

# Border Security System with Missile Tracking

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**Abstract**— We know that the soldiers are sacrificing their lives throughout day and night to safeguard the country. In spite of all the cares taken by the military people, intruders may cross the borders and enter into our land to damage the important properties of the country and kill the innocent public. To solve this problem we have made an attempt to design an embedded system which can detect the entry of intruders and take the necessary action immediately. Using robotic targeting, we can use this system to trigger the gun which destroys the missiles launched by the enemies in air.

**Index terms**— Border security system, missile tracking, intruders, GSM.

## I. INTRODUCTION

The improvement of science and technology has lead to many changes in the way of life. We are using this latest technology in most of applications like robots, space research, medical appliances, automobiles, military, education etc. In this regard, we have made an attempt to design an embedded system, which takes the responsibility of checking the intruder when a dangerous condition is found in sub station limits.

Sub station will be placed in the border where there will be lots of problem due to improper security. Usually there are many sub stations in the border located between the distance of 2 km range from one substation to another. In between this range, if any intruder tries to enter our border area then it will be very difficult for our soldiers to identify those intruders.

Our system consists of IR sensors and metal detectors to check sensitive points of the border. The outputs of sensors are fed to microcontroller.

GSM modem has been used for communication with the higher authorities. It is possible by sending a text message in the predefined format to the GSM modem. SIM card is used in the modem, so that precautions can be taken to avoid the enemies.

GSM modem can be controlled by a standard set of AT (Attention) commands. These commands can be used to control majority of the functions of GSM modem.

## II. METHODOLOGY

### A. Hardware Development

#### Functional Block Diagram

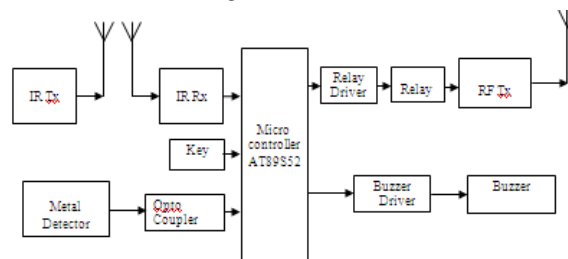


Figure 1: Block diagram of sub station

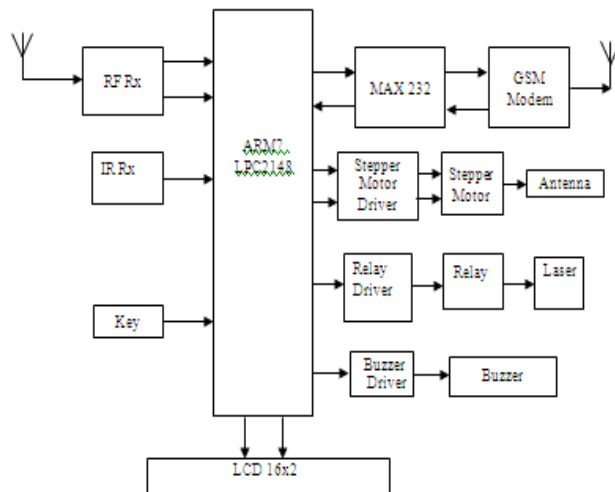


Figure 2: Block diagram of base station

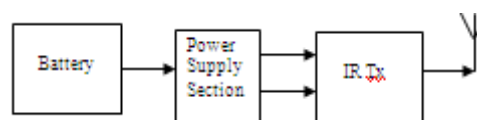


Figure 3: Block diagram of missile section

*Working Principle*

It has two sections- one is sub station and another one is base station.

Figure 1 shows the block diagram of sub station. In the sub station part, we have used microcontroller with IR transceiver, metal detector, opto coupler, buzzer, relay, relay driver with switch and RF transmitter.

If any intruder is detected by the IR transceiver, then microcontroller will activate the buzzer alarm in the substation, so that someone can go and check the intruders. It is also been provided with a single key to switch OFF the alarm once if they have cleared the intruder. And it has a metal detector which is used to detect the weapons carried by the terrorists or intruders. Once when the metal detector is detected, then the controller will take action and it will activate an emergency alarm in substation as well as it will use relay and relay driver with RF transmitter to transmit the RF signal to the base station about the emergency information.

