Abstract system is activated when the laser

Environment

ABSTRACTThis project is intended to establish our border as well asremote locations more secure. The Smart Unmanned Border Security System (SUBS) aimsat reducing the burden on forces and providing an additional layer of securitywith high precision and accuracy. The system is activated when the laser fencing is breachedand discharges the gun when an intruder is detected. This paperdiscusses the power efficiency with its feasibility and applicability in remotelocations. It highlights the security concerns in the network and theencryption techniques used.

A dedicated Dashboard is created for providing the better userinterface and easy understanding of run-time data collected from nodes. The data is plotted against various specifications like thecurrent status of nodes, a point of failure of nodes, number of intrusions, etc. at the headquarters for further strategic analysis. KEYWORDS: border security system, unmanned, gun system INTRODUCTION: Stronger the protection of borders, saferis the nation. With increasing intrusions and breaching of iron fences alongthe borders, there hasbeen a growing section of people advocating for unmanned automatic gun controlsystems to be implemented at the borders. There arevirtually no places left where intrusions have not been there, be it the most inhabitable Siachen Glaciers, damp and swampy.

So there is a need to safeguardthese places with least or no human supervision. The Smart Unmanned Border Security System (SUBS) aimsat reducing the burden on forces and providing an additional layer of securitywith high precision and accuracy. It aims at eliminating enemies with utmost accuracy andreducing human-made errors.

SUBS attend the internet of things (IoT) enabled the compact, flexible, light-weight and robust system for providing border securityelectronically and automatically. It is a network of wireless sensors to sense (detect.) intrusions. It is providedwith an array of actuators to eliminate the enemy in a process of raising alarmand is connected to other succeeding nodes as well as connected to the Internetfor communication.

Therefore, a particular node inthe system can be classified as the “ thing” in the IoT ecosystem. This electro-prototyping project is based on Master-Slave Node Communicationmodel and provides intercommunication between slaves nodes possible as well as centralized control on the robustnetwork via Master nodes and works fine even incase of one or more slave nodes failure. This project uses a public broker for MQTT communications using Pub-Sub model for secureinformation communication. The complete system can be manually switched ON and OFFaccording to the requirement wirelessly. Another aspect of this project is that, by using laser fencing instead of iron fencing, the SUBS can be operatedin dimmed mode and its activation can be madedependent on the breaching of laser fencing. Hence, thepower consumption is markedly reduced. The project aims at determining a substitute for humansurveillance at the borders.

HARDWARE DESCRIPTION: ARDUINO UNO: It is one of the most commonly used open source platform availableon the market. Arduino UNOboard uses Atmel microcontrollerand has a frequency of 16MHz. It has the sufficient number of I/O pins for analog, digital as well as PWM (pulse widthmodulation) data. It has a power jack for external dcsupply as well as

Serial USB adapter for communication with the computer. The devicesconnected to it can be easilyprogrammed/configured using Arduino IDE (Integrated DevelopmentEnvironment). It is used because of its simplicity, flexibility, and fault tolerant capabilities. Additionally, it is inexpensive with low power requirements. NODE MCU: It isa module which consists of esp8266 Wi-Fichip for network communications.

It has 64 kb of instruction memory and96 kb of data memory. It occupieseight ports out of which two are the general purpose I/O ports. It considersgeneral purpose I/O ports and runs at a frequency of 80MHz. This board isaddressable over SPI and UART protocols. Simultaneouslythis Wi-Fi chip can act as a station as well as an access point for theconnection with the Internet. It works on 3. 3V logic and does not attach to an inbuiltlevel shifter.

SERVO MOTOR: It is a type of DC used motors to push or rotate an objectwith absolute precision and accuracy. It uses a Servomechanism whichessentially consists of three parts-controlled devices, output sensor, andfeedback system. It works on PWM and occupies three wires whichare the positive terminal of supply, negative terminal of supply andcontrol signal wire respectively. It can yield atotal of 180 degrees that is 90 degrees from point of zero reflections. It canwork directly on the 5V supply. ULTRASONIC SENSOR (HCSR04 Ranging Sensor): It is a sensor which can measure a substantial distance in therange of 2cm to 400cm. Each HCSR04 unit essentially consists of onboard transmitter andreceiver modules and a control unit. There are fourpins VCC, echo, trigger, and ground respectively.

It works on a frequency of 40 kHz and 40mA current with thedimensions of 45*20*15mm. RELAY: A Relay is an electromechanical and used switch to turn ON/OFFthe more crucial current circuits. It consists of two states NO (normally open.) andNC (normally closed). By default, the relay is set to NC State. When the coilinside the relay is energized, it aims it to the NO State. A tickling soundis produced when the switching action is performed.

