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"OVERVIEW OF BURIED MINES DETECTION USING RADAR BULLET''

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ABSTRACT

A land mine is an explosive device that designed to destroy or disable enemy and hided under or on the surface of ground, especially in mine-affected countries like Afghanistan and Iraq .The mines which are implanted during the war time may remain undetected. As the name suggests detection is done using Radar Bullets and hence can be done further away from the mine carefully. Bullets fire from helicopter emits radar pulses as it grinds to the halt these radar pulses reflects from landed mines due to that reflection landmines can be estimated approximately. This is the method in which special type of radar bullet are use to find landmines without setting foot into the ground offering safe and efficient way of landmine detection.There are some methods for detection of land mines, such Metal detector method, Biological method and mechanical method. These methods are dangerous and risk is involved to life of solider. A safe method for detecting land mines is "mine detection using radar bullets".

KEYWORDS: Helicopter, Land Mines, Explosive detectors, Metal Detection, Radar Bullets.

INTRODUCTION

Radar bullet is a relatively new discovery used specially for detection of land mines. And this was very important invention because around 85 countries having problem with landmine, and approximately 20,000 peoples injured and kill every year by land mines accidents. In this discussion, main concentrate is Radar this ultra wide band radar provides centimeter resolution to locate even small targets.Radar bullet the mainly used to find land mines without setting foot into the ground .This consists of firing a special bullet into ground from a helicopter which could pinpoint buried land mines even though landmines which remains active for over 50 years after its implementation. Radar bullet internally consists of microwave emitter. This microwave emitter emits the electromagnetic waves whose wavelength The bullet emits a radar pulse as it grinds to halt .This pulse strikes the mine and its image gets available on the computer in the helicopter thus this method is safe and efficient for finding land mines [1] .

Radar bullet specially designed and use for detection of landmines without setting foot into ground. Internally it consists of microwave emitter. This microwave emitter emits the electromagnetic waves whose wavelength are conventionally measured in small number of centimeter called microwave. Microwave band having very large information carrying capacity by means of which mines can be find[2]. As search and removal of buried land mines is serious and problem faced by many countries, specially countries like Afghanistan, Ukraine, Cambodia and Iraq. Annually 20000 people injured and losing their lives only because of landmines accidents [3].It is estimated that there 110 millions active buried landmines that means one landmines for every 52 people. Landmines are found along roads, in fields and forest, near wells and river bank so it causes serious economical problem for the countries. Clearing mines is very dangerous as for every 5000 mines that are removed, one person is kill and two persons are injured because main methods used for demining means removal of mines are mines detection using metal detectors and biological method of detection by specially trained mine detection dog but these methods are typically slow, expensive and dangerous but new technology of detection of landmines using radar bullets is effective alternatives this technique is worthy for human being.

LITERATURE SURVEY

The word "mines" is derived from the Latin word mina which means vein of ore and was originally applied to the dug the hole in the ground. The term was then borrowed by military engineers having the job to dig landmines in the ground during military operation. The mines were firstly it used to destroy target located above but they were later filled with explosive like gunpowder or black powder. By the 14th century gunpowder was in military use and had a profound effect on all future conflicts. In order to cause greater destruction By 1530 experiments had been conducted in the use of landmines in Sicily and southern Italy. This type of

landmines was know as fougass mine (see Fig:1.1) A fougasses were improved mines constructed by making a hollow in the ground or rock and filling with explosives like black powder. Firsty the gunpowder used in landmine was able to absorb moisture and water from air which consequently losses it's explosive ability.
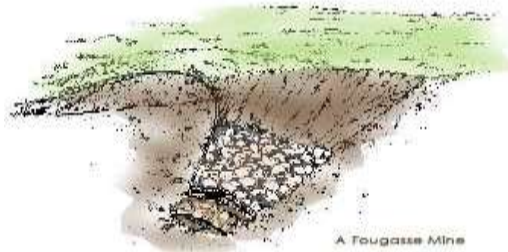

Fig. 1.1 A Cross Section of a Fougasse

Reference to these mines was made during the Battle of Williamsburg in 1862, where they adapted shells so as to surprise the Union vanguard. They consisted of a steel tank, 122 cm (4 feet) X 91.4 cm (3 feet) broad, and 25 cm (10 inches) deep, which contain very small amount of metal. When the charge exploded, the light sides of the case were blown out. The Americans are really the first nation to develop and use operational landmines. Then in 1862 he ordered his troops to prepare artillery shells so that they could be exploded by pulling tripwires or by being stepped on (see Fig 1.2)[4].

Fig. 1.2 The Workings of an Electrically Initiated Mine

Mines in Modern Time:
Mines only began to appear on a large scale in 1918, as new piece of weaponry the assault antitank. To combat the growing number and effectiveness of American tanks, the German needed to design new weapons. Initially they used large gun powder shells dug into the ground and covered with wooden boards for the purpose to provide wide pressure plate. But these mines proved to be unreliable and time consuming. In early 1918 the produced a mine that could effectively be used against tanks [5].

