

# Multi Parametric Healthcare System (MHS)

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## Abstract:

This paper deals with remote detecting proficiency which would accurately examine human anatomy parameters is utilized in practicing medical science. The system produce regular checking of patient's metabolic parameters and disease diagnosis using the parametric values obtained. Most of the current systems used for supervising human body parameter need electrifying which restrict the actual action. To get better of this limitation, a wearable wireless sensor network using Galvanic Skin Response sensor have been progressed for monitoring physiological human body parameters. The wireless characteristic allows the unshackled movement of the human body as denied by the wired monitoring device and makes the device truly portable, fast and reliable. The lightweight and compact size of the sensor node makes it easy attachment to the human anatomy. The expected work has thus accepted the health at home.

**Keywords:** Wireless Sensor Network, Galvanic Skin Response sensor, NodeMCU Microcontroller.

## 1 INTRODUCTION

"Prevention is better than cure". Health care of each and every individual person is important now-a-days. It can be maintained and improved by prevention, diagnosis, treatment, other physical and mental impairments. Health is a constant change in action that needs to be constantly examined. Health category facing diverse hospital admission issues due to high rate of patient admission to hospital. Health care system should provide the services to achieve best possible outcomes of target population who are in need of health related services. It includes three types of care- primary, secondary and tertiary care. Most of the people are died due to later prediction of disease or by wrong medical reports. The medical reports should be in a correct manner in order to predict the diseases by the doctors. In 2017, a study by Harvard University shows that nearly 5,00,000 deaths occurs in India annually due to medical errors. Those medical errors are due to lack of practical knowledge among the doctors and the nurses to handle the patients. Those errors are also occurs due to the improper diagnosis and wrong medication applied to the patients.

In proposed work, the system generates proper

observation of patient's metabolic parameters and disease detection using the parametric values obtained. The submitted work has thus establish the health at home platform. This system includes the progress of multi parameter health examining device on GSR. The infection diagnosis procedure utilizes the metabolic status of the person's body to find out certain illness. The device is programmed in GSR environment using an array of sensors and spotlights on mentoring the common ill status of the patient and early detection of infection. The diagnosed diseases are mainly Hyperthermia, Dysautonomia, etc. The disease is curable if detected early enough.

## 2. WORKING PROCEDURE

Galvanic skin response is a system for observing the electrical conductance of the skin. It mirrors human emotional activity. The skin's electrical conductivity increases when the person is stressed that promotes the secretion of sweat. The sweat which is responsible for the electrical conductivity of the skin is produced if the person is emotionally unstable. When the electrodes of GSR in contact with the person, it detects the instability in his behavior. It is a scrutiny for

developing sentiment based projects like sleep quality monitor. The motive of this sensor is to observe the skin conductance and its variation by using Ohm's law ( $\text{Voltage} = \text{Intensity} \times \text{Resistance}$  = Intensity/Conductance). As the voltage (V) is kept constant, skin conductance (C) can be computed by examine the current (I) flow through the electrodes. NodeMCU is a board designs are available which is open source firmware with wi-fi development module for project development. The progress board equipped with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor which works at 80 to 160 MHz adjustable clock frequency and supports RTOS. It consists of 128 KB RAM and 4MB of Flash memory (for program and data storage) that survives with large strings that fabricates in web pages, JSON/XML data. A Convolutional Neural Network(CNN) is a Deep Learning algorithm that works by obtaining graphical input from the user ( images) and process it with the algorithm



Fig. 2. NodeMCU Microcontroller

or condition fed by the developer and the results are produced. The input image is processed and classified based on the conditions. The CNN algorithm needs lesser pre-processing when compared to other classification algorithms. In primary methods filters are hand-crafted with enough training, while ConvNets has the ability to learn these filters/characteristics. For image classification problems CNN is the most desired neural network model because of its high accuracy. The CNN go along with a hierarchical model which process on building a network, and finally produces a fully-connected layer as an output that can be further processed. CNN is an efficient acceptance algorithm that is commonly applied in pattern recognition and image processing. CNN has many specifications like light architecture, less training parameters and versatility.

Fig. 3. Block Diagram

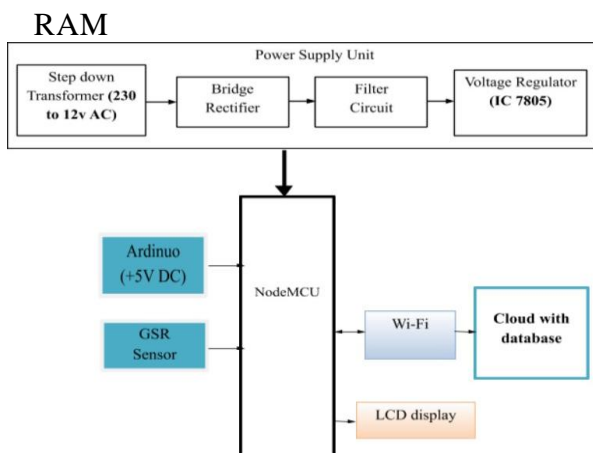


Fig. 1. GSR SENSOR.

