

# Defence Security System with Antibombing Technology using Laser Gun

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**Abstract:** *Border surveillance is the most difficult and important task for national defense and security. Especially under certain circumstances when activities like terrorists' infiltrations, intrusions and illegal happenings between the borders, it has become utmost important to protect the borders with smart and advance technology. Our project is based on a Border security system which fabricates on border security, by using advance technologies. The main objective of the paper is to describe how the technologies used in this system works and how this will help the soldiers to secure the border of the country. To curb such happenings the least we can do is to constantly monitor across the border and detect intrusions. It takes a lot of man power to stretch over the border and constantly keep an eye, hence the need of the hour is to build such automated border surveillance which can eliminate man power. Moreover, if something suspicious is detected by the system, it must be able to perform necessary actions by issuing an alarm alert and weapon activation system. The central room can be set up within a distance from the border. Once the human controller is aware of intrusion it is upon them to take next course of action.*

**Keywords:** Defence Security.

## I. INTRODUCTION

Now-a-days there is a sudden increase in the activities of terrorist & forces of neighboring countries at the borders between the countries. Due to the increase in these activities patrolling the soldiers will increase & sometimes soldiers lost their lives in these encounters. Our system is a simple solution for this problem in which or system will do the patrolling work & detects the intrusion & eliminate that intrusion. This system is fully automated which needs only one or two persons for maintenance purpose. This project will basically concentrate on the human interfacing & knowledge towards our project system i.e. the detection & alerting the soldiers to take necessary action to the problems at the border. This system has ultrasonic sensors which are responsible for the detection of intrusion. As they are mounted over the section pillars. The sensors continuously rotate in the range of certain degrees (180) & show the intrusion over the radar with its location. Another set of sensors which sense the intrusion & show over the LCDs & activation of the alarm. As the sensors detect the intrusion vibration sensor & gas sensor sends signal to the receiver or control room again detect the intrusion by sensor mounted over it. As it detects, the laser gun this rotating gun also come with camera which provides live surveillance at control room when the command of fire is received from command room it will fire towards the intruder & eliminate it. The laser used is Diode Laser.

The laser technology has made remarkable progress over the past couple of decades. It is being widely employed in diverse domains, such as holography, space sciences, spectroscopy, medical sciences, micro and power electronics, industrial engineering, and most distinctively, as directed energy military weapons. Owing to their active transmissions, laser systems are similar to microwave radars to some extent; however, unlike conventional radars, the laser operates at very high frequencies thus making it a potent enabler of narrow-beam and high energy aerial deployments, both in offensive and defensive roles. In modern avionics systems, laser target indicators and beam riders are the most common devices that are used to direct the Laser Guided Weapons (LGW) accurately to the ground targets. Additionally, compact size and outstanding angular resolution of laser-based systems motivate their use for drones and unmanned aerial applications.

Moreover, the narrow-beam divergence of laser emissions offers a low probability of intercept, making it a suitable contender for secure transmissions and safety-critical operations. Furthermore, the developments in space sciences and laser technology have given synergistic potential outcomes to use laser systems in space operation

