IoT Application: Human Emotions Management System

Gunti Spandan, Tanveer Ahmed, Sangmeshwar, Rajesh S M

Abstract: Mental stress, depression and anxiety are the major problems in our community, as these are the source of many health issues like hypertension, heart attack or even sudden deaths and self-annihilation. To reduce stress, it is necessary to predict it in its early stages before turning into chronic and irreversible damages. Generally, all these problems can be detected by counselling, questioning or observing a person for a long time. But we will focus on changes that occur in human body when he/she is in stress, depression or anxiety. We will monitor the heart beat and detect emotional changes occurred in a person when he/she is in stress, depression or anxiety. On detecting we will send an intimation message to their family member so that they will help that person to come out of his/her situation.

Index Terms: GSR Sensor, ECG, Stress, Anxiety, Depression

I. INTRODUCTION

INTERNET of things (IoT) is a network of devices in which physical objects are connected through the internet. These objects contain Embedded innovation to collaborate with internal states or the external environment. At the point when these objects detect and convey, it changes how and where choices are made, and who makes them. It is a modern wireless communication technology having its application areas in different enhanced domain areas. The basic idea of this thought plan is the unavoidable closeness around us of an accumulation of things or articles, for instance, Radio-Frequency Identification (RFID) labels, sensors, actuators, cell phones, and so forth. IoT has its application under different domains such as personal home automation system, smart environment, medical and health Care, smart metering, smart grid, and smart water monitoring system, energy management and so on. With the improvement of computers and data technology, there has been important improvement in the use and develop- opment of electronic devices in medical sciences, and with the flowering of IoTs, the medical IoT has slowly however steadily penetrated itself into lives of people.

The Internet of Things in medical Field had been seen as a way in which technology has helped in embedding wireless sensors in medical devices which then gets linked with the world wide web and interacts with patients, hospitals and medical devices to make use of the new development in the model of modern medical.

A. Application Domains in Health Care

1) Health Care: Fitness Care, Disease Prevention, Food Monitoring.

B. Challenges in Health Care

1) Adherence monitoring: Doctors don’t have the way to more readily survey whether their patients are following endorsed treatment that may incorporate prescription, recovery activities, and preventive exercises. For example, diet shirking. It is very regular that absence of grip expands the danger of hospitalization and subsequently, builds the monetary weight for patients and their families.

2) Restricted and Anticipated time: The expansion in the people brings about expanded illness and incapacity limits specialists to inspect every patient with quality time. Due to the brief timeframe of screening, doctors come up short on the everyday schedule of the patient. For example, physical movement, diet, rest and public activity, every one of these traits are similarly significant in the determination and treat- ment process.

3) Combination of multiple devices and protocols: The decent variety of gadgets engaged with systems is another test for the achievement of IoT in medicinal services. Assuring that different gadgets are associated with one another and that numerous patients discuss viably with one another is an issue. The difficulty lies in the way that numerous gadget producers dont have a concurred set of correspondence conventions and measures. Although an assortment of cell phones can be associated with the system and effectively gather information, diverse correspondence conventions confound the collection procedure [7].

The security challenge, which includes managing credentials and controlling access to tolerant patient requests and classified data. For instance, medicinal services suppliers are permitted access to gadgets in light of interest from the patient’s sensor gadgets, yet the Internet association utilized might be an open or shaky Wi-Fi arrange that can without much of a stretch be man-in - the-middle.

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Gunti Spandan, Department of Computer Science and Engineering, GITAM School of Technology, GITAM Bangalore Campus, Bangalore, India 561-203
Tanveer Ahmed, Department of Computer Science and Engineering, GITAM School of Technology, GITAM Bangalore Campus, Bangalore, India 561-203.
Sangmeshwar, Department of Computer Science and Engineering, GITAM School of Technology, GITAM Bangalore Campus, Bangalore, India 561-203.
Rajesh S M, Department of Computer Science and Engineering, GITAM School of Technology, GITAM Bangalore Campus, Bangalore, India 561-203.
TABLE I: Literature Review of Existing Methods

| Methodology | GSR | ECG |
|-------------|-----|-----|
| Detecting stress during tasks using physiological sensors | Yes | Yes |
| Anxiety using mental stress detection using physiological sensors | Yes | Yes |
| ECG and GSR measure and analysis using wearable systems | Yes | Yes |
| Wearable Depression Monitoring System with Heart-Rate Variability | No | Yes |
| ECG analysis using combined PGA | Yes | |
| Neural networks for ischemia detection | No | No |
| Detection of stress anxiety from ECG features | No | No |
| Stress monitoring using physiological sensors with the last time of response estimation | No | No |
| Wearable Physiological Sensors | |

Some of the previous works describing the usage of the GSR, ECG, the methodology followed with its advantages and disadvantages are discussed in the Table 1. Which gives a proper guidance for the work which we have proposed.

II. LITERATURE SURVEY

Some of the previous works describing the usage of the GSR, ECG, the methodology followed with its advantages and disadvantages are discussed in the Table 1. Which gives a proper guidance for the work which we have proposed.

