left or entered the area. PIR sensors are incredible, they are at control and minimal e_ort, have a wide lens range, and are simple to interface with. Most PIR sensors have a 3-pin connection at the side or bottom. One pin will be ground, another will be signal and the last pin will be power. Power is usually up to 5V. Sometimes bigger modules don't have direct output and instead just operate a relay which case there is ground, power and the two switch associations. Interfacing PIR with microcontroller is very easy and simple. The PIR acts as a digital output so all you need to do is listening for the pin to ip high or low.

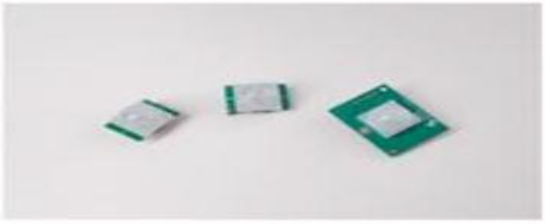

Figure 4.10: PIR sensor

The motion can be detected by checking for a high signal on a single I/O pin. Once the sensor warms up the output will remain low until there is motion, at which time the output will swing high for a couple of seconds, then return low. If motion continues the output will cycle in this manner until the sensors line of sight of still again. The PIR sensor needs a warm-up time with a specific end goal to capacity _ttingly. This is because of the settling time included in studying natures domain. This could be anyplace from 10-60 seconds. Throughout this time there ought to be as little movement as could reasonably be expected in the sensors field of perspective.

Applications of PIR Sensors

- All outdoor Lights
- Lift Lobby
- Multi Apartment Complexes
- Common staircases
- For Basement or Covered Parking Area
- Shopping Malls
- For garden lights

Features

- Complete with PIR, Motion Detection.
- Dual Element Sensor with Low Noise and High Sensitivity.
- Supply Voltage 5V.
- Delay Time Adjustable.
- Standard TTL Output.

Transmitter:

Switches S1, S2, S3 and S4 are interfaced with AD8 through AD11 of encoder HT12E for forward (FWD), reverse (REV), left (LEFT) and right (RIGHT) motions, respectively. Resistor R1 is connected between oscillator pins 15 and 16 to set the transmitter frequency.

Arduino:

This is Controller board which is used to control the movement of Robot by giving the commands to Motor driver IC L293D.

Remote control:

For controlling the Woman security robot remotely the encoder decoder pair (HT12E and HT12D) together with a 433MHz transmitter-receiver pair is used. HT12E and HT12D are CMOS ICs with working voltage ranging from 2.4V to 12V. Encoder HT12E has eight address and another four address/data lines. The data set on these twelve lines (address and address/data lines) is serially transmitted when transmit-enable pin TE is taken low. The data output appears serially on DOUT pin.

Implementation, Test Performance

5.1 Simulations

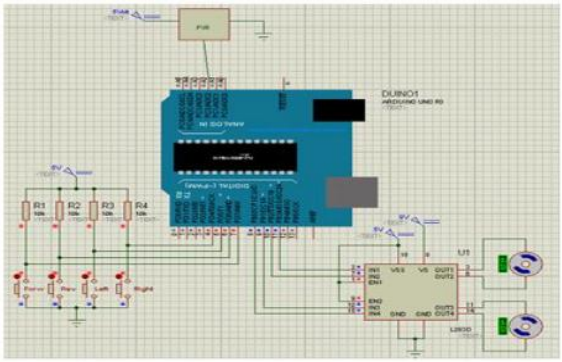

Figure 5.1: Simulation

7. CONCLUSION

After studying this system model carefully, we can conclude that this system will surely help to reduce the crime rates against women. The project grants designing about the women, faced the lot of critical situation at present days and will assist to clarify them scientifically with compressed kit and concept. The women safety Robot is capable of securing her in a distress situation. It provides alarm, SOS light and even integrated safety app for their very critical environment. The safety Robot can be enhanced much more in the future by using highly compact Arduino modules. It also contains safety app which is the environment where she finds the safest place in the app and rescue herself if no help is present at that time.

7.1 Future scope

In Future we can use IOT then we can control this robot from any place in the world Also we can use weapons for quick action on the problematic condition. As the main aim in the world is to ensure womens security so by this model we can achieve our aim also slowly it would reach the rural areas and the women in can bene_t themselves at a low price and women can leave their houses without any worries. This system can be more advanced by adding calling feature also the location can also be send to the nearest police station. Images can be clicked in the advanced system.

Fig 5-Women safety Night Patrolling Robot

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