

Bio-Power Driven Nano-Device for Monitoring Pyrexia in Special Children and Tracking Using a Two Way Communication GPS System

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Abstract- Child trafficking represents the major threat in today's world. It has increased the nation's consciousness to this problem. The proposed device is composed of a GPS tracker, Temperature sensor and a Force sensor (biometric sensors). The GPS tracker is powered by the thermoelectric generator (heat generated from within the body). The device is miniaturized using Nano technology and implanted in the teeth of the child. The proposed device communicates by a communication link to a Global Positioning System to obtain geographic location information relating to the physical location of a child. When the temperature readings from the sensor goes beyond the normal range an alert message will be sent to the parent's/guardian mobile number, in this case it can be used to examine whether a special kid has a fever or not because he/she may not be able to properly communicate about their well-being. The device is programmed based on the fact that during flight conditions our body temperature varies abnormally. So, when someone forcefully tries to abduct the child the temperature readings on the temperature sensor goes abnormal which in turn activates the GPS tracker or when the child wants to intimate its location to their parent's/guardian by exerting pressure on the force sensor which in turn sends the geographical location. If the parents have a bad feeling/intuition they can simple make a call to the inscribed number and they can get the geographical location of the child.

Index Terms- GPS Tracker, Nano Technology, Biometric sensors.

I. INTRODUCTION

Child abuse and neglect represent major threats to child health and well-being; recent high-profile instances of abuse involving adults in positions of trust including the clergy and teachers, easy access to child pornography via the Internet, along with a

string of kidnappings, abuse, and murder of children have heightened the nation's consciousness to this problem. Agencies that provide services to children are under increased pressure to take affirmative action's to protect children. Numerous non-profit, youth serving and sports organizations have developed formal policy for protecting children that include screening of leaders and volunteers, strict rules related to harassment, guidelines for adult/child interactions, and educational programs for leaders, parents and participants. In modern days, the children can't be monitored all the time. In order to monitor children various technologies evolved in the past. The most useful and fascinating technology is the GPS tracker and the biometric sensors (temperature sensor, force sensor) powered by thermoelectric generator and which can be implemented to track the children and they can be protected and monitored and can be rescued immediately in the case of any emergency.

II. LITERATURE SURVEY

It is largely reported that women are immobilized. There is thus, a need of simpler safety solution that can be activated as simply as by pressing a switch and can instantly send out alerts to the near ones of the victim. In this paper we intend to design and implement such a system in the form of a partial wearable and partial portable system [1].

Since partial application is possible for simpler alerts ,hence we can locate the child or women when the body temperature levels differ at a particular range using the next paper implementation Glenson Toney ,Fathima Jabeen ,Puneeth S says that the safety of women using ARM7 sends an alert message along with the location on through the GPS and GSM

tracker on always which produces radiation but still the children wear for safety which does not cause much taint [2].

Thus based on the above mentioned concepts Vladimir Leonov says that energy that is being generated from the harvesting cells present in our body .Micro-sized microbial fuel cells are miniature energy harvesters that use bacteria to convert biomass from liquids into usable power[3].

To switch on these modules into action the energy that is harvested from the energy cells are coagulated from the organic fuels in micro sized fuel cells [4].

We have used the Radio Frequency Identification (RFID) technology for human implants and investigate the technological feasibility of such functions. This wireless communication between passive RFID devices implanted inside human body and an off-body interrogator. Using current technology, a microchip is being prepared and implanted inside the children and women body and wirelessly the alert message is being transmitted then and there to the victim's people use of the internal power supply that is prepared from the energy harvesting cells in the human body. A low cost temperature sensor on the passive UHF RFID tag to sense temperature variation in specified applications. The variations of field strength are measured through simulation in CST MW Studio. The reader distance range of the tag, in free space is limited over few meters [5].

In this paper, a new theoretical concept in the thermoelectric theory is discussed, which is important for design optimization of a thermoelectric energy harvester. The general conditions are defined, which are required to make a thermoelectric converter effective in energy harvester application [6].

This paper presents an overview on Radio Frequency Identification (RFID) technology for human implants and investigates the technological feasibility of such implants for locating and tracking persons or for remotely controlling human biological functions. RFID devices are implanted in the human body for locating and tracking persons or for remotely controlling human biological functions [7].

Micro-sized microbial fuel cells (MFCs) are miniature energy harvesters that use bacteria to convert biomass from liquids into usable power. By producing nearly 1 μ W in power, this saliva-powered, micro-sized MFC already generates enough power to

be directly used as an energy harvester in microelectronic applications [8].

