Design And Implementation of Survelliance Approach Radar for Border Security Force

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Abstract— **The threat of terrorism has become a worldwide concern with several parts of the world reeling under frequent terrorist strikes. With little concern for human lives, terrorists continue to strike with impunity, leaving a trail of death and destruction. Since 2016 in counter terror operations and foiling cross border infiltration attempts in Jammu and Kashmir a total of 59 army personnel have been killed. These incidents are frequently happening even the Border Security Force(BSF) is trying to get rid of this problem by manual and mobile patrolling and also three tier fencing has been implemented . In spite of all these efforts, the problem is not completely eradicated. To overcome these problem and Safety and Security as the first priority for the nation a Surveillance device is designed which uses Ultra Sonic Sensor to broadcast the information to a mobile application using Bluetooth. this device senses objects with the help of Ultrasonic Sensor and hence can work even during night times, also Ultra Sonic sensor is mounted over a servo motor, this servo motor can be either be set to rotate automatically to scan the area or can be rotated manually using our Mobile app, so that can focus the ultrasonic sensor in the required direction and sense the objects present over there. All the information sensed by the sensor will be broadcasted to the Smart phone using Bluetooth Module.**

Keywords—Terrorism; infiltration; BSF; ultrasonic sensor; Bluetooth module; mobile application;

I. INTRODUCTION

Border management is a security function that calls for coordination and concerted action by various government agencies within our country. The aim is to secure our frontiers and safeguard our nation from the risks involved in the movement of goods and people from India to other countries and vice versa. Border management itself is a multifaceted term and may include, but is not limited to, the regulation of legal and illegal immigration, ensuring safe and secure movement of authorized people and goods, and prevention of smuggling, human trafficking and infiltration. The rapid growth that India is currently experiencing presents an array of opportunities and underlines the need for effective border management.

India has a very large and complex border, covering around 15,106.7km, which it shares with Bangladesh, China, Pakistan, Nepal, Myanmar, Bhutan as well as small portion with Afghanistan. What further increase the complexity and criticality is the varied terrain, climatic conditions. By taking the disadvantages mentioned above the threat of terrorism has become a worldwide concern. Without any concern for human lives terrorist continue to strike with impunity, leaving a trail of death and destruction.

The Indian armed forces are the prime guardians of our national integrity and sovereignty. The inclement weather conditions will make the soldiers very much vulnerable for the cross border infiltrations. There are many regions with extreme weather conditions which are much more prone to cross border infiltrations. The places such as Siachen will receive the average winter snowfall of about 1000cm and temperature can dip up to as low as -50^0 C. soldiers even die from harsh weather condition. The place called Dras which is in Kargil is the second coldest inhabited place in the world. The temperature in this region remains in single digit throughout the year, barring a couple of months. The Indo-Pak border in Rajasthan amidst extremely hot weather conditions. Temperature shoot up to 50^0C in some regions while dust storms, sand storms and the blistering heat combine to make the dessert region an unfit place for habitation altogether. The soldiers patrol these long borders even with such inclement weather beating down on them.

