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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*:* PIC18F4520, Metal detector sensor, Ultrasonic Sensor, Servomotor, MQ6 sensor,HC-05, Motor

I. INTRODUCTION

Now-a-days there is a sudden increase in the activities of terrorist & forces of neighbouring 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

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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 operations.

This paper comprehensively reviews laser applications and projects for strategic defense actions on the ground or in space. Additionally, a detailed analysis has been done on recent advancements of the laser technology for target indicators and range-finders. It also reviews the advancements in the field of laser communications for surveillance, its earlier state of the art, and ongoing scientific research and advancements in the domain of high energy directed laser weapons that have revolutionized the evolving military battlefield. Besides offering a comprehensive taxonomy, the paper also critically analyzes some of the recent contributions in the associated domains.

II. LITERATURE SURVEY

Comparison of your system with same system available in market

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 One is of course familiar with the mythological tales of the third eye of 'Lord Shiva' (Indian deity) that could send a scorching beam of light to burn and destroy the evil. All such perceptions and early adaptations of the use of visible light energy were indeed precursors to DEW. Ever since the discovery of laser (light amplification by stimulated emission of radiation) in 1960, the real world has come very close to the science fiction images of bright light beams as the new generation weapon. HPL–DEW, today is recognised as unique speed of light energy beam weapons using high power lasers that can be precisely aimed to target over long strategic distances. Other DEW options include HPM and particle beams, but they are yet to mature to the level of HPL, which is ready for direct use as a weapon system in modern warfare. While the technology today is still far from providing the ultimate death-ray gun in the hands of a foot soldier, DEW as a platform-based weapon system is being pursued by many advanced countries, albeit at varying levels of technology maturity. Invisible infrared (IR) lasers have been in use for IR countermeasures (IRCM) through much of the cold war period. These devices are aimed at blinding or disabling enemy sensors in the visible or IR band to deny enemy the early advantage of accurate observation. More modern versions of IRCM capability include causing dazzle effects to weapon system operators or damaging the guidance sensors onboard on enemy missiles or unmanned air vehicles (UAVs) to render them ineffective. As threats become complex, the need to respond rapidly and accurately with minimum collateral damage will be very essential, and most defence and security planners envisage increasing use of DEW to meet this future challenge across the full spectrum of modern warfare. The major boost to DEW came in 1983 from the strategic defense initiative (SDI) of the Regan era, when 'Star War' technologies were promoted with the promise of making nuclear weapons obsolete. Billions of dollars have

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been spent for R&D in DEW, driven by the logic that advanced DEW capability should provide a paradigm shift in the perception of 'strategic deterrence' that need no longer depend so heavily on nuclear-tipped missiles. While HPL technology made impressive progress and remained in the news, significant technological advances were also achieved in the areas of HPM as well as in particle beam technologies 1 . Extensive research into DEW sources and the concurrent advances in beam directing technology have pushed technology envelop to the level where fully configured DEW systems are now being designed and tested for imminent deployment. Advances in material technology, information technology, and space-based capabilities of the 21st century are also providing the right environment for growing demand for DEW systems. The US Air Force project on airborne laser (ABL) is a classic example of how DEW technology is transforming into a formidable weapon system with hitherto unthinkable military capabilities.