This sensor can be implanted on a tooth or a dental implant to monitor the mouth temperature. RFID Enabled temperature sensor, a change in temperature causes structural beams to bend, which results in a proportional displacement of the plates of the capacitor. External readers can be used to detect the change in the resonance frequency, and in turn determine the measured temperature [9].

This system is designed with the integration of various technologies such as GSM/GPRS, GPS, sensors (wearable device) and P2P. The proposed new system will be useful for common people, during the emergency situations to diagnose the mobile heart (Cardiac) patients, diabetic patients, elderly people as well as an accident victim [10].

III. SYSTEM REQUIREMENTS

A. HARDWARE REQUIREMENTS:

- ▶ GSM modem
- ▶ GPS
- ▶ MAX232
- ▶ PIC Microcontroller
- ▶ Transformer
- ▶ Force sensor
- ▶ Temperature sensor
- ▶ Antenna
- ▶ SIM card
- ▶ Comparator

B. SOFTWARE REQUIREMENTS:

- ▶ MP Lab IDE 8.0(PIC Kit 3 Programmer)
- ▶ COMPILER : High Tech Compiler
- ▶ OPERATING SYSTEM: Windows XP
- ▶ LANGUAGE USED : Embedded C

IV. METHODOLOGY

The proposed device is composed of a GPS tracker, Temperature sensor and a Force sensor (biometric sensors). The GPS tracker is powered by the thermoelectric generator (heat generated from within the body). The device is miniaturized using Nano technology and implanted in the teeth of the child. When the temperature reading from the sensor goes beyond the normal range an alert message will be sent to the parent's/guardian mobile number, in this case it can be used to examine whether an autistic kid

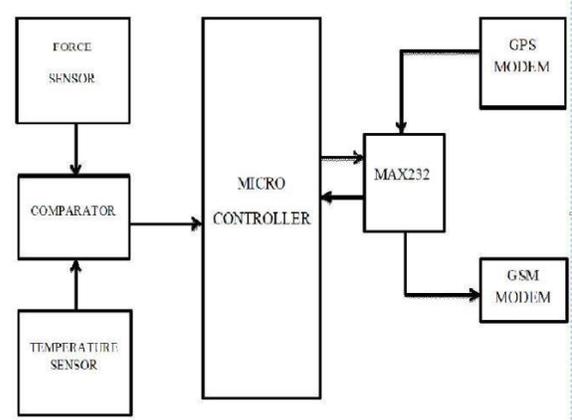
has a fever or not because he/she may not be able to properly communicate about their well-being.

A. IMPLEMENTATION:

Preparing the cavity in a tooth of a person and mount a microchip in the cavity (the microchip including a transceiver means for transmitting a wireless signal containing geographic location information relating to the physical location of the person, the microchip adapted for communicating with a Global Positioning System to receive geographic location information of the person based on the abnormal changes in the temperature sensor or when the person crosses a particular range in a specified period of time. Then the cavity is filled with a dental filling material. Then establishing communication between the microchip by the first communication link and the tracking apparatus which without wires i.e. wirelessly communicates with the microchip implanted to obtain the geographic location information from the microchip to determine the location of the person. Then establishing communication between the microchip by a second communication link between the microchip and the Global Positioning System for obtaining geographic information relating to the physical location of the person. A system for remotely monitoring the location of a person comprises of the: a microchip including a transceiver for transmitting a wireless signal containing geographic information relating to the physical location of a person, and a temperature sensor used to detect the body temperature of the individual, the microchip adapted is to be mounted in a tooth of a person. A GPS is transmitting global positioning data to the microchip and a tracking apparatus disposed of a wireless communication with a microchip to obtain the geographic information from the microchip to determine the physical location of the person. The temperature sensor that is used to detect the changes in the body temperature of the individual. Whenever there is an abnormal change in the temperature it activates the GPS automatically and the geographic location of the person is intimated. There are two types of power supply. The types of power supplies are as follows out of which we use only one to implement the proposed project. The power supply may be an active power supply, such as a battery which can be recharged by energy sources internal to the body of the person, such as acoustic, mechanical,

chemical, electrical, electromagnetic, or thermal sources derived from, for example, bodily temperature differences, muscle activity, vibrations due to pulse, speaking, breathing, and so on. The power supply may also be an inactive power supply, such as an inductive type power supply which induces electrical energy from signals received from the tracking unit. Here we use the power generated from the human body temperature and harvest it with the help of thermoelectric generator.

