

# PERIPHERAL INTERFACE CONTROLLER BASED AUTOMATIC ROBOT FIRING ON INFILTRATORS

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**Abstract**— For a country to be secured, it must be secured in its borders. The enemy infiltrations from neighboring countries pose a severe threat to an country’s national security. And this project focuses on defending the border by thwarting the enemy terrorist, enemy soldiers infiltrations by using an automatic robot based on peripheral interface controller which surveils 180 to-180 degrees along the enemy LOC using a sensor shaft fitted with a infrared transceiver which eliminates the infiltrators by firing at them.This automatic mechatronic robot could work on any kind of adverse climatic conditions and areas of high tension without getting detected from enemy RADARs. This project could eliminate the human casualties and minimize the work of the soldiers.

**Keywords**— Peripheral interface controller ;infrared transceiver ;sensor shaft; gear disc ;gun with a solenoid

## I. INTRODUCTION

In the current scenario, most of the India’s international borders are protected by only conventional concertina fencing , And India shares most of its international borders with Pakistan Bangladesh and china.

TABLE I- FENCING STATUS AS OF 2013

Region	Sanctioned (km)	Finished (km)	Remaining(km)
Indo-Bangladesh	3359.590	2542.336	817.254
Indo-Pakistan	2043	1959	84
Indo-Myanmar	1643	No info	No info

TABLE IIIII -DEFENCE EQUIPMENTS USED IN INDIA'S INTERNATIONAL BORDERS

Defence techniques	Indo-Pakistan border	Indo-Bangladesh border
Fencing	Yes	Yes

Flood light	Yes	Yes
Foot-vehicl patrol	Yes	No
NWIA	Yes	No
LORROS	Yes	No

This concertina fencing technique and other main defensive equipments used as of now is ineffective and it needs constant surveillance of the soldiers and effective maintenance and these are being replaced by the UAV at some areas, though they are effective, their cost is very high and needs frequent maintenance and fueling. So these factors leads to the cause for developing an ultimate machine which has a minimum cost and a maximum efficiency which would be able to work on any kind of rough terrains and adverse climatic conditions and defending the borders without any human intervention.

## IVV. CONSTRUCTIONAL FEATURES

This machine has a very simple and intelligible construction and the main components are listed below with their constructional details.

### 2.1. construction of chassis

The chassis houses all the components of this automatic robot. And the chassis is divided into two main compartments, namely compartment A&B.The compartment A is entirely inside the chassis and has no contact with the outer world. The compartment B has the part which makes contact with the outer world which has the sensor shaft and the gun. The chassis is made up of steel alloy which would be buried under the soil. The chassis is provided with the corner reflectors or radar absorbent material to reflect any kind of microwaves and radio frequency waves.

### 2.2 battery

This power supply for this robot is given by two 80-180 AH/12 volt Ni-MH batteries connected in series to give an output of 24 volts. Since some of the devices operate in 24 volts this arrangement is made. And these batteries also acts as balancing weight for the chassis which suppresses the mechanical vibrations. Figure 2 shows the batteries.

2.3. Screw type air compressor

This compressor supplies compressed air to the pneumatic cylinders needed to open the door in the chassis and lift the frame holder table of the gear disc-gun mount. The ratings of the compressor are-1/8 HP,24 Volt,3.5Kg,60 bar/PRI.figure 2 shows the batteries

2.4. Peripheral interface controller

The peripheral interface controller acts as the brain of this robot in which it controls and coordinates all the activities of this robot. This PIC microcontroller performs the function of locking at the target and energizing the solenoid wound ,whenever the infrared signal is obstructed by an object(infiltrator).figure 2 shows the batteries.

2.5.Infrared Transciever&controller

The infrared transceiver performs the function of transmitting the infrared signal which is used for the purpose of ranging and detection of targets within a range of 50 feet and is shown in the fig 1 . And the receiver part of the transceiver senses the received signal and it transmits it to the infrared controller for further processing. The signal received is then processed in the infrared controller for any error, and in case if any changes is found on the signal received then in it send command to the PIC microcontroller for further action. Figure 2 shows the Infrared controller

2.6.sensor shaft

The sensor shaft acts as the eye of this robot in which it is fitted with the Infrared transceiver. This sensor shaft is made up of black nylon to avoid its detection from any kind of deep search metal detectors. This sensor shaft is mounted on the gear disc and this shaft is of a length of 3 feet. And it is coated with suitable radar absorbent material so that it cannot be detected by any enemy GPR or weapons locating radars. And the figure 1 shows the sensor shaft.

2.7.gear disc-gun mount arrangement

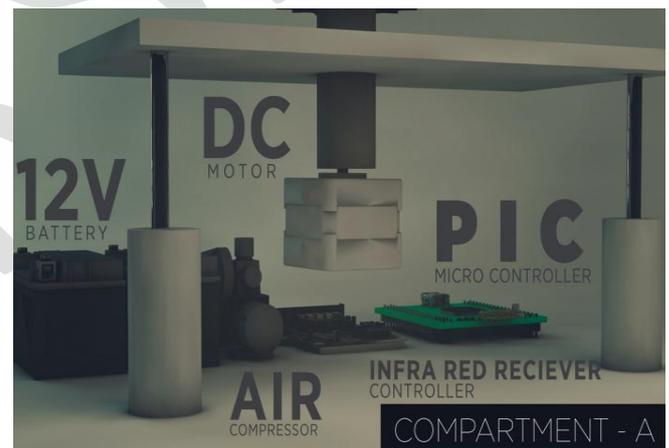
The gear disc arrangement acts as the hand of the robot in which it is coupled with the DC motor drive. This DC motor drive rotates the gear disc along the enemy LOC. The pinion of the DC motor is made up of 24 teeth and the gear disc has a diameter of 450mm and has 144 teeth. The gun used in the prototype is just a toy gun. And during the real time

implementation the guns could be changed according the magnitude of the risk in that installing area with the combination of the paralyzing injections and stunning injections. And the figure 1 shows the gear disc-gun arrangement

