

# “LOW COST BULLETPROOF JACKET WITH EMERGENCY SIGNAL TRANSMITTER AND LOCATION TRACKER”

Aniket Adhikrao Patil, Amol Tanaji Yamgar, Rohit Rajendra Disale

Department of Electronics and Telecommunication ADCET Ashta, Sangli 416301

\*\*\*

**Abstract** – Now a days, Indian army facing huge shortage of light weight bulletproof jackets which provides protection to soldiers in various operations and also this jackets lacks in advance technology. Location tracker based bulletproof jacket is a prototype developed to overcome this problems (To provide safety in low cost in order to affordable for armed forces with location tracking system). Our Bulletproof jacket with location tracker is very much beneficial for armed forces due to its new specifications. The world demands lighter & cheaper vast and location tracker based bulletproof jacket fulfills this demand. This project explores the development of light weight plate which reduces the weight of jacket. The purpose of this project is to build light weight vest, with location tracker using GPS modem which gives information about the location of solders in emergency situation.

**Key Words:** Advance technology, new specifications, demands, plates.

## 1. INTRODUCTION

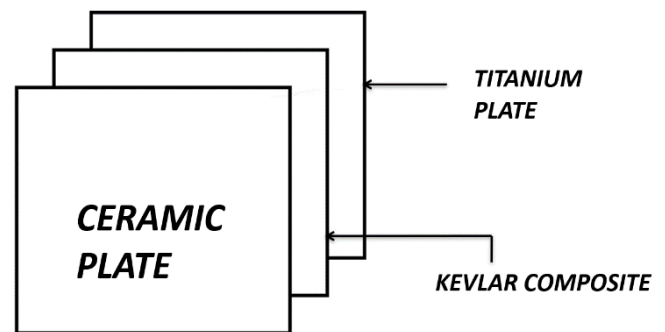
Our bulletproof jacket is light armer specifically designed to protect body from injury caused by bullet from rifle. This body arm or will helps to absorb the impact by layered structure of kevlar composite and reduce penetration of bullet.

Our project is concerned about new specifications with low cost of the bulletproof material which includes ceramic and high GSM kevlar. The specifications which we are going to use in this project are

- 1) Emergency signal transmitter
- 2) Location tracker

The first specification called emergency signal transmitter is used to transmit the emergency signal from battel field to the base station during the critical condition like when our soldier is injured in certain incidence so that he/she can get medical support in time. Another one is location tracker which is used to track the location of the soldier in order to provide the medical support to the soldier. It also used to find out location of the soldier when the critical condition occurs like soldier lost himself in snow or in valley. The main purpose of this project is to reduce the cost of the bullet proof jacket and introduce the new specifications.

## 2. Structure Formation:



The above diagram gives an idea about arrangement of different material in bulletproof jacket. This structure helps to absorb and disperse impact energy that is transmitted to the vest from bullet which causing bullet to deform and additional energy is absorbed by successive layer of Kevlar composite. Until such time as bullet has been stopped. Most useful properties of layered structure which used is high specific strength and specific stiffness also Kevlar and Titanium have fatigue resistance and corrosion resistant. On account of these highly desirable characteristics, structure has rightfully emerged as important material for application where weight of the structure is an important consideration.

The first layer in the structure is ceramic plate. We use ceramic plate as first layer because it has high hardness and compressive strength. Hard ceramic materials defeat the kinetic energy of projectile by shattering it into pieces, decreasing its ability to penetrate. When bullet hit the vest, firstly it pass from the ceramic plate as ceramic has high hardness, it will definitely break into pieces but it will reduce sharpness of tip of the bullet which indirectly reduce penetration power of bullet.

Next layer is Kevlar composite which made from Kevlar fabric and epoxy resin. Kevlar is strong synthetic fiber related to the other aramid fiber. Kevlar is extremely strong yet lightweight and durable that's why we selected Kevlar fabric for the composite. We use epoxy resin to bind Kevlar fabric together in such a way that we place Kevlar fabric then apply epoxy resin on it then place second layer of Kevlar and again resin applied on it. In this way we placed 42 layer of Kevlar fabric then we applied pressure on whole layered structure the put for 2 days for dry and make the

composite. Also when bullet hit the jacket the hard but brittle ceramic elements are broken into pieces. This backing structure also holds the ceramic elements in place so they are not merely knocked aside, but absorb the impact.

We use grade 5 titanium in this vest. As compared to steel in a strength to weight ratio, titanium is far superior as it is stronger than steel but 45% lighter. So, in some cases steel bullet penetrate through out Kevlar composite it is stopped by titanium plate. These three plates (ceramic, Kevlar, titanium) are bind together by using construction adhesive As shown in fig 1.

Also we have used location tracker in this project. TTGO T-Call module is used and programmed for location tracking. According to program we will get information about the latitude and longitude on Blynk app. NEO 6M GPS is connected to TTGO T-Call Module that receives the signal and gives to TTGO T-call module. TTGO T-Call module updates the information on Blynk app according to signal. In this 2G SIM card is used in TTGO module. When soldier is in emergency situation he/she will press the key and that key is connected to TTGO module. When key is pressed we will get message on mobile number that you have given in the program.



**Fig -1:** Figure

### 3. CONCLUSIONS

Traditionally the vest available in the market are having a price of approx. INR 45-50k which is very costly and that is not affordable to India to buy the jacket for each soldier. By considering this issue we are making this jacket with some new specifications in around Rs. 20k. For this we have used different materials than steel and ceramic armor. Due to this we have reduced cost as well as weight of the jacket.

The specifications which used in this project are location tracker and emergency signal transmitter that we have achieved using TTGO module and GPS receiver. TTGO module helps to transmit message from soldier to the base station and GPS receiver helps to provide information like longitude and latitude.

### REFERENCES

1. "The New Indian Express" (19<sup>th</sup> Nov2019)
2. Building a Dedicated GSM GPS Module Tracking System for Fleet Management: Hardware & Software (By CRC Publication)
3. Analysis of composite material used in bulletproof jacket International Journal of Scientific & Engineering Research, Volume 4, Issue 5, May-2013, ISSN 2229-5518.