BLOCK DIAGRAM:



B. WORKING:

The GPS tracker and the temperature sensor which is integrated into a single chip are implanted in the teeth of children in order to monitor the health conditions like pyrexia in special children. The GPS, the force sensor and the temperature sensor receive power supply from the thermoelectric generator (conversion of the human body temperature to electricity). The GPS tracker is programmed to activate when the human being's temperature goes beyond normal range or when the pressure exerted on the force sensor goes beyond the normal range then immediately the location of the particular person is sent to the receiver, the rest of the time the GPS tracker is idle. Hence the level of radiations is reduced. The GPS Tracker also activates when the parent makes a call to the inscribed number to know the location of their children. And additionally we have used a biometric sensor i.e., the temperature sensor. The GPS Tracker automatically activates when the reading taken by the temperature sensor goes abnormal (based on the fact that during flight conditions the human body temperature rises above normal). Similarly when someone disguise themselves as known person's/relatives and try to abduct the

child in such a case if the child realizes it later, the child can intimate its location to their parent's/guardian by exerting pressure on the force sensor which in turn sends the geographical location to the parent's or guardian's mobile. If the parents have a bad feeling/intuition they can simply make a call to the inscribed number and they can get the geographical location of the child. Thus, making it a two-way communication.



Fig.1 Working principle of GPS Tracker

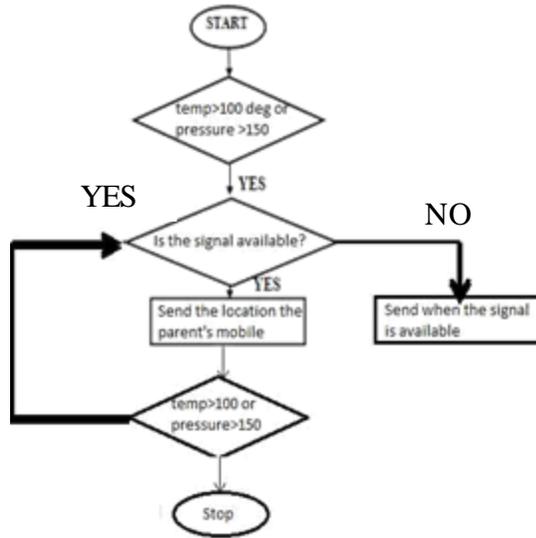


Fig.2 Working model flowchart

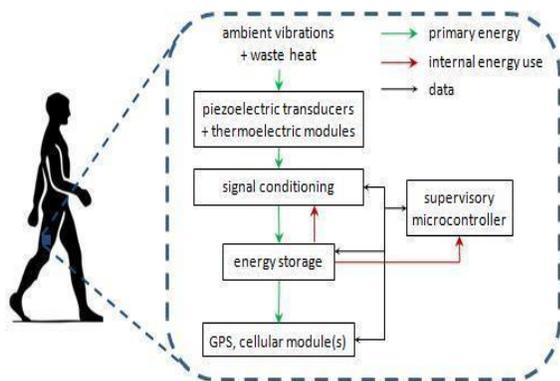


Fig. 3 Energy harvesting from human being

V. ADVANTAGES

The seriousness of the project lies on controlling the child traffickers all over the globe. The system is about making children more defended by the use of GPS, GSM technology and a web application. This project can be further enhanced by the use of camera and by developing a mobile based application to get the real time view of the child and also provided with an additional effect to track them even through mail, which would be more convenient for the user to track the target. In the proposed model, we have overcome the continuous transmission of signals in order to reduce the radiations produced by the GPS tracker reducing its adverse effect on the human health. The GPS tracker is said to ON only when the implanted human crosses a particular range in the particular time limit or else when the temperature of the human being sensed by the temperature sensor becomes abnormal the GPS Tracker automatically switches ON and transmits the signal.

- Easy to implement.
- Cost effective.
- Replaceable.
- Easy maintenance.
- Reduced level of radiation
- Energy is generated from the difference in the body temperature. (thermo electric generator).
- The maltreatment of children continues, and increases day by day. It is our responsibility to take care of our children.

