

# Automatic Gun Targeting System

Ajay S. Mirchapure

Department of Electronics and Telecommunication Engg.  
Prof. Ram Meghe College of Engineering And Management

**Abstract:** Until now the border security was totally depending on soldier. In highly secured area the soldier detected the enemy and targets him. But if the soldier was not able to detect the enemy the enemy could easily enter the secure area. So for the increasing the security level microcontroller based automatic gun targeting system is introduced. The basic purpose of this automatic gun targeting system is to secure the border using automation and this will reduced the human effort. Current system is capable to detect any PIR radiation in the range of border and automatically target its position. The introduced system is based on PIR sensor. The PIR sensor senses the temperature differences and then these signals are coded by microcontroller and transmitted toward the receiver on watch tower.

## 1. Introduction

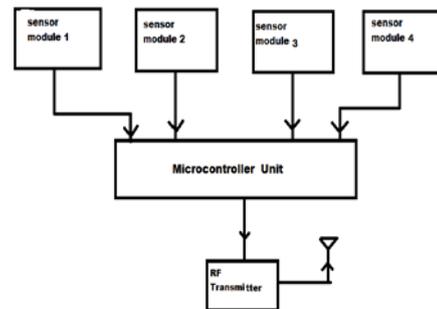
The prior concept of Automatic Gun targeting System is to detect and target the living object or any movement in highly secured area such as Border by using automation. The automation is sensor base automated gun targeting system target the living object within the range of sensor. The automatic gun targeting is primary base on PIR sensors, microcontroller and RF transmitting and receiving unit with targeting gun. Until then, border is done by Iron Spike wires, and a watch tower from which a person continuously flashing the light over the border area day and night. Those persons are fully responsible for border security.

Automatic Gun targeting System will not fully remove the responsibility from their soldiers, but shares the maximum responsibility and will reduce human mistake on the border. The sensors will sense any living object within the provide range. The signal of sensor is provide to microcontroller, in response, microcontroller generates the code and it will transmit that code using RF transmitter to the watch tower where the RF receiver receives the code. The microcontroller at receiver side control targeting gun, buzzer and motor drivers circuit as per received code and targeting gun at receiver will target the living object. The buzzer will indicate that target is sensed by sensor. So the person on watch tower can easily interpret the location of the object. The automatic gun targeting system will enhance the

border security using automation which may reduce the human efforts to large extents. In future the system can further implement with the help of face recognition and Bluetooth technology and so that system will work more efficiently.

## 2. SYSTEM OVERVIEW

### 2.1 Block diagram and Working of Transmitter Section:



**Figure: Block Diagram of Transmitter Section**

As shown in figure the living object detected by presence of motion sensor. It's consisting of the Passive IR Sensor module that detects the invisible IR radiations of the any living object and generates a signal. This signal is given to the microcontroller and then microcontroller generates a code corresponding to the sensor detection. As the code is generated, this looks like something as 0001, 0011, etc. The code is given to the RF Transmitter section for modulation of signal and transmission of signal to the RF receiver on receiver side.

Each passive IR sensor senses and generates the signal at the port of the microcontroller and it then depends on the microcontroller to generate a unique corresponding code related to the passive IR sensor detection. Multiple passive IR sensors can detect a single object and generate codes which in result generates signal on the multiple ports of the microcontroller. Under such situation, it depends on the microcontroller to take the input of multiple sensors at a time and then decide the correct location of the object on the basic of received data.

## 2.2 Block Diagram and Working of Receiving Section:

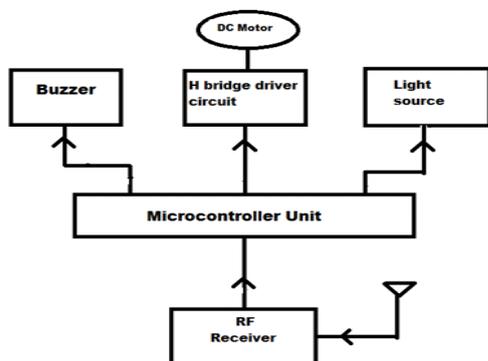


Figure: Block Diagram of Receiving Section

The receiver contains RF transceiver, Microcontroller, DC motor, light source, H- Bridge Driver circuit, Buzzer Alarm. The signal transmitted via transmitter is received by the RF receiver, demodulated by a demodulator. Then the s/g is transmitted to the microcontroller and microcontroller retains the code transmitted by a transmitter and performs the function accordingly. The signal received and code regenerates is called obtained code. The format of the obtained code is the 1011, 0101 etc. Each code regenerated is destined to perform some target function. It depends on the code, how much degree will the motor rotate and targets itself to the object location and then, as the targeting function is completed, the buzzer module activates and buzzer alarm system activates that alarm everyone present into the watch tower. As the buzzer system gets activated, after very small delay, the targeting system gets activated, and light source starts focusing over the destined location. The fire lasts until the sensor stops sensing the IR radiations. It is a complete destruction program of the discovered living object near the border area range.