Fig. 1.3 A German anti-tank mine

A pipe mine was made by packing dynamite into a T piece of ordinary 0.63 cm (1/4 inch) water pipe. A glass tube in the cross piece held the detonating compound. A thin steel rod in the long part of the T had one end resting on the glass tube; the other projected about a 1.27 cm (1/2 inch) above the ground. When someone lift foot and put it down on the rod broke the glass tube and detonated the charge. This was first mines designed to main rather than to kill indirectly.

CURRENT TECHNOLOGY
There are various method for the detection of land mines these are as follows
1) Metal detector method
2) Biological method
3) Mechanical method

Metal detector methods:
The following figure shows the use of metal detector for landmines detection. This method measures the disturbances of an emitted electromagnetic field caused by presence of metallic objects in the soil. But problem is plastic landmines cannot be detected by this method[11].

Fig 2.1 metal detector method

1)Introduction of coil imaging sensor:

This sensor creates the image of an object instead of producing audio signal [9].Now days we able to detect and see metal parts of less than 1cm but this prototype is quite heavy.

2) Magnetic sensor:

Magnetic sensors are used to measures the magnetic field. In this we sends the current through a wire wrapped around a metal rod or loop produces. Magnetic field of this may tend to penetrate the ground and ground significally distributed the magnetic field; which is measured by the magnetometer. This method is more sensitive to noise.

Strengths:

Above method have reasonable penetration depth.

Limitations:

Image resolution is poor.Horizanal range is limited. There is risk to life of man who handles the metal detector.

Biological methods:

1)Use of dog and rat:

Well trained dog can detect the smell of explosives in landmines which is hided under the grounds. Dog clearly learn to detect mines using odour of explosives and other chemicals that's leaks forms buried landmines. Dogs are able to discriminate up to ten odours without difficulties

2).Bees:-

Entomologists trained bees that detects explosives and variety of landmines these bees can search large area in short time. But the thing is to more needs to be understood about the fate and transport of explosives in the surface before the full potentials of trained bees.

3) Bacteria:-

In this principal the process of spraying bacteria on the mine affected areas is done by airborne system. The bacteria are allows to grow for several hours. Then surveys team would return to search for fluorescent signal.

This method can also cover large area of detection of mines. But possible have the environmental limitation[12].

Mechanical method:

Sometime there is no time for army to find out the buried mine in minefield. To clear the safe path at that time military forces employs several kind of mines clearing machine to clear the path. Some of the mine clearing machines are remote controlled which minimized the risk to the life of army. But by this method virtual are get destroyed and mis mine

USE OF RADAR BULLETS FOR DETECTION OF LAND MINES

Radar bullet is a special type of bullet the main use of radar bullet is to find landmines without setting foot into the ground. Microwave band have very large information carrying capacity thus internal structures of radar bullet consist of microwave emitter. Microwave emitter emits the electromagnetic waves whose wavelengths are conventionally measured in small number of centimeter called as microwave. The bullet emits a radar pulse as it grinds to halt .This pulse strikes the mine and its image gets available on the computer in the helicopter. following figure shows radar bullets that consists of microwave emitter.

Fig.2.2. Radar bullets

Fig2.3 Internal Structure of Radar bullet

Working of Radar bullet:

Radar means detection of radio waves and ranging. Radar makes use of radio waves to detect and locate objects. Radar works like a sensor and its purpose is estimating certain characteristic if its surroundings, mostly the presence and motion of aircrafts. Radar operates by transmitting electromagnetic energy into the surroundings and detecting energy reflected by objects.The direction from which reflections comes the bearing object can be detected.The distance to the reflecting object is estimated. In radar bullet principle, the change of medium by the waves must be taken into consideration. Radar is basically a means of gathering information about distant objects that we interested in or targets of which information is needed by sending electromagnetic waves towards object to be detected and analyzing the echoes.
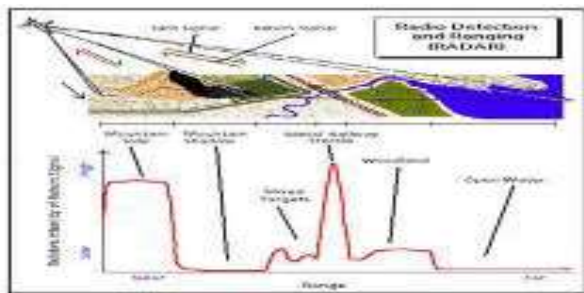
Fig.6.1 working phenomena

Tables:

Table 9. Comparison table for limitations of different methods for detection of landmines

Metal detector method	• done very close to mines thus risk to life of army. • Low success with land mine of low metal content. • False position of 1000 for every 1 landmine.
Biological method 1)Use of dogs and Rats:	• Time and investment taken to train Dogs and Rats.
2)Use of Bees:	• more needs to be understood about the fate and transport of explosives in the surface before the full potentials of trained bees.
3)Bacteria for landminedetection	• Question of meeting U.N. standard for humanitarian demining • Certain chemicals are yet undetected.
Mechanical methods	• Relatively high cost of operation. • Longistics of transporting and serving

	these vehicles.

CONCLUSION

This paper has described different method that used for detection of land mines. The safe method of detection is use of radar bullets. This can be used for detecting antipersonnel as well as anti- tank mines and the mines used in sea for targeting the ship and submarines. Since it can also be used for exploring oil, minerals and other buried natural resources, thus radar bullet is very important invenstion for the modern world .

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