E-GLOVE using IoT

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Now-a-days, people pay more attention towards prevention & early recognition of disease.

## *Abstract -* Healthcare is one of the most promising applications of information technology. This system is experiencing a variation where constant monitoring of resident is possible without hospitalization. Internet of Things provides importance to the healthcare field. This motivates the need for wearable devices, which is reliable, affordable, low power and will improve the quality of life. This system is necessary to monitor patient’s physiological parameters. The motive of this paper is to highlight the concept of Internet of Things and an Electronic Glove- an IoT based smart wearable device, which can perform various functions such as monitoring of temperature, blood pressure and heartbeat.

*Keywords* - Internet of Things (IoT), Electronic Glove (E-Glove), Arduino, Sensors: LM35, blood pressure and pulse rate.

# I.Introduction

The Internet of Things (IoT) is a giant network of connected things and people, which collect and share data about various things around them. Objects and devices with built in sensors is connected to an Internet of Things platform, which combines data from the different devices and applies analytics to share the most significant information with applications created to serve particular requirements. These dynamic IoT platforms can identify what information is fruitful and what is negligible. This information is used in various fields like to detect patterns, make endorsement, and identify possible issues even before they arise. The focus is to implement the health monitoring system continuously using wearable sensors. To detect the disease in a more efficient manner a continuous record of body health parameters can be used.

Biomedical is one of recent trends to provide better health care. The IoT technology provides the personal health care facilities. So having a smart system, various parameters are noted which consume power, cost and increases efficiency.

An Electronic Glove is an interactive device, which resembles a glove worn on the hand. It is equipped with sensors that sense the data and sends back the data to computer. This is used in several other fields like Military, Biomedical Engineering, and Hospitals etc. The glove is supervised through transceivers capable to play the role of both transmitter and receiver. Electronic Glove is highly energy efficient and has huge potential for implementations in varied areas like Robotics cum Artificial Intelligence, Corporate Houses for Sensor data measurement, R&D Institutes. Satisfactory work is done in health monitoring by using arduino as well as IoT, we use embedded concept of both the platform. The devices and IoT gathers, and share information with each other, making it possible to collect, analyze and monitor data more accurately.

This paper proposes a health monitoring system, which is capable of detecting multiple parameters of our body like temperature, heart rate, blood pressure & further displaying the result on LCD. Also in case of emergency, alerts will be sent to doctors if any unusual activity is detected in the patient using GSM technology. The main motive of GSM is to provide the mobile healthcare for isolated areas. Various sensors have been used like temperature, heart beat and blood pressure are used. The temperature sensor series are integrated circuit devices, which is used to measure the body temperature. The blood pressure sensor is used to measure human blood pressure. Any irregularity in the health conditions can be detected and can be informed to the particular person through

GSM technology or through internet. The proposed system is simple, efficient and easy to understand. It behaves as a connection between patient and doctor. The hardware of the project will be implemented and the results will be displayed.

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| --- | --- | --- | --- |
| Sl no | Title of paper | Sensors Used | Techno- logyUsed |
| 1 | Health Monitoring System using iot and arduino | Temperature, Blood pressure, ECG sensor | IoT enabled data modelling |
| 2 | IoT based Health MonitoringSystem | ECG sensor | MATLab R2012A |
| 3 | Human Health Monitoring System usingWearable Sensor | Temperature, HeartBeat sensor | MP Lab IDE |
| 4 | Data Glove:Internet of Things Based Smart WearableGadgets | LDR,Accelerometer | Arduino IDE |
| 5 | Wireless Blood Pressure MonitoringSystem | Blood Pressure, ECG | E-Health Sensor Platform |
| 6 | HealthMonitoring System using IoT | Temperature | IoT Platform |

# II. Related Work

Latest health care system introduces new technologies like wearable devices or cloud of things. It provides flexibility in terms of documenting patients monitored data and send it remotely through IoT. Hence, for this connection, there is need of secure data transmission. The system presents cloud of things and security of health care. This works in two major parts namely storage and data retrieving stage. In storage stage, the data is stored, processed and updated for future use. In data retrieving stage, the data is retrieved from cloud. The cloud server can provide this data to the authenticated user when they provide the credentials. A patient with wearable devices continually updates his record every 5 or 10 min.

The research and scientific communities are working hard to design and develop wearable devices, which can be used for continuously monitoring various human activities. There are various challenges faced on design, development, implementation and utilization for continuous monitoring. While designing any wearable devices there are various challenges from the software and hardware constraints arising from the lightweight and low energy operations, safety requirements to avoid any kind of physical injury. The biggest challenge of the work is to develop a wearable sensor system, which can be worn by the individual continuously without any kind of malaise. Although the research and development on different kinds of wearable devices has reached a point where it can be used as general household items, the high cost is still a concern. From a financial perspective, the cost of the product need to lower to a level so that any individual can afford them.

