Health Monitoring Suit

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Team Members:

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Project Overview:

This project tries to make a wearable health monitoring suit. It aims to identify major injuries such as severe bleeding, hypothermia, loss of consciousness, etc. The data is reported to a remote location. It can be used to monitor health statistics of soldiers in covert operations which can help in providing medical support in time.

Objectives of the project:

The overall objective of the project is to provide the basis for remote health monitoring and provide immediate help in case of any abnormalities or diseases . Specific objectives are:

➜ To make a wearable suit for remote and continuous health monitoring by analysis of multi-parametric data collected using various sensors installed in the suit.

➜ To use communication modules to transfer data from suit to remote location and interpreting the results.

➜ To minimize energy requirement by harvesting body heat and converting it to electric energy.

Project Details:

In order to achieve the above objectives project will consist of wearable health monitoring jacket and glove embedded with multi-parametric data collecting sensors and other electronics for its working.

❏ The jacket will comprise of three biomedical sensor pads placed on right leg, left arm and right arm connected to ECG module to measure ECG which will give various cardiac parameters like inter - beat interval, heart rate variability, risk of coronary occlusion and heart attack etc.

❏ The glove will be embedded with temperature sensor and pulse sensor which will record body temperature and heart rate respectively.

❏ Thermoelectric power generator modules will be placed inside jacket at various points such as chest and arms to harvest body heat.

❏ Data collected from all the sensors will be communicated to remote location using communication modules and results will be interpreted.

❏ An android application will display all the data from the sensors to the remote location.

Time Schedule:

DURATION	PROJECT WORK
10th june -10th Aug	● Developing ideas, ● Making required inventory list ● Research on biological parameters and required sensors.
10th Aug- 31st Aug	● Interfacing of pulse rate sensor ● Medical analysis of data collected
31st Aug – 30th Sept	● Research on new sensors ● Ordering of components ● Interfacing of that components
30th Sept - 15th oct	● Finalising positions of components ● Research on thermoelectric generators for human body heat harvesting
30th Oct – 15th Nov	● Experimenting on thermoelectric generators for human body heat harvesting ● Connections and final assembly of project
15th Nov – 30th Nov	● Final positioning of TEG sensors ● Testing of suit ● Developing an application to read transmitted data.

Budget:

No	DEVICE	Quat	price	total
1	Thermoelectric Power Generator Peltier Module TEG	4	450/-	1800
2	LITHIUM POLYMER BATTERY PACK (LIPO)	1	2000/-	2000
3	Pulse Rate Sensor	1	550/-	550
4	ECG Measurement Module	1	3300/-	3300
5	Body Temperature Sensor	1	250/-	250
6	LTC3108 Voltage Step Up converter	1	1000/-	1000
7	Arduino	2	1400/-	2800
8	Zigbee Modules	2	1800/-	3600
9	Wiring , jumpers and miscellaneous		1000/-	1000
10	Jacket	1	1000/-	1000
11	Belt	1	200/-	200
12	Pair of Gloves	1	450/-	450
13	9 DOF IMU	1	800	800
	GRAND TOTAL=>			18,750

Deliverables:

The final output of this project is:

- ❏ A health monitoring wearable system embedded with sensors for remote and continuous health monitoring with minimum energy consumption due to body heat harvesting.
- ❏ An android application displaying the data and analysing the results.

Applications:

The main application of this health monitoring suit is in military. It can be worn by soldiers for continuous monitoring of their health to provide immediate help to those diagnosed with any abnormalities.

Its other applications are:

- It can also be worn by patients to monitor their health and inform family members in case of any abnormality.
- It can be worn by old age people for preventing congestive heart failures, hypertension, ischemic heart disease etc

Software and Hardware Required:

Software:

- Solidworks
- Arduino IDE
- Proteus
- Eagle
- Android Application

<u>*Hardware:*</u>

- Arduino
- PCB Printing Facilities
- Soldering Gun and Desoldering pump
- Digital Multimeter
- Battery
- Jumper cables
- LEDs, Resistors and Diodes
- Tools to trim and cut multipurpose PCB, Glue and resins.
- Screws,Nuts and Bolts
- Zigbee Modules

<u>*Sensors:*</u>

- TMP36 Temperature Sensor
- DC 3.3V AD8232 ECG Measurement Module Kit
- SEN-11574 Pulse Sensor
- Wifi/Bluetooth module
- Wearable thermoelectric generator modules

<u>References:</u>

- https://news.ncsu.edu/2016/09/wearable-teg-heat-harvesting-2016/
- https://www.popularmechanics.com/military/research/a20884740/soldiers-implantable-health-monitors/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2409965/
- https://ieeexplore.ieee.org/document/6120571/