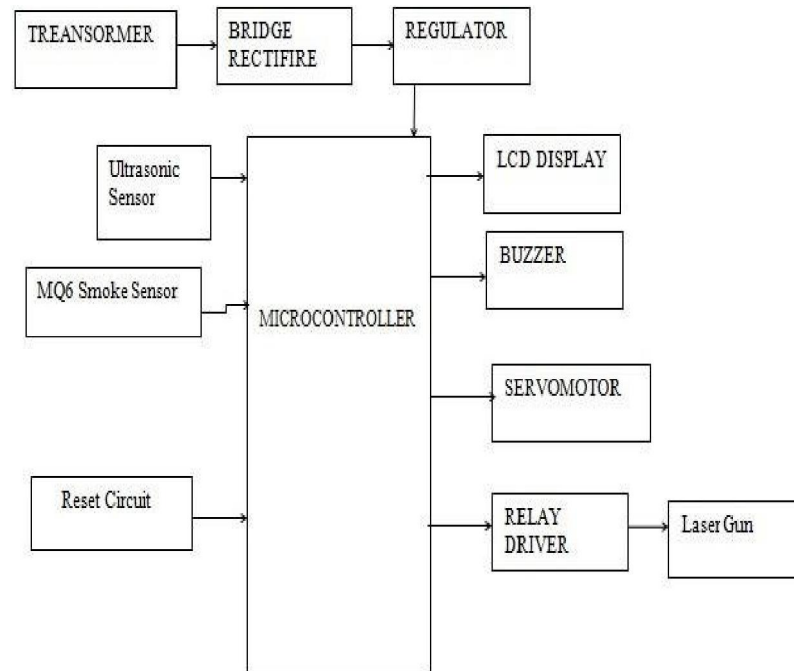
## II. LITERATURE SURVEY

The progress of science and technology has been closely linked to man's pursuit of electromagnetic spectrum towards higher frequencies as this has opened up new application potentials and enabled new capabilities for defence and security. After the early days use of radio frequency for communication, radar and microwaves have opened up new avenues related to defence applications. Today, the decisive impact of technology on war and peace is much more pronounced than ever before. As we commence the 21st century, the perceptions of military might and defence preparedness are changing significantly as compared to the last century which was dominated by cold war. The cold war era was dominated by nuclear weapons and missile technology. More recently, satellite surveillance, information communication technologies (ICT), and precision strike capabilities have transformed the strategic doctrines for defence and security around the world. Thus, 21st century is likely to be influenced by technologies that can either complement these capabilities or create new capabilities that can out-match the winner technologies of the 20th century. While information technology and space technology are proving to be major enablers for modern network centric warfare, another new technology emerging clearly as critical for 21st century is directed energy weapons (DEW). Sustained R&D over past three to four decades and successful tests after overcoming many hurdles and problems, have led the technology to a state of maturity that is likely to enable deployment of new generation beam weapon systems. While high power lasers (HPL) and high power microwaves (HPM) have emerged as the two main options for the DEW technology, HPL technology has progressed rapidly and has a clear advantage for long-range military applications. Directed energy weapons are revolutionary in nature and thus have the potential to significantly influence the international power balance in the 21st century. Electromagnetic energy is known to travel at the speed of light to reach long distances in a split second, and this aspect has always fascinated human mind over the ages. One of the first uses of such energy against enemy was the use of mirrors by Greek warriors to reflect sun rays into the eyes of the enemy to blind them before attacking them.

The field of laser has witnessed tremendous scientific and technical developments in the recent past, enabling its deployments for a variety of biological, industrial, commercial and scientific applications. The key applications of laser technology can be divided into the domains of health sciences, engineering, and technology and security and defense. One of the rapidly progressing

fields in the defense sector is the offensive use of laser for airborne military applications. Laser weapons have many advantages over traditional weapons. First, the transmission at the speed of light allows laser-based weapons to engage distant targets immediately after detection. Second, the directed laser energy provides less collateral damage and low-profile and covert operations capabilities. Laser is a surgical weapon of choice, offering precise target-point selection. Initial installation costs are high but after deployment, laser weapons provide cost-effective engagements. Finally, the laser deployments can be flexibly tuned to deliver a gradient effect to tailor the range of results to non-fatal, destructive and disruptive outcomes .

BLOCK DAIGRAM



TEST METHOD

Check that component agree with the part list (value and power of resistors, value and voltage eating of capacitor, etc.) if in any doubt double check the polarized components (diodes, capacitor, rectifiers etc.)

If there is a significant time elapse between circuits, take trouble to read the article; the information is often given in a very condensed form. try to get most important point out of the description of the operation of the circuit, Even if you don't understand exactly what is supposed to happen.

- If there is any doubt that some component may not may be equivalent, check that they are compatible.
- Only use good quality IC socket.
- check the continuity of the tracks on the PCB (and through plated holes with the double sided boards) with a resistance meter or continuity tester.
- Make sure that all drilling, filling and other 'heavy' work is done mounting any component.
- If possible keep any heat sinks well isolated from other components.
- Make wiring diagram if the layout involves lots of wires spread out any all direction.
- check that the connectors used compatible and that they are mounted the right way round.
- Do not reuse wire unless it is of good quality. Cut off the ends and strip it a new.

PIC18F4520 Microcontroller



PIC18F4520 is a low-cost, low-power, high- speed 8-bit, fully-static Microcontroller unit that has 40 pins out of which 36 pins can be used as I/O pins. It has Power- on-Reset (POR) as well as the Extended Watchdog Timer (WDT) circuitry, which can be programmed for 4ms to 131s It is an 8-bit enhanced flash PIC microcontroller that comes with nona Watt

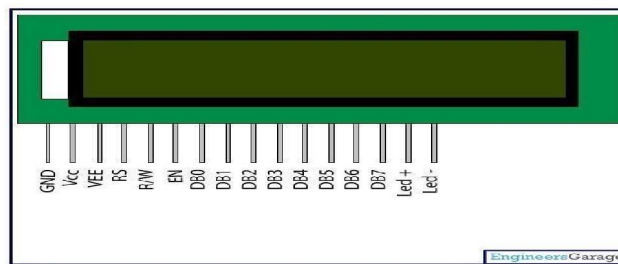
technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end- user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

**BUZZER**

A buzzer or beeper is an audio signal device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. If embedded system is misplaced from dashboard, the IR sensor becomes active. The signal is sent to ARM microcontroller to ring the buzzer. It is connected to the port pin P0.21 via jumper J10 of microcontroller.