# III. System Design

The system is divided into hardware and software section.

1. Software is responsible for better working of the system, also for interfacing. Both section work in parallel process.
2. Hardware is again classified into transmitter and receiver section. Implementation of transmitter is important because this is directly attached to human body.

The glove is worn on hand which consists of all the sensors attached to it. The sensors will collect the data and transmit the raw data to the microcontroller. The arduino processes and analyses the data. The processed data is compared with the predefined data and if any abnormalities are found then the alert is sent to the user.

## Objectives

* + To develop health-monitoring system that measures body temperature, blood pressure and heart rate.
	+ To analyze the various data collected from sensors.
	+ To provide an efficient, reliable wearable device to measure various parameter in the body to verify the regular functioning of the body.
	+ To alert doctors in case of emergency.
	+ To provide a simple device which any individual at remote areas can use.
	+ Hospital visits for normal routine check-ups are minimized.
	+ Easy to monitor in the case of emergency

## Block Diagram



Fig 1: *Block Diagram of Electronic Glove Components*

## Components Used

For implementing the Electronic Glove, there is a need of essential components that are suitable to detect health problems. The components used generally include temperature sensor LM-35, blood pressure sensor, heartbeat sensor, ECG sensor, Arduino and GSM module

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* + Temperature Sensor(LM35)

The LM35 series are integrated circuit temperature devices with an output voltage linearly proportional to the temperature in centigrade. An IC sensor is used to measure temperature with an output voltage linearly proportional to the Centigrade temperature. This device is rated to operate over a -55C to +150C temperature range. This sensor has an advantage over linear temperature sensor, as there is no conversion of kelvin to centigrade.

Table – 2: Classification of temperature range

|  |  |
| --- | --- |
| Category | Temperature Range (C) |
| Hypothermia | < 35.0 |
| Normal | 36.5 – 37.5 |
| Hyperthermia | > 37.5 – 38.3 |
| Stage 1 hypothermia | 35-36 |
| Stage 2 hypothermia | 34-33 |
| Stage 3 hypothermia | 32 |
| Hyperpyrexia | >= 40.0 -41.5 |

* + Blood pressure sensor

This sensor measures the human blood pressure. It also measures the systolic and diastolic pressure. This sensor records the pulse rate. It is more accurate than the sphygmomanometer (instrument attached to inflatable air bladder cuff and used with a stethoscope for measuring blood pressure in an artery). In simple word, blood pressure sensors measure the pressure of blood against blood vessels walls or arteries.

Table – 3: Classification of blood pressure.

|  |  |
| --- | --- |
| Category | Systolic/diastolic pressure(mmHg) |
| Hypotension | < 90/60 |
| Desired (normal) | 90-119 / 60-79 |
| Prehypertension | 120-139/80-89 |
| Stage 1 hypertension | 140-159/90-99 |
| Stage 2 hypertension | 160-179/100-109 |
| Hypertensive | >= 180/>=110 |

* + Heart Rate Sensor

Pulse sensor is designed to give analog output of heartbeat. It starts operating when a finger is placed

on the sensor. To see the result, output pin of sensor is connected to the controller. This sensor uses the principle of light modulation by blood flow, which is through the nerves.

Table – 4: Classification of heart rate.

|  |  |
| --- | --- |
| Age | Average Heart Rate |
| Newborn | 140 |
| 7 years | 85-90 |
| 14 years | 80-85 |
| Adult | 70-75 |

* + Arduino

Arduino is the core of the system. It collects the data of the different sensors interfaced to it. It communicates such a data to the cloud server for further processing or for retrieving the information. A, single board microcontroller that is powered through a Li-Ion battery in our front-end nodes.

* + LCD

Liquid Crystal Display is an electronic display segment, which uses liquid crystal to produce a visible image. The 16×2 translates a display 16 characters per line in two such lines. Here each character is presented in a 5×7 pixel matrix. There are two registers in the LCD and they are Command and Data. The command register is used to store the command instructions given to the LCD. The data register is used to store the data that will be displayed on the LCD.

* + GSM

Global System for Mobile communication (GSM) is a digital mobile network. It operates at a range of 900MHz to 1800MHz frequency band. Connect your arduino to cell phone network with the arduino GSM shield. The data can be transferred through SMS, calls or TCP and UDP Sockets and it can in turn send the information to the internet.

# III. Conclusion

Our aim is to develop a wearable device that is accurate and efficient. The working is simple hence no complexity involved. The device will be useful to measure various parameters of human body and hence can verify the normal functioning of the body. After the completion of the work, it can be upgraded by embedding more sensors ad adding more functionality.

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