III. SYSTEM DESIGN

A. Stress

Stress is an impulse of Physical Tension and also could be a bodys methodology for reacting to any form of interest. It aims to be brought about by both great and terrible encounters. At the point when individuals feel worried by something going on around them, their bodies respond by discharging synthetic substances into the blood. Different types of stress are Acute stress, Episodic acute stress and Chronic stress [11].

B. Anxiety

Anxiety is the point at which a person feels stressed long after the actual event has passed. This consistent feeling of being stressed, despite the fact that the stimulus doesn’t exist any longer is what is classified as anxiety. These emotions simply beat under the surface and show themselves in you as a persistent day by day anxiety, dread, or frightful inclination in the pit of your stomach or chest, especially
when you reset in an awkward circumstance, or are relied upon to come back to the area of a damaging occasion. Stress over friends and family, menaces, work pressures, all these are instances of continuous focused on emotions that can be called tension. Social uneasiness is something that has been seen to be on the ascent [8].

C. Depression

Depression is something beyond feeling down. While about us all vibe pitiful, cranky, or down every once in a while, individuals who are discouraged have these emotions significantly more strongly and for longer periods of time, often for weeks, months, and even years. They think that its difficult to work, and because of the disgrace appended, do a great deal to shroud their downturn. Depression is one of the most well-known psychological illnesses we have in the society today, and it has been evaluated that one of every five individuals will encounter it at some phase in their life. Depression is ordered as far as its seriousness: mellow, moderate and extreme [12].

![Fig. 2: Arduino Mega 2560](image)

**A. GSR Sensor**

GSR represents galvanic skin reaction, is a technique for estimating the electrical conductance of the skin. It estimates changes in sweat organ action on the skin as a sign of physiological or mental excitement, utilizing changes in skin conductivity. During stress, opposition of skin drops because of expanded emission in perspiring organs [6].

![Fig. 3: GSR Sensor](image)

**B. GSM Modul**

GSM/GPRS module is employed to set up consistency among a PC and a GSM-GPRS framework. It is developed at Bell Laboratories in the year 1970. It operates at different frequencies like 850MHz, 900MHz, 1800MHz and 1900MHz.

![Fig. 4: ECG Module](image)

**IV. EXPERIMENTAL SETUP**

**A. Arduino Mega 2560**

The Arduino Mega 2560 is a microcontroller board. It has 54 digital input/output pins, 16 analog inputs, 4 UARTs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

![Diagram](image)

**Fig. 1: Process Flow of Human Emotions Management System**

Figure 1 describes about the work flow of the project. The device gets switched on and it send a SMS as system alert from the GSM module and it will connect to the Bluetooth module when the pairing is done and it will display the ECG values. Based on the ECG Values it is going to check if the anxiety threshold is met or not if it is met it is going to send a message as feeling anxious. If the anxiety threshold is not met it is going to check if the depression threshold is met or not if it is met it is going to send a message as feeling depressed. If the depression threshold is not met it is going to check if the stress threshold is met or not, if it is met it is going to send a message as feeling stressed. If the stress threshold is not met it is going to display ECG Values and threshold V.

B. Wiring Diagram

available to be paired with your mobile so click on connect. The device gets paired up and will start plotting the graph. Whenever the person is under stress or anxiety or depression an intimation message is sent to the family member or friend so that they can come out of their state. The below three figures are the text messages received to the mobile via GSM module when the
V. CONCLUSIONS

In our work we proposed a multi-model system that combines ECG and GSR sensors for intimating and monitoring the stress, anxiety and depression levels of a person. We used the ECG for monitoring the heart rate of the person by displaying the value on the LCD and as well sending this data via Bluetooth module to an app to plot the ECG graph on the mobile phone. The GSR sensor is placed on the finger and it works on the skin conductance i.e. based on the sweat secretions and with the help of certain threshold values. When these thresholds are met an intimation message in the form of text SMS is sent to the saved contact details of that persons family or close friend intimating about their state so that they will help them to overcome from it, and also on the LCD display these states i.e. stressed / anxious / depressed id displayed if the person is in that state.
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AUTHORS PROFILE
Gunti Spandan is an Assistant Professor, Computer science and Engineering, GITAM School of Technology, Bengaluru Campus. Overall, He is having 6 years of teaching experience. He did his BE in Computer Science and Engineering from HMSIT College of Engineering Tumkur and his M. Tech in Computer Science and Engineering from School of Technology Jain University Bangalore. His area of research is Internet of Things, Cyber Security. He published papers in different areas like wireless sensor network, Internet of Things, and He is certified with Advanced RPA Professional by Automation Anywhere.

Tanveer Ahmed received the M.Tech degree in Computer Science and Engineering from VTU University, Belgaum in 2016. Currently he is working as an Assistant Professor in the Department Of Computer Science and Engineering at GITAM School Of Technology, Bangalore Campus from 2017. He is interested in the areas of Artificial Intelligent, Machine Learning and Cloud Computing.