2.1 Proposed System

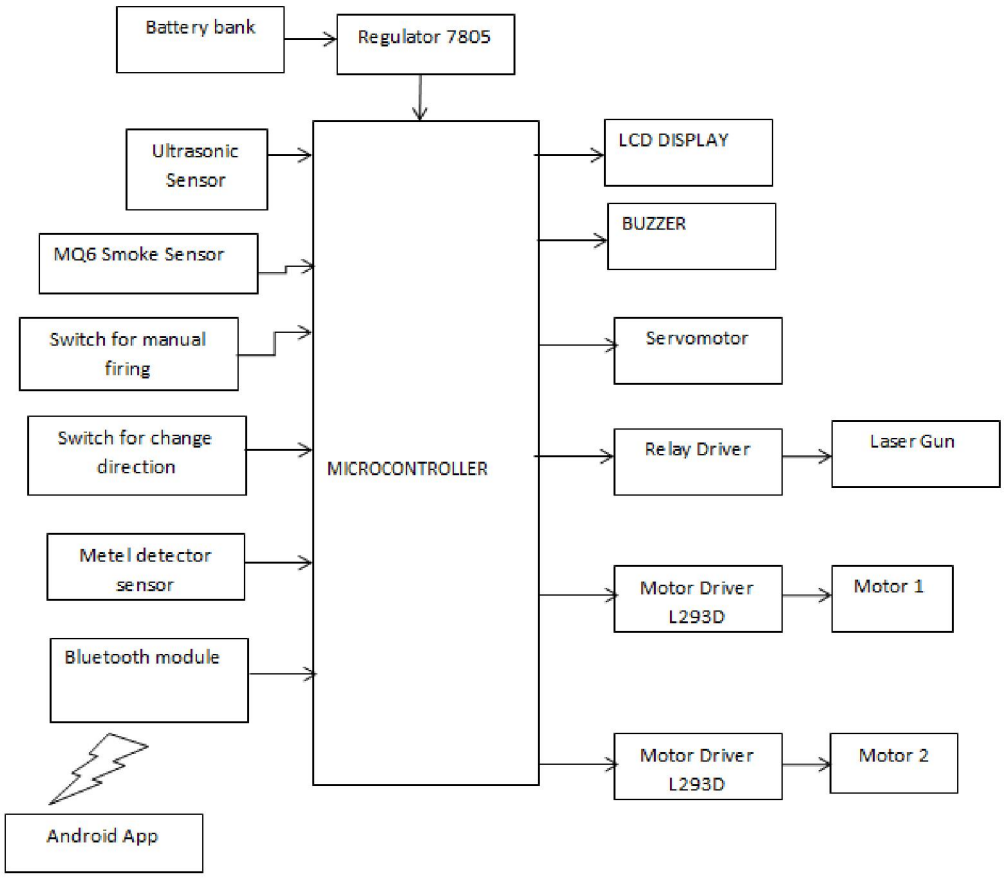

Fig. 1. Block Diagram

Microcontroller uses ultrasonic sensor to detect object. The sensors will sense any living object inside its range and provide thesignal to microcontroller. Using this signal, microcontroller generates the code on the site and transmits to the watch tower. The receiver receives the code, microcontroller decodes it, interprets the location of the object corresponding to received code, which activates the targeting system [2]. The gun (in this case, a toy laser) is mounted on the motor. The sensor detects the intruder, sends the signal to microcontroller which then executes certain code and signals the motor to rotate so as to point the gun to the intruder. It then activates the buzzer alarm and firing control. This system operated automatic and manual through mobile app.

PIC 18f4520 Microcontroller

It is an 8-bit enhanced flash PIC microcontroller that comes with Nano Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances,

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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. Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF
Divided into 256-byte banks
There are total of F banks
Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bit
Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
Program memory stores the program and also static data in the system.
On-chip External
On-chip program memory is either PROM or EEPROM.
The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig. 2.PIC18F4520

Bluetooth Module

Communication protocols like UART (Serial), I2C and SPI are very popular because several peripherals can be Bluetooth wireless technology is becoming a popular standard in the communication. it is one of the fastest growing fields in the wireless technologies. It is convenient, easy to use and has the bandwidth to meet most of today's demands for mobile and personal communications. Bluetooth technology handles the wireless part of the communication channel; it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). The most popular host controller interface today is either a UART or a USB .Here, I will only focus on the UART interface, it can be easily show how a Bluetooth module can be integrated on to a host system through a UART connection and provide the designer an optimal solution for Bluetooth enabled systems

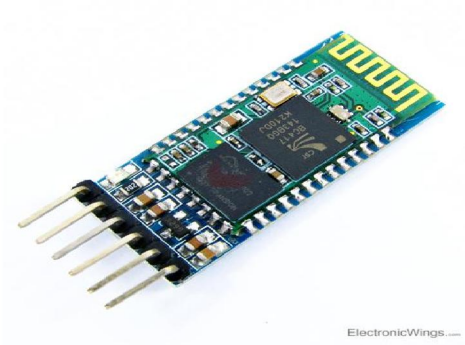

Fig. 3.Bluetooth Module

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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. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