Figure 2 shows the block diagram of base station. In the base station part, we have used ARM controller with GSM modem, buzzer, LCD with switch and RF receiver.

When the RF signal from sub station is received by the RF receiver which is present at the base station, then it gives the warning information to the ARM controller. And the controller will display the same information on the LCD screen by activating the emergency signal through the buzzer. And at the same time the controller will send the SMS to the higher authorities using the GSM modem. A single key is used to switch OFF the alarm manually once they have confirmed the warning information.

Figure 3 shows the block diagram of the missile section. RF receiver receives RF radiations produced by the missiles launched by the enemies in air. Using these radiations, it detects the direction of the missile and destroys it.

*B. Software Development*

In order to detect the entry of intruders into the border and to detect and destroy the missiles launched by the enemies in air, a program is written in embedded C language. The functioning of the sub station is shown in figure 4.

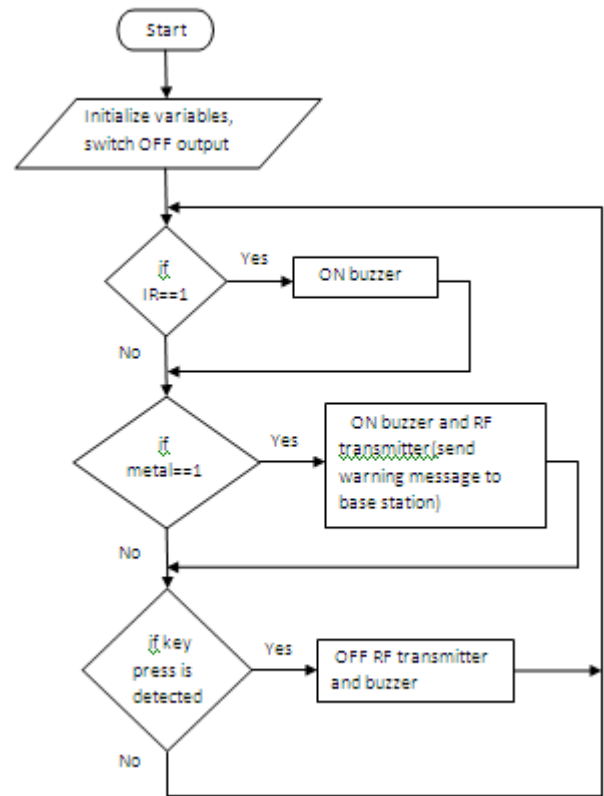


Figure 4: Flowchart of Sub station

The program first initializes the variables and switches OFF the output loads. It then checks if the status of IR is 1, if it is 1, it turns ON the buzzer which indicates that an intruder is detected.

The program next checks for the weapons carried by the intruders. If metal status is 1, then the buzzer is turned ON in the sub station and the RF transmitter sends a warning message to the base station indicating the entry of terrorists.

The next process is to check if key press is detected at the base station. If the key is pressed, then the program instructs the microcontroller to turn OFF the RF transmitter and buzzer.

The functioning of the Base station is shown in the figure 5.