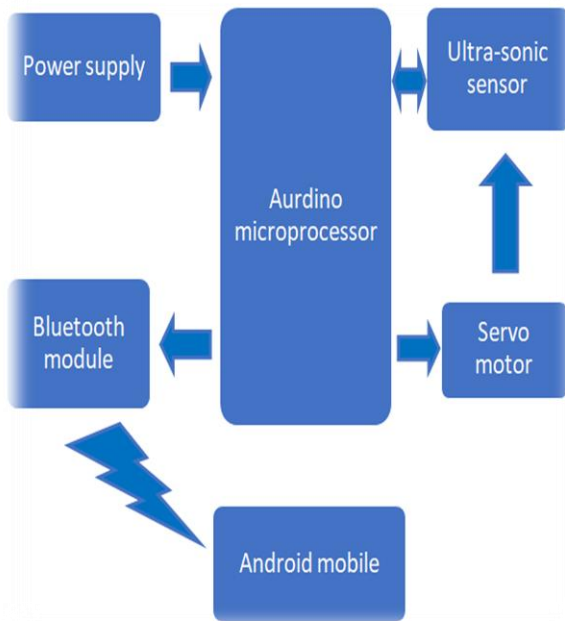## II.   IMPLEMENTATION OF THE SYSTEM

Fig. 1.   Design of System hardware

The software part consists of the programs for calculating the distance and for rotating the servo motor from 00 to 1800, one of the advantages is that application will be developed through which the rotation of the motor can be manually controlled. The ultrasonic sensor will be connected to the servo motor which would be connected to the Arduino board. The programs will be created by using Arduino software and will be installed in the board. A Bluetooth module will be connected to the board for which a mobile will be connected. Whenever the ultrasonic sensor starts to rotate, all the information which it will be collecting while sweeping will be sent to the board. The Bluetooth module which is connected to the board will transfer the information to the application which is created in the mobile through which the information can be seen on the mobile screen. The operation of the servo motor can be operated manually by using the application from the mobile.
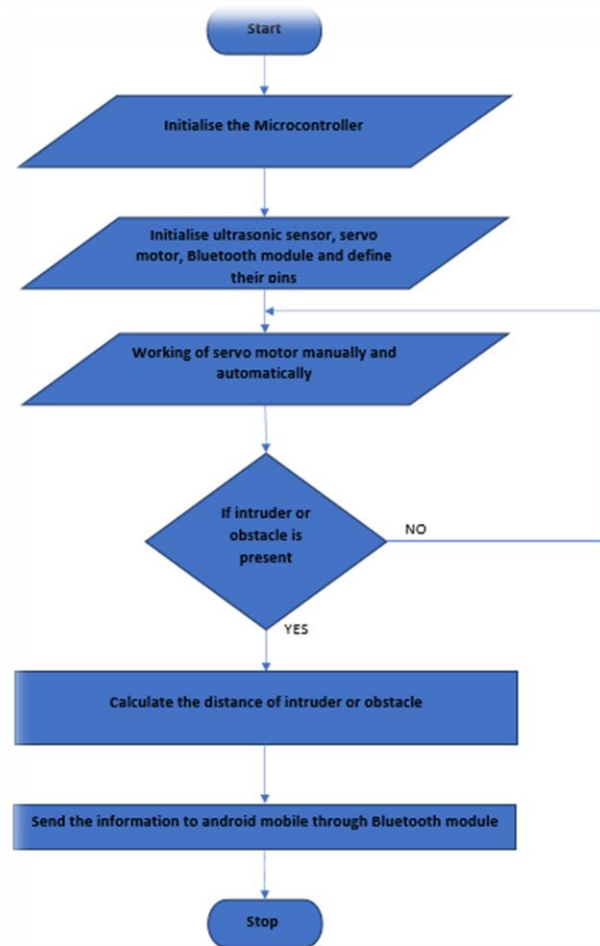

Fig. 2.   Implementation of Flow chart

III.   COMPONENTS

The main components required for the functioning of the above proposed solution are elucidated below.

A. Microcontroller

The Arduino Mega 2560 has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

- Operating Voltage=5V
- Input Voltage (recommended)   =7-12V
- Input Voltage (limits)=6-20V
- DC Current per I/O Pin=40 mA
- DC Current for 3.3V Pin=50 mA
- Flash Memory=256 KB of which 8 KB used.
- SRAM=8 KB
- EEPROM=4 KB
- Clock Speed=16 MHz

B. Ultra sonic sensor (HC-SR04)

The ultra sonic sensor has 4 pins- Vcc (5V), Trig, Echo, GND. Trig (trigger) is used to send out an ultrasonic high

level pulse for at least 10μs and the Echo pin then automatically detects the returning pulse.

