

“Ajaatshatru”- A New Technology in Indian Army

Zakir Hussain, Rahul Kumar, Parul Priya, Sumit Bisht, Rohit Singh, Arindam Ghosal

Abstract— This paper is mainly focused with defensive technology. It is designed to serve the Indian army. We all know about the environment around the border areas. Terrorists always try to infiltrate border security mainly during night and winter. Indian soldiers always try their best to protect border so that no terrorist can infiltrate border. But sometimes it become difficult for them to guard border because of their several limitations i.e. vision problem due to dark and due to fog in winter, because nobody can fight properly without sight. For eliminating these kinds of problems we are introducing “AJAATSHATRU”.

Index Terms—Ajaat shatru, Thermal Imaging System, Mine Detector, Global Positioning System, Remote Driving.

I. INTRODUCTION

Terrorists always try to safe border security mainly during night and winter. Indian soldiers always try their best to protect border so that no terrorist can attack through border[1]. But sometimes it become difficult for them because of their several limitations i.e. vision problem due to dark and due to fog in winter. Nobody can fight properly without sight. For eliminating these kinds of problems we are introducing “AJAATSHATRU”. It has a spider like caricature with remote control driving. The features that AJAATSHATRU has are explained as follows:

1. Thermal Imaging System (TIS)
2. Mine Detector (MD)
3. Global positioning system (GPS)
4. Remote driving (RD)

II. THERMAL IMAGING SYSTEM

An infrared system is that system that forms images using infrared radiation. It encompasses radiation from Gamma rays to radio waves.[2]

A certain amount of black body radiation will be emitted in a positive correlation with its temperature. This radiation can be detected by a thermographic camera via a special detector like the way in which optical cameras do with visible light. Since thermographic cameras take infrared radiation instead

of light to form images, it works even in total darkness. This makes it especially useful when applied in night vision, firefighting, astronomy and underground detection. [3]



Fig1, Output image from thermal imaging system
The Equipments required are mentioned as follows:

1. Thermal eye + stepper motor
2. Sensor2255 frame grabber (installed in computer image grabbing and processing system)
3. MV2000 step motor controller
4. The camera’s direction of view will be driven by two stepper motors with motion control system to realize two degrees of freedom of motion, i.e. the lateral and vertical rotation of the camera’s view.
5. The camera connects to the frame grabber through BNC connector.
6. The frame grabber connects to the computer through USB.
7. Two motors are used which connect to the computer via a motion controller card through a serial port.

Characteristic of the equipments:

1. It is waterproof.
2. Install the application software to computer or Smartphone.
3. It has a global unique ID address and password for remote monitoring.

It uses radio frequencies to send and receive data. When a radio frequency current is supplied in antenna an electromagnetic field is created that then is able to propagate through space.

Working wifi frequency should be 2.5GHzfor 802.11g or 802.11n and 50 Hz for 802.11a

We can use a wifi enabled thermal imaging camera which only need to install software to computer as stated above and provide data simultaneously with the help of wifi.

III. MINE DETECTION

An electromagnetic sensor is used for detection of personnel landmine. Personnel landmines are used for explosion of individual person. They are buried as close as to surface. They are actuated by pressure application[4].

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A sensor called electromagnetic sensor used to detect mines when charged or current flows through it then it produces electromagnetic waves which have ability to penetrate through earth's surface to some extent. Whenever these waves collide to a metal and plastic then it reflect back to sensor and thus mine is detected by alarming system.

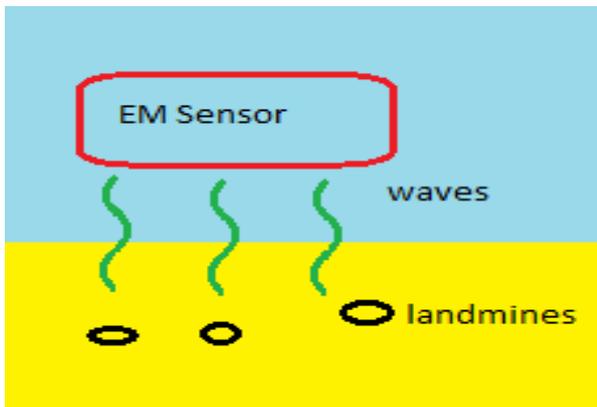


Fig2, EM sensor

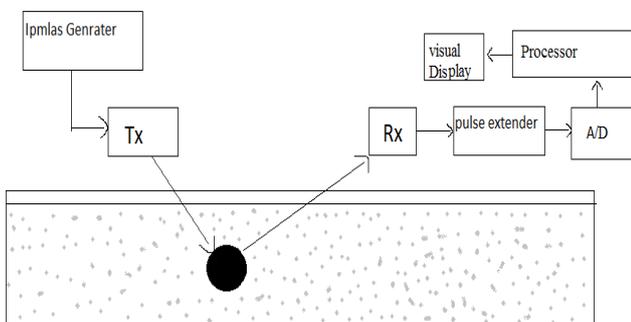


Fig3,Block diagram

Power consumed by electromagnetic waves is proportional to frequency and wavelength of EM waves i.e.,
 $E = \text{Planck const.} \cdot \text{speed of light} / \text{wavelength}$
 $\text{Wavelength} \cdot \text{frequency} = \text{speed of light}$
 Therefore, $E = \text{Planck const.} \cdot \text{frequency}$.

IV. GPS TRACKING DEVICE

A GPS tracking unit is a device that uses the Global Positioning System to determine the precise location of a vehicle, person or any other asset to which it is attached and to record the position of the asset at regular intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location data base, or internet connected computer, using a cellular (GPRS or SMS), radio or satellite modem embedded in the unit[5].

The following advantages are discussed below:

1. Reduction in no. of deaths around border.
2. Better visibility and security at night and winter.
3. Battery and remote operated mechanism.
4. Spider caricature supports better in off road operations.
5. Infiltrator can be capture alive.
6. From a distance people can be detected.
7. Thermal camera can detect better than human eye during night and fog.

There are some disadvantages which are also pointed out like below:

1. Power problem.
2. Big structure causes problem in operation.
3. Cannot identify human as it shows thermal image.

4. Costly.
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