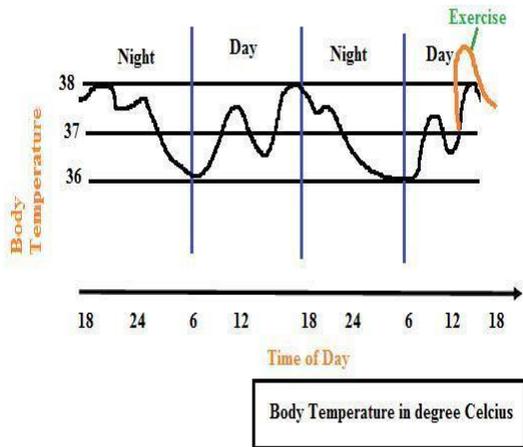
There are so many actions being taken by the community to prevent child abduction. Using the proposed project, we can reduce the rate of child abduction and it plays a vital role in monitoring the children and keeps them safe from the strangers and sends an alert immediately if they are in any critical situation based on their body temperature and their location can be precisely found with the help of the GPS tracker.

VI. RESULTS

A. Alterations in Body Temperature

1. Normal body temperature is 37^oC or 98.6 F
2. Range is 36-38^oC (96.8-100 F)
3. The body temperature may vary abnormally due to various conditions such as fever (high temperature) or hypothermia (low temperature).

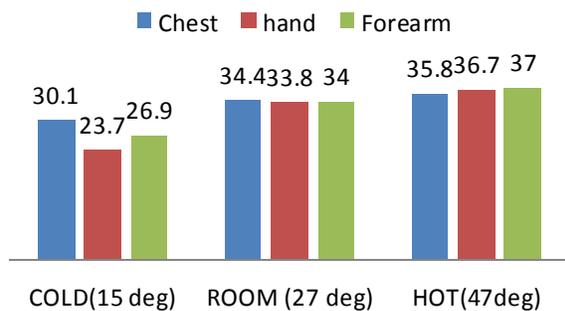
4. Pyrexia, fever: a body temperature above the normal ranges 38°C-41°C(100.4-105.8°F)
5. Hyper pyrexia: a very high fever, such as 41°C > 42°C leads to death.
6. Hypothermia: a body temperature between 34°C-35°C, < 34°C is death.



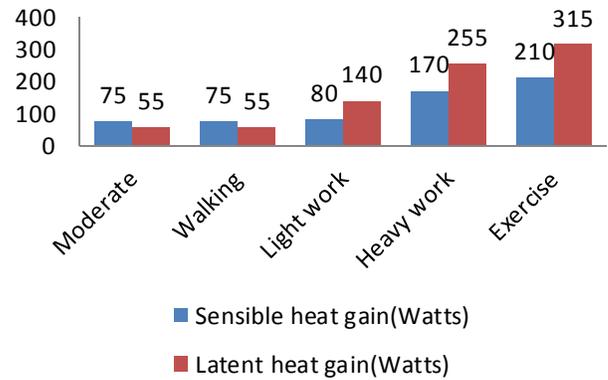
Graph.1 Variations in Body Temperature during Day and Night

F	0-2 years	3-10 years	11-65 years	> 65 years
oral	-	95.9-99.5	97.6-99.6	96.4-98.5
rectal	97.9-100.4	97.9-100.4	98.6-100.6	97.1-99.2
axillary	94.5-99.1	99.6-98.0	96.3-98.4	96.0-97.4
Ear	97.5-100.4	97.0-100.0	96.6-99.7	96.4-99.5
Core	97.5-100.0	97.5-100.0	98.2-100.2	96.6-98.8

Table.1 Normal Body Temperature Range



Graph.2 Power generated by the TEG on various parts of the body



Graph.3 Heat generated by people

VII. CONCLUSION

The proposed final product will be customized for each individual, considering their unique requirements. The proposed project, once implanted will help in monitoring body temperature of the autism children, special children and also helps in tracking normal children at exigent situation. It will also help the child to immediately alert their parent's when in crisis. In the event of child's inability to communicate, the biomarkers will trigger the exigency mechanism. In the event of the special children being risen beyond the normal temperature the Nano-device will produce electricity through the bio-cells that are located in their body and activate the device. These multiple alert options will be useful in various situations regardless of the state of the children and keeps them safe from the strangers and immediately sends an alert immediately if they are in any critical situation based on their body temperature and their location can be precisely found with the help of the GPS tracker using Google Maps.

ACKNOWLEDGEMENT

Finally, a dedication. We dedicate this project to the children, students, women and parents, past and present, in the field of monitoring the well-being of children. Many of them appear in the pages that follow; but of those who are not mentioned. Let us mention two thoughtful and generous souls, Dr.T.Kalaichelvi, Professor of Computer Science & Engineering and Dr.V.Subedha, Head of the Department of Computer Science & Engineering at Panimalar Institute of Technology for lending an

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