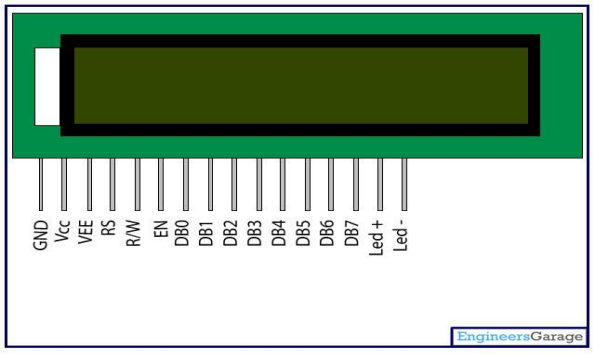

Fig. 4. LCD Display

Ultrasonic Sensor

The HC-SR04 ultrasonic sensor uses sonar to determine the distance to an object. This sensor reads from 2cm to 400cm (0.8inch to 157inch) with an accuracy of 0.3cm (0.1inches), which is good for most hobbyist projects. In addition, this particular module comes with ultrasonic transmitter and receiver modules.

Features

Here's a list of some of the HC-SR04 ultrasonic sensor features and specs—for more information, you should consult the sensor's datasheet:

- Power Supply :+5V DC
- Quiescent Current : <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance : 2cm – 400 cm/1″ – 13ft
- Resolution : 0.3 cm
- Measuring Angle: 30 degree
- Trigger Input Pulse width: 10uS TTL pulse
- Echo Output Signal: TTL pulse proportional to the distance range
- Dimension: 45mm x 20mm x 15mm

Fig.5. Ultrasonic Sensor

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Relay Driver Circuit

A relay driver circuit is a circuit which can drive, or operate, a relay so that it can function appropriately in a circuit. The driven relay can then operate as a switch in the circuit which can open or close, according to the needs of the circuit and its operation. Now that we're using a transistor to drive the relay, we can use considerably less power to get the relay driven. Because a transistor is an amplifier, we just have to make sure that the base lead gets enough current to cause a larger current to flow from the emitter of the transistor to the collector. Once the base receives sufficient power, the transistor will conduct from emitter to collector and power the relay.

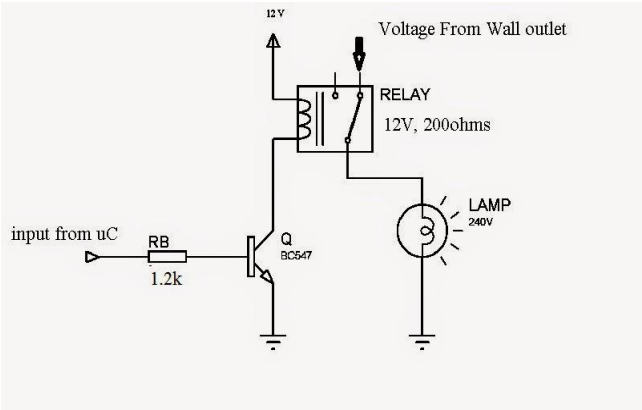

Fig. 6.Relay Driver Circuit

L293D Motor driver IC

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between controller and the motors. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. We will be referring the motor driver IC as L293D only. L293D has 16 pins.The L293D is a 16 pin IC, with eight pins, on each side, dedicated to the controlling of a motor. There are 2 INPUT pins, 2 OUTPUT pins and 1 ENABLE pin for each motor. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor.

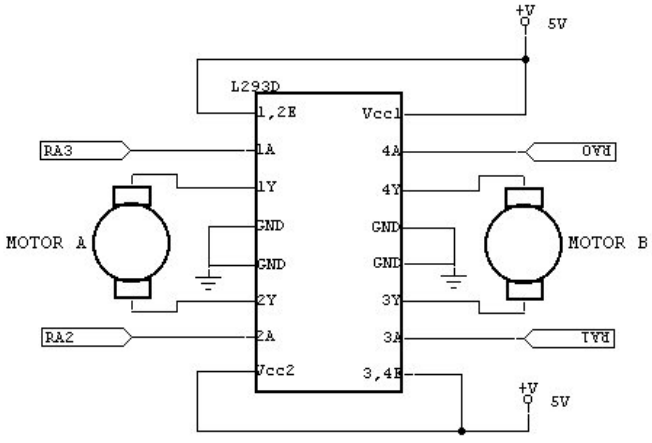

Fig. 7.L293D Motor Driver IC

IV. 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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