Team YETI

DELHI TECHNOLOGICAL UNIVERSITY

Idea submission for Smart India Hackathon 2020

Organisation Name: DIRECTORATE OF IT & CYBER SECURITY, DRDO
Category: HARDWARE
Problem Statement: SOLDIER STRAP *(CK48)*
Team Name: YETi
Team Leader Name: YATHARTH AHUJA
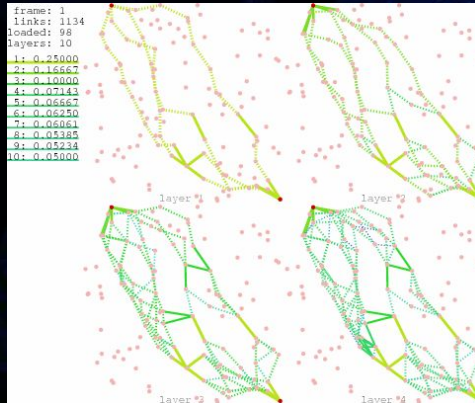College Code: 1-3512649004

Our Solution

We propose to develop a vest shaped strap embedded with multiple sensors to facilitate deployed soldiers by collecting relevant data and providing a secure ad-hoc communication amongst the soldiers and base camp. Data collected from a single strap (node) on a soldier, namely body temperature, pulse rate, current location, altitude, are transmitted to next closest node, according to the established optimised topology through a secure mesh protocol and all the data is stored at the base camp sever. Every soldier will be able to send distress signal as well as communicate over public network, if necessary.

We intend to benefit the SOLDIERS of our country by providing them with our best efforts and we are grateful for this opportunity to give back!

Connecting and Communicating

- TCP Based Network.
- Self organizing and repairing mesh network.
- Cipher encrypted messages.
- Connection table and users message are sent simultaneously.
- Direct communication through GSM and Email if needed.


```
frame: 1
links: 1134
loaded: 98
layers: 10

1: 0.25000
2: 0.16667
3: 0.10000
4: 0.07143
5: 0.06667
6: 0.06250
7: 0.06061
8: 0.05385
9: 0.05234
10: 0.05000
```

- Network limit of upto 200 nodes.
- Connection based on WiFi signal strength.
- Upto 100m of Node to Node transmission.
- Circular paths are actively avoided.
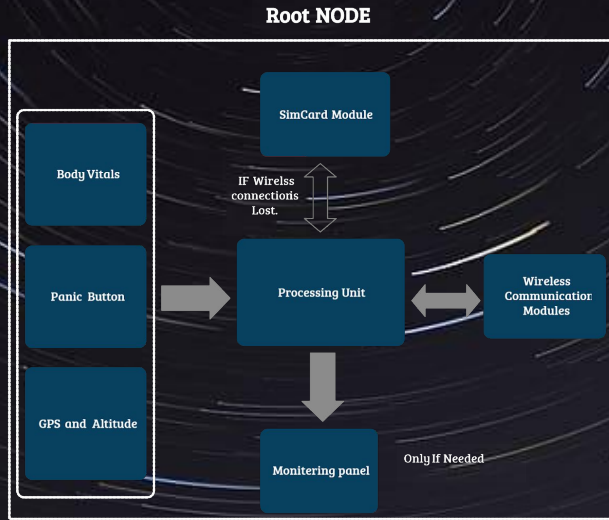- Time sync. with accuracy better than 10ms
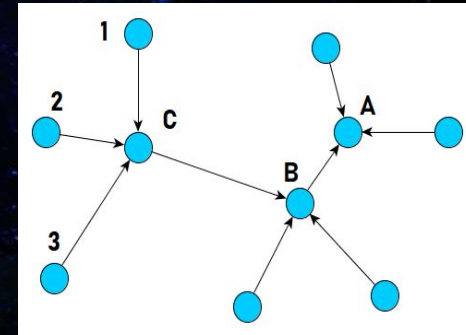
Data Sensing and Analysis

Various sensors (Temperature, Barometric, Pulse, GPS) collect data which is then forwarded to the central processing unit. All the circuitry is powered by the Li-ion battery source mounted conveniently on the strap.

The strap is made of Nylon fabric, offering proper strength, breathability and production ease.

Root NODE

SimCard Module

Body Vitals

IF Wirelss connections Lost.

Panic Button

Processing Unit

Wireless Communication Modules

GPS and Altitude

Monitering panel

Only If Needed

NODE 2

NODE 3

NODE at Base Camp

Data reception and analysis

The data received at base camp can be processed and analysed to develop meaningful and critical insights about contour, adversity of situation and various other metrics regarding military unit performance using various plotting APIs and simulation softwares such as OpenStreetMap. Which can be subsequently used to improve operation safety.
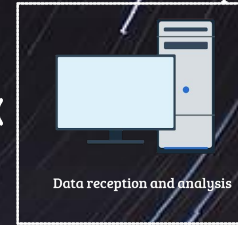
- In case a strap is destroyed or lost the strap can be tracked through location timeline which will be saved on the base camp storage system.
- To protect the internal circuitry, from moisture and dust, an encasement is provided.
- Any Node transmitting SOS will be observed carefully from the base camp.
- The root node collects data from all surrounding nodes and then transmits collective data to the base camp through WiFi medium.
- Atmega32 a low power CMOS based chip with 1MHz Clock speed is used for processing.
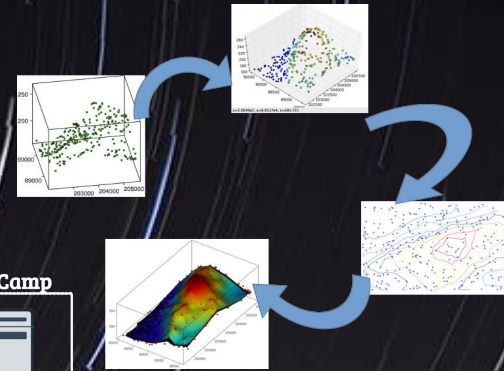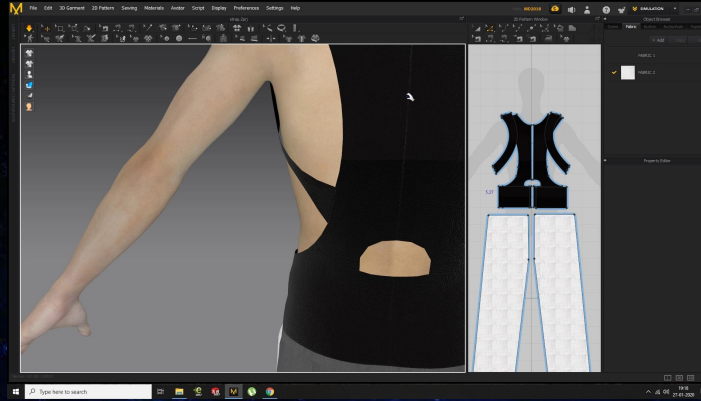
What Our Solution Looks like

SIMULATION ANIMATION
https://drive.google.com/open?id=1qEk0VrwY
CqCAJpsIpag--jGmZz_OqsRs

CAD MODEL
https://drive.google.com/open?id=1aMVo5qf
-ZX62UMrK61M1wMTlWfOAFgyw

Further Research/Future Prospects

- Fracture warning system using frequency separation and contour analysis.
- Continuous blood pressure measuring.
- To implement and use Indian GPS modules to enhance security
- Better WiFi hardware setup to increase range.
- Alternate strap designs to increase adaptability.
- Fabrication of custom PCB to decrease manufacturing cost.
- Decrease size of battery and optimise battery usage.