**16\*2 LCD DISPLAY**



LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments). Animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

**Ultrasonic Sensor**



Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

1. Using IO trigger for at least 10us high level signal.
2. The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

- IF the signal back, through high level, time of high output IO duration is the time from sending ultrasonic to returning.

$$\text{Test distance} = (\text{high level time} \times \text{velocity of sound (340M/S)}) / 2,$$

Wire connecting direct as following:

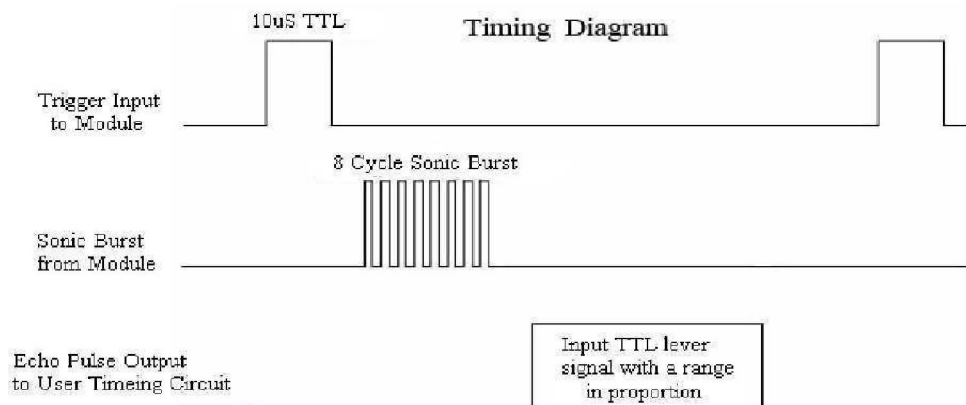
5V Supply

Trigger Pulse Input

Echo Pulse Output 0V Ground

### Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion. You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula:  $\mu\text{s} / 58 = \text{centimeters}$  or  $\mu\text{s} / 148 = \text{inch}$ ; or: the range = high level time \* velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



### MQ6 SMOKE SENSOR



Sensitive material of MQ-6 gas sensor is SnO<sub>2</sub>, which with lower conductivity in clean air. When the target combustible gas exist, The sensor's conductivity is more higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-6 gas sensor has high sensitivity to Propane, Butane and LPG, also response to Natural gas. The sensor could be used to detect different combustible gas, especially Methane, it is with low cost and suitable for different application. Character Configuration

Good sensitivity to Combustible gas in wide range

High sensitivity to Propane, Butane and LPG

Long life and low cost \* Simple drive circuit Application

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Domestic gas leakage detector \* Industrial Combustible gas detector  
Portable gas detector

The MQ-6 module is used in gas leakage detecting equipment in family and industry, This module has high sensitivity to LPG, iso-butane, propane and LNG. It can also be used to detect the presence of alcohol, cooking fumes, and cigarette smoke. The module gives out the concentration of the gases as a analog voltage equivalent to the concentration of the gases. The module also has an onboard comparator for comparing against an adjustable preset value and giving out a digital high or low. It can be easily interfaced with your Arduino or Raspberry Pi.

This is a simple-to-use MQ-6 Liquefied Petroleum, iso-butane, propane gas Sensor module, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

Sensitive material of MQ-6 gas sensor is SnO<sub>2</sub>, which with lower conductivity in clean air. When the target combustible gas exist, The sensor's conductivity is more higher along with the gas concentration rising. Please use simple electrocircuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-6 gas sensor has high sensitivity to Propane, Butane and LPG, also response to Natural gas.

The sensor could be used to detect different combustible gas, especially Methane, it is with low cost and suitable for different application.

## RELAY



A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

A relay is an electrically operated switch.

Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram.

**Normally Open (NO):** Contacts connect the circuit when the relay is activated, the circuit is disconnected when the relay is inactive.

**Normally Closed (NC):** Contacts disconnect the circuit when the relay is activated, the circuit is connected when the relay is inactive.

**Change Over (CO):** It's the common contact.

**Coil:** It's the electromagnet coil inside relay.

**Coil rating:** It's the Voltage at which the coil gets fully activated. Some also have coil resistance mentioned on them. Relay coil voltage rated 6V and 12V are the most commonly available.

