

Autonomous Wearable System for Health Monitoring

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Abstract - There is a growing demand for wearable devices among people as it has the ability to monitor in real-time situations in the different areas of daily life. In wearable devices, power is the important factor. One of the aspect is the power supply with batteries that introduces weight, the overall dimensions, and the disposal of the batteries. A solution to overcome these limitations of battery as power supply is to extract energy to power the devices directly from the sun. In this paper, a proposed wearable device is designed for health monitoring of a person to measure his/her health parameters. If the condition of the person is unwell then a signal is send to his/her near ones and to the doctor. This paper describes the proposed autonomous T-shirt powered by flexible solar panel mounted directly on the T-shirt. The wearable device is capable of measuring heart beat and temperature of the body. The device would be very useful for health monitoring of elderly people and heart patients. In alarming situation appropriate help and necessary actions can be taken which can save life.

Key Words: Wearable Device, Flexible solar panel, GPS & GSM.

1. INTRODUCTION

Wearable technology, wearables are smart electronic devices (electronic device with microcontrollers) that can be worn on the body as implant or accessories. WEARABLE system can be a viable solution for monitoring the principal vital signs of a person during daily activities for a variety of applications in the medical, sport, and wellness fields.

In the literature, some wearable systems are equipped with sensors and suitable electronics devices are used to condition and store the vital signals have been reported.

Monitoring devices are able to check the physical status of elderly person in his/her daily routine life, indoor as well as outdoors. The main advantages are decrease in the health costs and waiting time and overcrowding in different medical structures. This increases the independence of the people improving the quality of life [1]. The MAIN Shirt [2] is a wearable that consists of sensors based on electromagnetic coupling. The sensor is a coil that is sewn into the shirt. The MAIN Shirt is also tested for pattern recognition. The same group of research also developed a device that comprises magnetic induction and reflectance photoplethysmography for cardio-respiratory monitoring [3]. Another system for continuous measurement for vital signs for health monitoring has been described in [4]. The authors have

design a wearable sensor which can monitor important signs of health and fall detection. The current composition of the device is 150mA. In [5] the wearable transmits the data to patient's digital assistance via Bluetooth. This project presents the design of energy harvesting module. It harvests the energy from the sun and body heat from the environment. But no vital signs are measured.

This paper describes a battery less wearable system which detects heartbeat and temperature of the patient's body. The energy is harvested with the help of flexible solar panel. This power generated is then used for powering up the electronic circuit. Whenever the heartbeat or temperature of the patient goes high a sms and location to doctor and near ones so that action can be taken to save the person's life.

2. OVERALL SYSTEM

The wearable system with details about the autonomous instrumented T-shirt is schematically shown in Fig.1. It can be divided into several blocks:

- A T-shirt that is made of single jersey cotton with Lycra for enhanced comfort and good body adherence.
- The electronic circuit board including conditioning sensor circuits, heart beat sensor and temperature sensor.
- The flexible solar panel used as energy-harvesting system to supply power to circuit board.
- A GSM and GPS Module which send the data and location to the mobile no. feeded to indicate the alarming situation.



Fig -1: Wearable System Architecture.

3. METHODOLOGY OF PROPOSED PROJECT

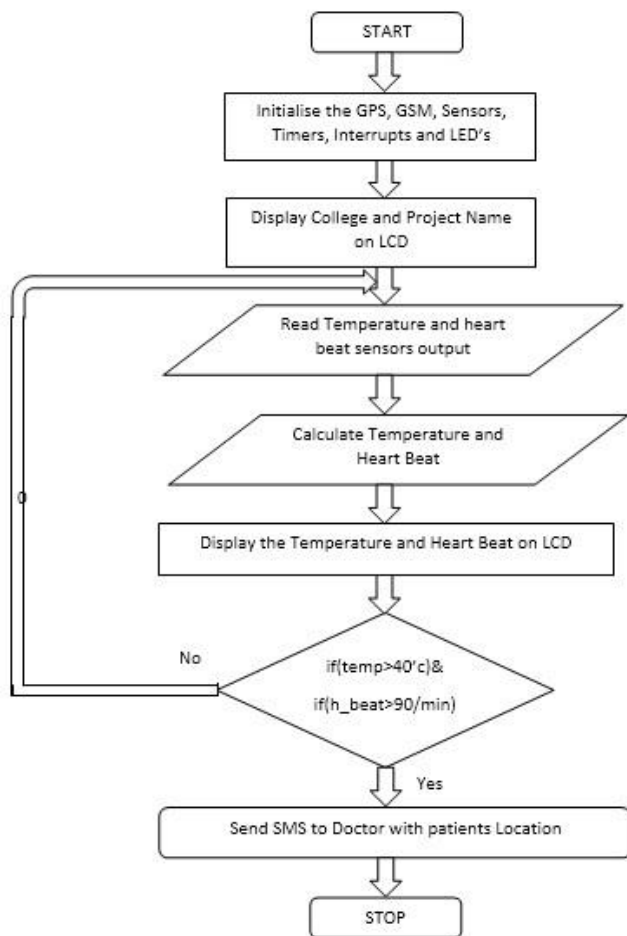


Fig -2: Flow Chart.

4. CONCLUSIONS

In this project autonomous instrumented T-shirt powered by an energy-harvesting module is presented; no batteries or other power sources are used. Low-power circuits have been implemented in the circuit board measuring heart rate, temperature. Flexible solar panel is used to generate the requested power. The experiment can be carried out using the T-shirt outdoors in sunny and shadow areas and then in two indoor cases. The wearable system with the energy-harvesting module allows improving the non-invasiveness opening up new prospects to develop self-sustained electronic devices for outdoor long-monitoring or with specific indoor constraints, whose applications can be currently limited by the problems associated with the use of batteries. In this regard, the power management could be adapted so as to accumulate a large amount of energy when possible, for example, outside in the sun, in order to use this energy in environments where radiation levels are not sufficient to directly switch ON the system.

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