The rotation can vary accordingly to the sensation of the sensors as the code transmitted will rapidly changes. The transmitter and receiver can be at 80M from each other. If more distant, receiver will create problem in the reception of code which is an extremely important part of the program. The transmitter and receiver works on 433 MHz frequency.

## 3. CIRCUIT SCHEMATICS

### 3.1 Transmitter Section Schematics:

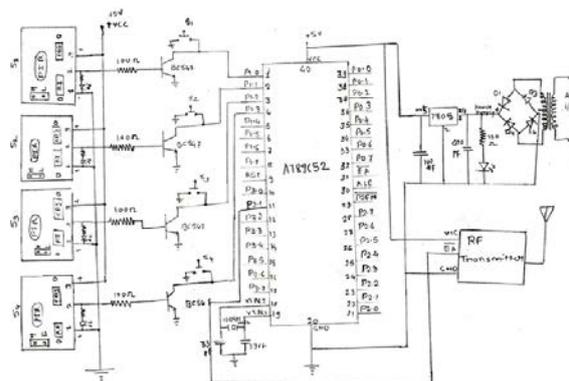


Figure: Circuit Diagram of Transmitter Section

### 3.1.1 Description of Schematics of Transmitter Section:

Transmitter section includes following units

- 1] PIR sensor
- 2] Microcontroller unit
- 3] RF module
- 4] Power supply (regulated power supply of 5v)

4 PIR sensors named as S1, S2, S3, and S4 to the pin P1.0, P1.1, P1.2, and P1.3 of port 1 respectively. Each sensor connected to microcontroller pins through BC547 transistor. For the operation of microcontroller 89C52 one crystal oscillator of 11.0592MHz is connected between XTAL1 and XTAL2. The generated code for the sensor output is given to the RF transmitter module for transmission to the receiver via TXD pin (p3.1) of microcontroller. 5v regulated supply is used for microcontroller, RF module and sensors. Power supply consists of 9v, 500mamp step-down transformer and it is converted to DC using one bridge rectifier IC. The DC output is given to the voltage regulator IC 7805 and at the output of 7805 we get constant 5v supply.

### 3.2 Receiver Section Schematics:

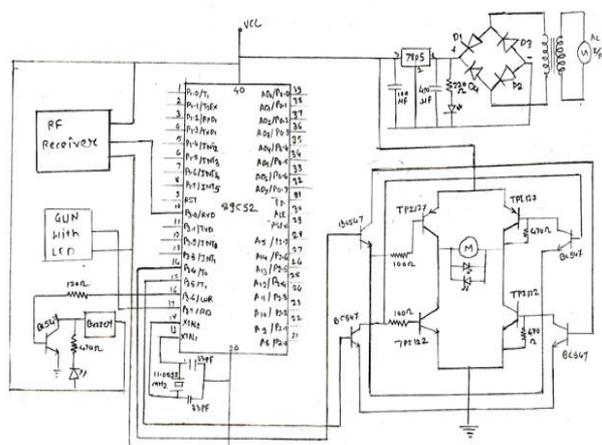


Figure: Circuit Diagram of Receiver section

### 3.2.1 Description of Schematics of Receiving Section:

Receiving section includes

- 1] RF receiver module
- 2] Microcontroller unit
- 3] Buzzer (alarm system)
- 4] Motor driving and firing control mechanism.

RF receiver will receive the signal from RF transmitter on RXD pin of microcontroller. The signal received on p3.0 of port 3 of microcontroller.

Microcontroller regenerated the signals for the operation of microcontroller 89C52 or crystal oscillator of 11.0592MHz is connected between XTAL1 and XTAL2. Buzzer alarm system is connected to p3.6 of port 3. The buzzer is connected via transistor BC547 to microcontroller. Motor driver and firing control mechanism is interfaced with p3.4, p3.5 and p3.7 of port 3 of microcontroller. The signal from microcontroller is given to motor driver circuit through Darlington transistor TIP122 and TIP127. It consists of pair of Darlington of BC547 transistor. The firing control system by LED which is connected on p3.7 of port 3 of microcontroller. 5v regulated supply is used for microcontroller, RF receiver module, Buzzer and motor driver and firing control mechanism. Power supply consists of 9v, 500mamp step-down transformer and it is converted to DC using one bridge rectifier IC. The DC output is given to the voltage regulator IC 7805 and at the output of 7805 we get constant 5v supply.