III. RESULT

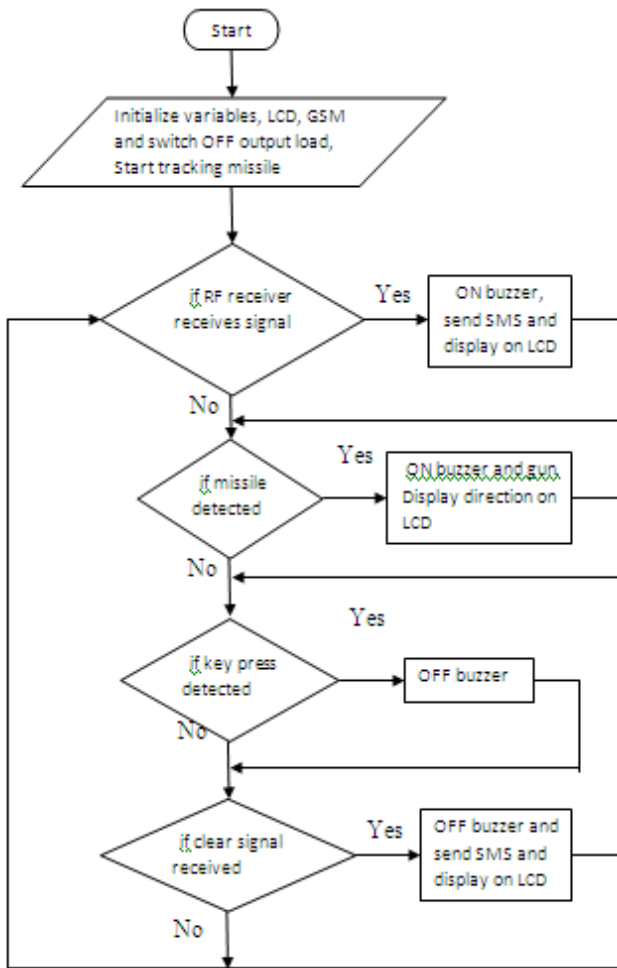


Figure 5: Flowchart of Base station

The program first initializes the variables, LCD, GSM and switches OFF the output loads. And it starts tracking the missile.

The program checks if the RF signal is received by the RF receiver. If the signal is received, it indicates that an intruder has entered the border. The program instructs the ARM controller to turn ON the buzzer and display the message on the LCD indicating the sub station at which the intruder has entered. It also instructs the ARM controller to send SMS to the higher authorities using GSM.

The next process is to detect the missile. If the missile is detected, then the program instructs the ARM controller to turn ON the buzzer and gun. And also display the direction of the missile on the screen. The gun shoots the missile and therefore the missile is destroyed.

The program now checks if the acknowledgement key is pressed. If the key is pressed, then the buzzer is turned OFF.

If clear signal is received from the sub station, then the ARM controller is instructed to turn OFF the buzzer and send SMS to the higher authorities and display on the LCD that the problem is solved.



Figure 6

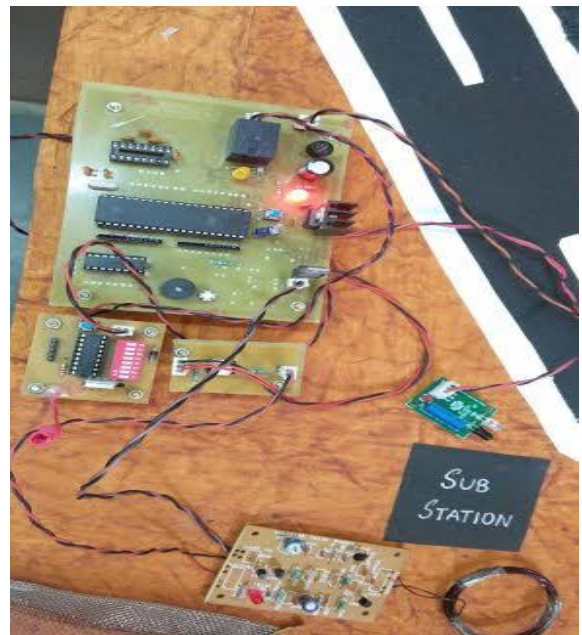


Figure 7: The output when an intruder is detected by the IR sensor.

When an intruder is detected by the IR sensor, the Red LED glows and a Buzzer is activated in the sub station.

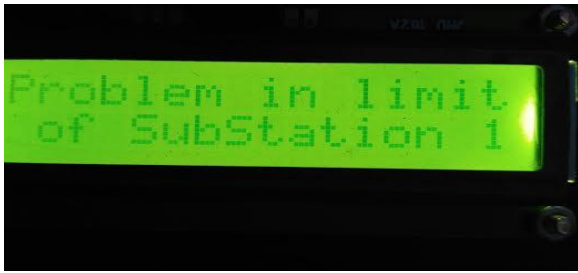


Figure 8: The output on LCD in the Base station when an intruder is detected at the Sub station.



