**UNMANNED GUN CONTROL SYSTEM FOR BORDER AREA**

As protected are the borders, the stronger the safer is the nation. With increasing intrusions and breaching of iron fences along the borders and subsequent collateral damage to property and lives, there has been a growing section of people advocating for unmanned automatic gun control systems to be implemented at the borders.

There are virtually no places left where intrusions have not been there, be it the most inhabitable Siachen Glaciers , damp and swampy regions of the terrestrial forests or the arid and hot Thar deserts so they have to be guarded risking the lives of defence personnel. So there is a need to safeguard these places with least or no human requirements.

The Unmanned Gun Control System aims at reducing the burden on forces and providing and additional layer of security with high precision and accuracy. It aims at eliminating enemies with utmost accuracy and reducing human -made errors.

The basic purpose of this system is to increase the border security electronically and automatically. It works by detecting the IR radiations in the specified range along the border, and automatically targets its position and destroy or kill the intruder or enemy by firing the bullets. The targeting system should be highly efficient and accurate to target and fire the target correctly .There can be variations on how the intruder can be identified ,one of the way is to employ image processing on the data that is collected through a web cam and process it in MATLAB code in PC to identify the exact location of intruder ;another way is to send out the infrared radiations and use PIR sensors to determine where is a passive or non-radiating surface i.e. a human or intruder is .The gun can find and lock the target in pitch darkness .It may use a camera that is capable of higher resolution and zooming power .For maintaining high resolution the area under observation has to be divided into smaller sub areas and then specific differentiated code for every sub section has to be written differently .Nowadays CCD cameras with ‘enhancement feature ‘ for bad weather ,in conjunction with a dual FOV ,autofocus Infra -Red Sensor to pick out targets are used in other countries , where this system has already been used.

Then it brings it to the specifications of gun that can be used, generally the a standard 12.7mm machine-gun, a 40mm automatic grenade launch upgrade weapon, or whatever other weapon systems that can be made automatic and unmanned. A laser range finder helps to set the distance of intruder from the gun and a gyroscopic stabilizer unit helps correct both the system’s aim and the direction of the guns after recoil pushes them off –target. This system can be made to operate in full autonomous mode or can be made to be use in manual mode for increased human intervention. The machines can be made to simply collect data and send it to headquarters through a LAN cable or wireless network which guides it or communicates with it on what step has to be taken next.

Now let us dwell into some of its technicality perspectives and their working:

As communication is taking place so there has to be necessarily transmitter and receiver ends, so at transmitter section we have Passive IR Sensors that detects the invisible IR radiations of any living object and generates a weak signal for op-amp to be amplified. Op-Amp makes it readable for the microcontroller that generates a code for the sensor detection. Now at receiver section we have microcontroller, DC motor, Firing laser gun, buzzer alarm and the decoder IC. The micro controller retains the code transmitted by transmitter and performs the function accordingly.

Passive IR Sensor Module:

PIR is an electronic sensor that measures infrared light radiating from objects in its field of view. All objects with a temperature above absolute zero emit heat energy in the form of radiation. It can be detected by electronic devices designed for such purpose. The term passive refers to the fact that PIR devices do not generate or radiate any energy for detection purposes. They work entirely by detecting the energy given off by other objects.

There are various shortcomings that challenge its basic cause and its vulnerability. Also, there are modifications that can be made to this system to make it more accurate and efficient.

As it communicates wirelessly, so its signal can be jammed to make it paralysis and unresponsive.

The priavicy and security of the network can also be compromised at certain times so a proper encryption and decryption mechanism had to be maintained for firing out the intruders.  
If only one System is present ,it can be engaged and intruders could breach the security or fencing.  
The speed of operation that is firing and stabilizing again back  for shooting the target are also very important aspects that need to be taken proper care of introducing highly efficient and reliable microcontrollers.  
The accuracy or resolution can be increased by differentiating the area into various sun sections and implementing different code logics for different sub sections .But this introduces increased software and hardware considerations and complexities .But higher the resolution ,better is the overall capability of System.  
The purpose of System can be modified by modifying the observation ranges and the ammunition System for taking out enemies .With reduced range and only buzzer in place can be used for automatic home security.  
Multiple such systems can be made to use in a region by giving each other capability of inter-communicating and some sort of intelligence to take auctions on its own without any human intervention .  
The devices used must be highly reliable and fault tolerant and multiple paths should be there to take auctions even in case of break down or failure of one of the components .The System could be attached to the Ground Vehicle System.

In the conclusion ,it is important to state that the System may has its pros and cons but essentially it provides an additional layer of security and reduce the burden on defence forces .It is already in place in many countries around the globe and certainly many other are investing time and money in this System as it is realized that it is future of border protection in difficult terrains and vulnerable region across the burden .Many improvements are essentially to take place as we proceed further and realizing this the Govt. Of India has decided to enforce it for border protection from latter part of this year.[[1]](#endnote-1)

1. Vivek Chauhan [↑](#endnote-ref-1)