### 3.2.2 Mechanism behind Dc Motor Targeting System:

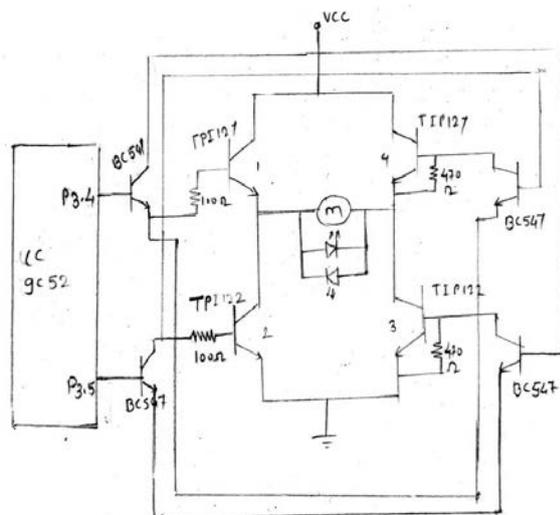


Figure: Motor Driver Circuit

The above figure shows the schematic of DC motor driver. Pin P3.4 and P3.5 of port 3 are connected to the base of Darlington transistor. The microcontroller generates the code on pin P3.4 and P3.5 of port 3 FOR DC motor driver circuit.

Darlington transistor is compound structure consisting the two bipolar transistor connected in such a way that the current amplified by first transistor is amplified further by the second one and common emitter gain is enhanced. Microcontroller sends control signals to the motor deriving and firing control mechanism on pin 3.4, 3.5 and 3.7 of port 3 as per received code. Accordingly the motor will rotate in desired direction.

E.g. If the p3.4=1 and p3.5=0, the motor will rotate in forward direction, if p3.4=0 and p3.5=1, then motor will rotate reverse direction.

### 3.2.3 Buzzer Alarm System:

Buzzer alarm system is used to indicate that any living object/ any movement is sensed or detected by PIR sensor. Alarm will alert the person on watchtower and the person will take necessary action on located area. The firing can be automatic or we can keep it as manual. The buzzer is connected to microcontroller pin p3.6 of port 3. When there is no object detection and output of sensor is zero then buzzer will be in off position.

### 3.2.4 Firing Control System:

In the given circuit diagram the gun firing control mechanism is replaced with LED. The LED connected on pin p3.7 of microcontroller. When p3.7 of microcontroller is zero then the LED will not glow, means no object sensed by the sensor, so the gun will not fire means the LED is off. When the port p3.7 will be high on the object detection by the sensor, the transistor LED on means the object completely destroyed by targeting gun.

## 4. CONCLUSION

Thus, the automatic gun targeting system is feasible for highly secure area such as border the system consist of microcontroller unit, RF module targeting gun. The automatic gun targeting system is based on PIR sensor. This system helps produce the responsibility and efforts of soldier in border security. This system can further implemented by using Bluetooth technology and face recognition system.

The system is economical. The automatic gun targeting system is not taking full responsibility of security. The automatic gun targeting system can be easily implemented for the home security also. This system shows better result in highly secured region.

## 5. REFERENCES

- [1] C. E. Daniell, D. H. Kemsley, W. P. Lincoln, W. A. Tackett, and G. A. Baraghimian, "Artificial neural networks for automatic target recognition," *Opt. Eng.*, vol. 31, no. 12, pp. 2521–2531, Dec. 2012.
- [2] W. M. Brown and C. W. Swonger, "A prospectus for automatic target recognition," *IEEE Trans. Aerospace Electron. Syst.*, vol. 25, no. 3, pp. 401–410, May 2011.
- [3] <http://www.engineersgarage.com/contribution/automatic-gun-targetting-system>
- [4] [http://www.academia.edu/4857984/AUTOMATIC\\_TARGETTING\\_SYSTEM4](http://www.academia.edu/4857984/AUTOMATIC_TARGETTING_SYSTEM4).
- [5] <https://learn.adafruit.com/pir-passive-infrared...motion-sensor/overview>
- [6] <http://electronics.stackexchange.com/questions/34774/what-sensor-to-choose-to-track-human-presence-indoors>
- [7] S. Blackman and R. Popoli, *Design and analysis of Modern Tracking Systems*, pp. 309–313, 1999: Artech House