Figure 10: The output on LCD when the missile is detected in North-West direction.

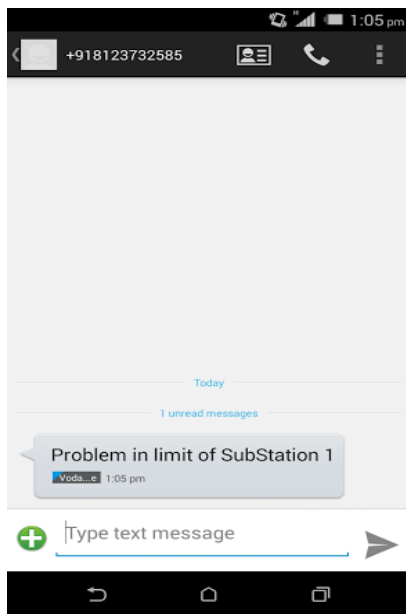


Figure 9: Alert message is sent from Base station to the higher authorities using GSM.



Figure 11: The output on LCD when the missile is detected in South-East direction.



Figure 12: The output on LCD when the missile is detected in West-South direction.

Figure 15: Message send to the higher authorities from Base station using GSM.



Figure 13: The output on LCD when the missile is detected in East-North direction.

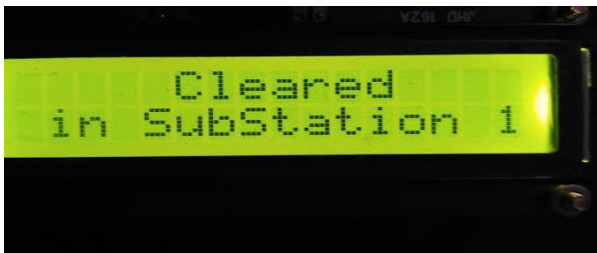
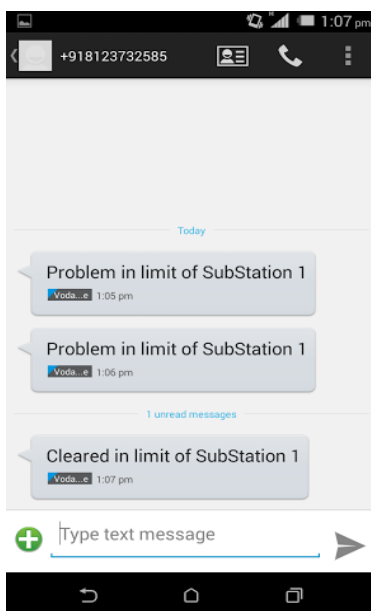


Figure 14: The output on LCD when the intruder is cleared at the Sub station.



#### IV. CONCLUSION

The development of a border security system using missile tracking incorporating microcontroller at the sub station and an ARM controller at the base station has been described in this paper. The system could detect the entry of intruders at the border and alert the Sub station as well as the Base station. It could also detect and destroy the missiles launched by the enemies in air. It provides an efficient way of securing the country.

#### ACKNOWLEDGEMENT

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#### REFERENCES

- [1] P. Zarchan, Tactical and Strategic Missile Guidance, AIAA(2007).
- [2] Morrison, Bill, SR-71 contributors, Feedback column, Aviation Week and Space Technology, 9 December 2013, p.10.
- [3] "Trident II D-5 Fleet Ballistic Missile", retrieved June 23,2014.
- [4] Siouris, George, Missile Guidance and Control Systems, 2004.
- [5] Champion P.D, Hofstra D.E, Clayton J.S, Border Control System, 2007.
- [6] The Journal of Applied Sensing Technology, Advanstar Communication Inc.
- [7] The 8051 Microcontroller Architecture, Programming and Applications, Kenneth J. Ayala.
- [8] The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi.
- [9] Programming and Customizing the 8051 Microcontroller, Myke Predko.