LASER LIGHT: The Laser stands for Light Amplification by Stimulated Emission ofRadiation. It is a capable device of demonstrating the highly intensebeam of light by utilizing the technique of optical amplification. LDR: LDR (Light Dependent Resistor) acquiresthe capability to vary its resistance granting to the moderate intensity which is also known as Photoresistor. The resistance of LDR is inversely proportional tothe light intensity whichdecreases when the light intensity isincreased. workingThe project can execute according to thepresence differently of the laser fencing or the iron fencing.

When the latteris present, the complete system is independent of the iron fencing breaching asit is not capable of transmitting an electrical signal and solely dependent onthe ultrasonic sensor ranging which has to be active all the time thusconsuming power even when it is not required. The rest operation of nodes and the complete system isexactly similar. In case of laser fencingsecurity, the laser and LDR (light detecting resistor) circuitis kept at a distance of 300cm from the nodes of SUBS.

Whenever thereis breaching of laser fencing that is whenever the connection between the laser lightand LDR is broken, itsends a “ LOW” signal to the

controller and a buzzer goes ‘ on’. This sets theservo motor on which ultrasonic sensor is mounted to go intothe motion which has been till now in OFFmode. The ultrasonic sensor goes from -60 degree to +60 degrees fromneutral or zero reference position. This is done to accomplish the complete -180 to +180 degree surveillances even in case of one or more node failure by expanding the range of nearby nodes. The individual node efficiency is sacrificed for therobustness and fault tolerance of the robust system. Whenever theintruder is detected in the range of 50cm from the ultrasonic the relay switchsends a HIGH signal to the actuator which is laser light here starts firingcontinuously in the direction of the intruder and observes it continuously ifit is moving.

A Counter circuit is also used at the relay switch toconsider the number of shots fired (switching done). A counter circuitrycan also be used at the laser fencing to consider the number of intrusions. The distance ofthe intruder along with the time-stamp is also transmittedthrough MQTT andweb-socket connection to the server (or the cloud) usinggateway which is also the master node in our project. Each slave node has its ownidentity and maintains a default list of the usernames and password of thenearby nodes to which it has to connect. The slave nodes are also connected tothe station hosted by the master node and thishelps in ascertaining specific node failure. In case of node failure, a trigger has generated this changes the program to vary the range ofsurveillance. The data from sensors is transmitted for sure transfer of the messages using MQTT dueto its data time

interval. The data is transmitted using Publish-Subscribe modelon a public broker (in this project) on the ‘ Topic’ of one’s choice.

The data is transmitted using a protocol for easy understanding and retrieval of themessages. The data received is analyzed by plotting data against thenumber of specifications like the number of shots fired, the number ofintrusions made, the frequency of intrusions in particular time, etc. forbetter and quick understanding. A dedicated dashboard is maintained which shows theabsolute number of nodes employed, number of nodes currently active or inactive. This interface can be viewed only withauthorized access as the dashboard can be opened only using a valid name and password combination preventingany misuse
of data. Individual nodes can alsobe switched ON/OFF from headquarters by choosing the action and publishing iton a subscribed topic by the nodes.

FUTURE SCOPEThe project can also be extended to develop a feasible webcamcontrolled devices which will increase the sophistication and accuracy. It will consumeless amount very of power which ensures a much-needed condition for the borders. The intruderswill be detected by using a webcam so that the gun will shoot only the humans, not the animals/birds. This system supports the manual switching of the device. Consequently, the sent messages for the switching can also be encrypted to make it moresecure. This will ensure the intruder will not have the chance toswitch ON/OFF the device by the use of hacking. Since, it is very complex to change the power sources everytime at the borders so the system can use the renewable sources of energy suchas solar power, wind

power, etc. This will increase the efficiency as well asthe organized use of power consumption.

CONCLUSIONSUBS is designed for the purpose of border security or no manregion areas near the army, navy, air force bases. It can work inany part of the country irrespective of the geographical conditions. This system cansolely be used for surveillance and monitoring in the no man areas.

With increasingintrusions and breaching of iron fences along the borders, there has been a growing section of people advocating forunmanned automatic gun control systems to be implemented at the borders. There are virtually no places leftwhere intrusions have not been there even themost inhabitable Siachen Glaciers, damp and swampy. So there is a need tosafeguard these places with least or no human supervision. This system is based on the technology of " Internet of Things." The principals used in this technology are: A. 3A's(Always-Anytime-Anywhere) B. 6T's(Track-Think-Talk-Transfer-Trigger-Tell)More the borders are protected, stronger and safer is the nation. The SmartUnmanned Border Security System (SUBS) aims atreducing the burden on forces which is determining an additional security withhigh accuracy.

It aims at eliminating enemies with utmost accuracy andreducing human-made errors.