## I. WORKING

The various factors that affect the person's health are stress, sleep, food diet. The symptoms of any diseased person can be identified from his external appearance through nails, hairs, acne, etc., Each disease exhibit different symptoms that can be encountered and cured. In this system, we provide analysis report by considering necessary parameters. The system is programmed to detect the diseases such as Anemia, diabetes, Malaria, dengue and Tuberculosis. The symptoms of these diseases are fed as input in form of image (affected person).

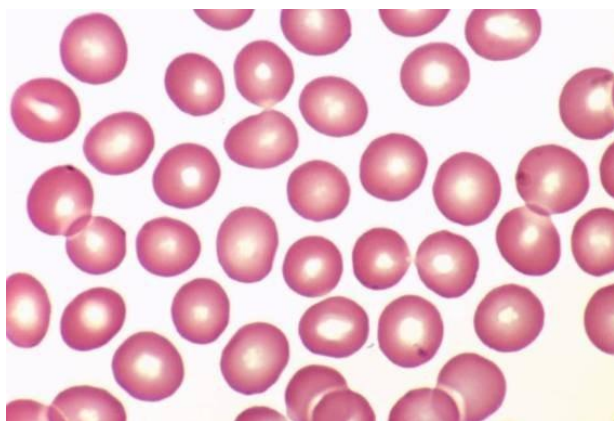


Fig. 4. Normal blood cells

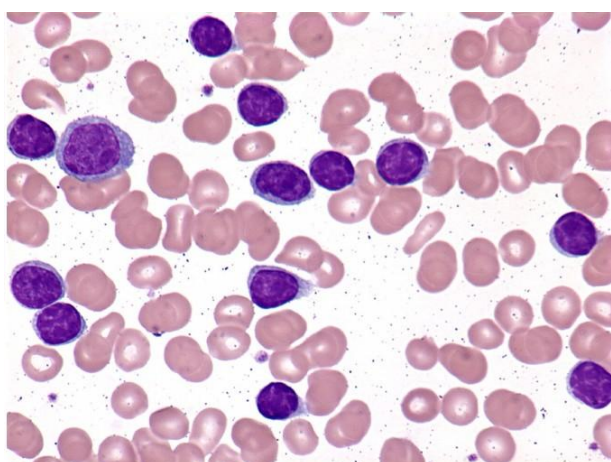


Fig. 5. Infected blood cells

and the standard dataset of a normal person is compared. If the red blood cell count of the person is below 12gram/100 ml then the anemia is positive for that particular person.

## II. PROTOTYPE

1) First Module: The real time input such as stress, pain and heartbeat is obtained with galvanic skin sensor and the different values are segregated by the code programmed in the NodeMCU microcontroller and the result are stored in cloud.

2) Second Module: The combined input that includes GSR values and the microscopic image is compared with the standard datasets in the cloud storage using CNN algorithm and the report of the patient is produced as the output. 3) Third Module: The report is analyzed by the experts and the individual are provided with their corresponding reports. The web interface is created for the expert's analysis of a particular locality and also examines

The algorithm is coded for comparing the image of the patient with the standard image (normal person) to detect whether the person is affected with any disease or not. The particulars such as microscopic test and real time value observed by the GSR sensor of the patient are obtained for comparison. The output of the algorithm is stored in the cloud environment that can be accessed by experts and corresponding patient. While considering anemia, the affected person is identified by the examining red blood cells count from his microscopic image

individuals.

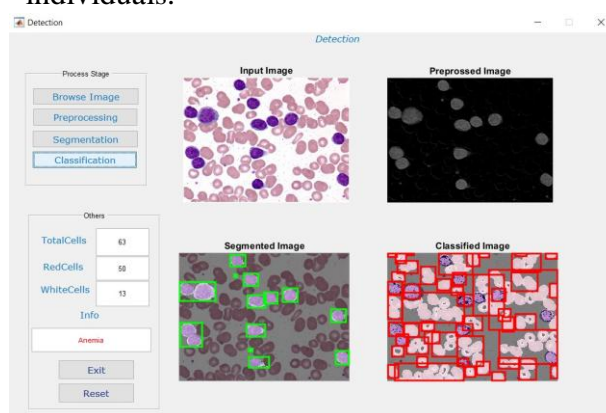


Fig. 6.

## III. ADVANTAGES

With help of this system, the diseases that spread in a particular locality during a season or a yearly report can be generated and preventive measures are provided for those people in locality. The particular person is benefited with his report and he can take further measures at earlier stage.

## IV. FUTURE ENHANCEMENTS

Full relocation on android is possible. This system can also be developed by using GSM and GPRS technology.

## V. CONCLUSION

The system provides design and implementation of Multi- Parametric Healthcare System. The website interface is associated with the monitoring system to get data of different sensors. It examines minimum set of metabolic parameters for detection of maximum diseases.

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