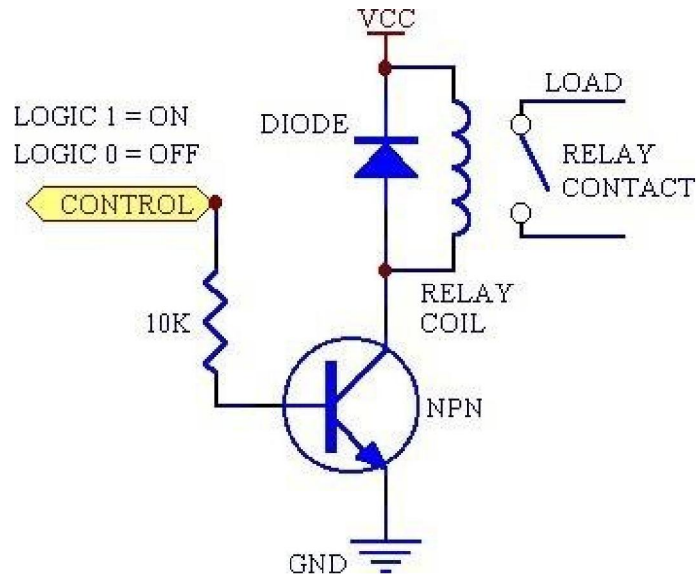


Figure 2.4.8(b): Relay Driver Circuit

The figure shows a relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts.

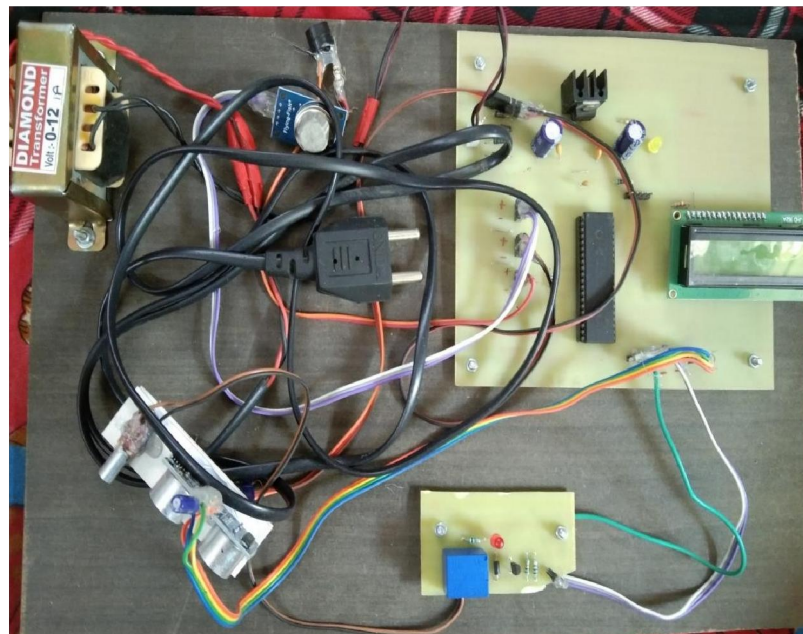
**Applications of relays:**

- Control a high-voltage circuit with a low-voltage signal, as in some types of modems or audio amplifiers.
- Control a high-current circuit with a low-current signal, as in the starter solenoid of an automobile.
- Detect and isolate faults on transmission and distribution lines by opening and closing circuit breakers.

**SOFTWARE SPECIFICATIONS**

MPLABIDE8.91

RESULT



### SCOPE OF PROJECT

Adequate amount of power, preferably in megawatts, to cause considerable damage to the distant targets. Such high-power transmissions pose serious safety challenges during lab/field testing, where the performance of such systems is to be evaluated under a controlled environment. As this domain is gaining maturity, development, and configuration of safe, cost-effective and comprehensive testing facilities for high-energy laser-experiments has emerged as an important research challenge.

### ACKNOWLEDGMENT

“Perfect and precious guidance, hard work, dedication and full encouragement are needed to complete a project successfully in the life of every student illumination of project work is like engraving a diamond

We take this opportunity on the successful completion of our project so thank all the staff for their valuable guidance, for devoting their precious time, sharing their knowledge and their co-operation throughout all course of development our project and the academic year of education.

We a deep guidance to our project **Prof. PAGIRE.R.R (Project Guide)** whose valuable guidance, which has been a key factor in the successful completion of our project. Also we a deep guidance to our project **Prof. Borhade G.L (project Co-ordinator)** has been a key factor in the successful completion of our project A remarkable and unspeakable person in our life **Prof Kulkarni B. L HOD E&TC Department)** whom we have a gratitude and respected for developing entrepreneurship qualities and sharing his knowledge and lifetime experience to make our future glorious Also our special thanks to **Prof. V. B. DHUMAL (Principal)** & management staff whose assistance is also an important part in completion of our project Lastly we take opportunity to thank one and all who directly or indirectly have helped using the successful completion of our project.

### CONCLUSION

We have fabricated a robust and portable security system for the country borders. We believe that our system is very simplified and have the features that other border security systems does not have at portability level. Our system can be improved by doing the advancements according to the needs. The accuracy & precision of the system can be improved by using multiple sensors & it will give good & accurate results with high precision.

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