- Operating Voltage=5V
- Static current=2mA max
- Effectual angle=<15°
- Ranging distance=2cm – 450 cm
- High precision up to 3mm
- Ultrasonic Frequency=40k Hz

C. Servo motor

It is tiny and lightweight with high output power. This servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller.

- Operating voltage=4.8 V (~5V)
- Operating speed=0.1 s/60 degree
- Dead band width=10 μs
- Temperature range=0 ℃ – 55 ℃

D. Bluetooth module (HC-05)

Bluetooth module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. It can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.

- 80dBm sensitivity
- Up to +4dBm RF transmits power
- 3.3 to 5 V I/O power
- UART interface with programmable baud rate.
- With integrated antenna
- Slave default Baud rate: 38400
- Data bits: 8
- Stop bit: 1
- Parity: No parity

IV. RESULTS AND DISCUSSIONS

The project presents the prototype model of arduino Based Real Time System for Border security force. The main component in this prototype is the US sensor which works on the principle of Doppler Effect. Once the intruder is detected in the range of US sensor, the arduino will send this information to the android mobile through Bluetooth module.
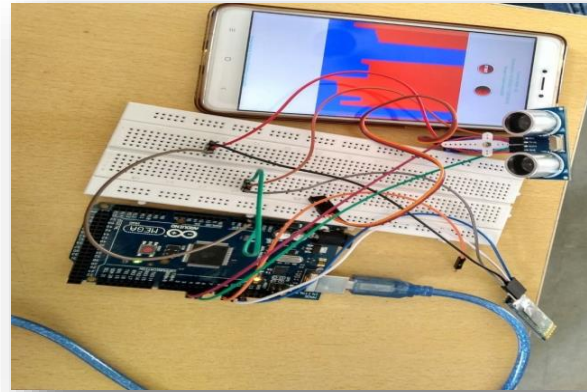

Fig. 3.   Experimental setup

The Indian government has initiated multiple steps to ensure secure and non-porous borders for our country. The border areas are currently protected by fencing, flood lighting, sensors and manual patrolling. The Central government is planning a five-layer elaborate protection system to completely stop infiltration.
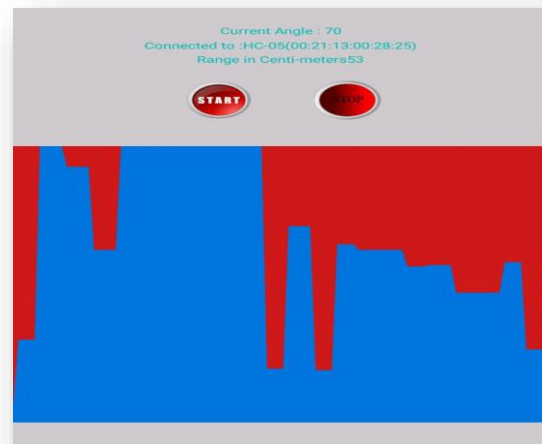

Fig. 4.   Experimental output

V. CONCLUSION

Border surveillance is one of the most important parts of an integrated border management system. The Indian border extends to a length of around 15,106 km, spanning six countries with varied geographical profiling. The extreme weather conditions prevalent at the locations make the surveillance of our borders a challenging task for the armed forces. Thus, it is imperative that a technology-based state-of-the-art surveillance system be employed by the armed forces to ensure an effective surveillance, intrusion detection and identification system. By implementing the proposed project the border system will become more power full against the infiltrations. Considering the economic feasibility of the Central government plan, it is more cost effective and easy to implement.

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VI. FUTURE ENHANCEMENT

There are lot of applications in this project mainly in the field of surveillance and security system. Since we are using the Ultrasonic sensor which is available in different range of operation, hence higher version of the Ultrasonic sensor can be implemented for anti-collision detection system. By adding Infrared sensor along with the Ultrasonic sensor the detection will be more accurate in terms of object recognisation.

VII. APPLICATIONS

- Surveillance for border security system.
- Anti-collision detection of aerial work platforms
- Anti-collision detection of ships

ACKNOWLEDGMENT

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