FIGURE VI-COMPARTMENT B



FIGURE VII-VIII-COMPARTMENT A



IXXXI. PRINCIPLE OF WORKING

When the infrared signal emitted is obstructed by any infiltrator the infrared controller sends command signal to the PIC microcontroller which locks the position of the gear disc at the target and simultaenously the PIC microcontroller energizes the solenoid wound on the trigger thereby firing at the target.

3.1. Detailed working

Let us split the working of this robot into two cases  
 Case1:for a constant interval of time say-90 seconds, the sensor shaft comes up and Infrared transceiver emits infrared radiation. And this sensor shaft is rotated 180 degrees to -180 degrees along the enemy LOC, during this time if the infrared

signal is obstructed by any infiltrator, then the change in the value of the infrared signal compared with the reference signal in the comparator and the error signal is fed to the PIC microcontroller so that the microcontroller responds by locking the position of the gear disc as soon as the change in signal is received and the PIC microcontroller energizes the

solenoid wound on the trigger simultaneously thereby shooting at the target. The sensor shaft resumes its rotation again and only after finishing the full rotation the shaft goes into chassis again.



FIGURE 3.WORKING OF PIC ROBOT

Case2:for a constant interval of time say-90 seconds, the sensor shaft comes up and Infrared transceiver emits infrared radiation. And this sensor shaft is rotated 180 degrees to -180 degrees along the enemy LOC. and during this time if the

infrared ray is not obstructed by any object then the shaft completes its rotation either on its side and returns to its original position inside the chassis with the doors closed again.

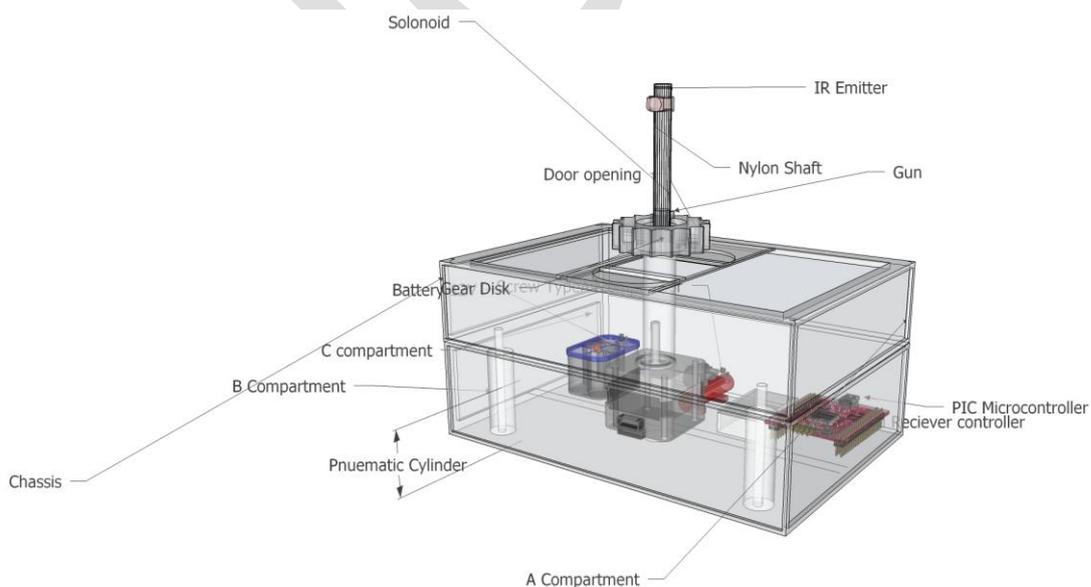


FIGURE 4.ENTIRE CHASSIS WITH ALL THE COMPONENTS MARKED

## MERITS AND DEMERITS

- This project can work in any kind of adverse climatic conditions and it is suitable for working in rough terrains
- This electromechanical machine cannot be detected by any ground penetrating radars and weapons location radars since the shaft is coated with suitable radar absorbent material and chassis is fitted corner reflecting mechanisms
- Use of this electromechanical robot could minimize or eliminate the human casualties and provide 24/7 surveillance.
- Use of the gun makes the machine very lethal since it could attack any animal or civilian passing by the border.
- Cannot track multiple targets at a same time. But this could be improved in future by advanced tracking & ranging mechanisms.

## IV. CONCLUSIONS

The threat to our country by enemies are increasing day by day ,so we have to develop advanced machines which would eliminate the threat of the enemies without any human intervention and maximize the security at the borders. And though this project doesn't satisfy all the needs, but sure in future this mechatronic robot will be modified to tackle any kind of threats from enemies with the help of ultramodern mechanisms.

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