IOT based Patient Health Monitoring System to Remote Doctors using Embedded Technology

Rashmi I R
Department of Electronics and Communication Engineering
NIE Institute of Technology, Mysuru-570018, India

Sahana M K
Department of Electronics and Communication Engineering
NIEInstituteofTechnology, Mysuru-570018, India

Sangeetha R
Department of Electronics and Communication Engineering
NIEInstituteofTechnology,Mysuru-570018,India

Shruthi K S
Assistant Professor
Department of Electronics and communication Engineering
IE InstituteofTechnology,Mysuru-570018,India

Abstract—**Internet of Things (IoT) is the emerging paradigm, which contains huge amount of smart object and smart devices connected to the internet for communicating with each other. These smart devices are used to collect temperature, blood pressure, sugar level etc., which are used to evaluate the health condition of the patient. IoT devices are used in many fields which make the users' day to day life more comfortable. Communicating the collected information to the doctor, making accurate decision on the data collected and notifying the patient is the challenging task in the IoT. In this paper, the architecture of the Patient Health Monitoring System (PHMS) using IoT devices is proposed to collect the required parameters and evaluate the data obtained from the IoT devices. PHMS also notifies the patient with possible precautionary measures to be practiced by them. This system suggests the patient with medical care and next step to be followed in case of critical situation. The PHMS system is evaluated for certain parameters and the decisions made on the data obtained from the source are assumed to evaluate the system. The proposed system is designed for heart rate, Respiratory rate, kidney stone and kidney failure detection.**

Keywords—AVR Microcontroller, Sensors, Arduino software, IOT in healthcare and Embedded systems.

I. INTRODUCTION

In case of emergency and dangerous situations we have to alert the doctor immediately. For this we are using a IoT based network for doctor to patient communication in the hospital and even to communicate and indicate the status of the patient through SMS. This way of communication is actually done with IoT network topology and with the Bluetooth or Wi-Fi network. Each patient will be given this module and with the help of this module the patient health condition is monitored and if there is any change in the condition of the health then immediately sends that changed

Data through Bluetooth Wi-Fi network to the local system. The heart beat is monitored with the pulse rate of the body. The high intensity light sensor senses the expansion andcontraction of the heart with the help of the nerves. That beamwill transmit the signal to the receiver and the minute change in the pulse is noticed as the heart beat. If there is any change in the pulses then it is noticed as the change in the heart and then the controller will get a disturbed pulse count which indicates the fault or malfunction of the heart. The controller is fixed for a no. of pulses initially. If there is any change in the any of the pulse count then it onsiders as a malfunction of the heart and then it transmits the pulse count with the patients ID to the doctor in the hospital and at the same to it sends a sms to a fixed number in the microcontroller.

IoT

The Internet of things is the internetworking of physical devices, e-health monitor, vehicles, buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society." The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer- based or smart phone based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

II. METHODOLOGY

It consists of two sections Heart rate and Respiratory Monitoring and Kidney status detection.

Special Issue - 2020

International Journal of Engineering Research & Technology (IJERT)
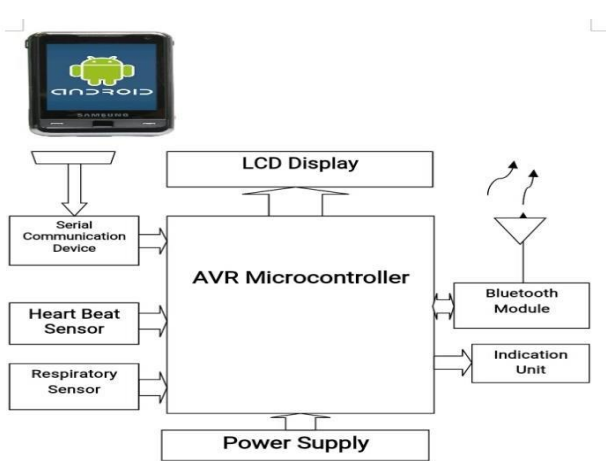**ISSN: 2278-0181**
NCCDS - 2020 Conference Proceedings

Figure1: Block Diagram

Kidney status detection Section:

In Iris Image Analysis method kidney status is detected. The main idea is to combine IRIDOLOGY and Image processing with its scientific reasons to open up a new research field and healthcare diagnostic technique. Implementing this method practically requires special image processing where iris feature extraction plays a crucial role. Input iris image is taken as input and given it to pre-processing stage where image quality is enhancing with basic conversion. Pre-processed iris image is extracted and segmented. HMM recognition method is used to detect kidney stone and kidney failure. Matlab image processing tool box is used to implement this project.
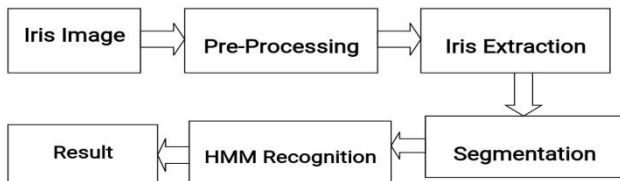

Figure 2: Block diagram of Kidney Status detection
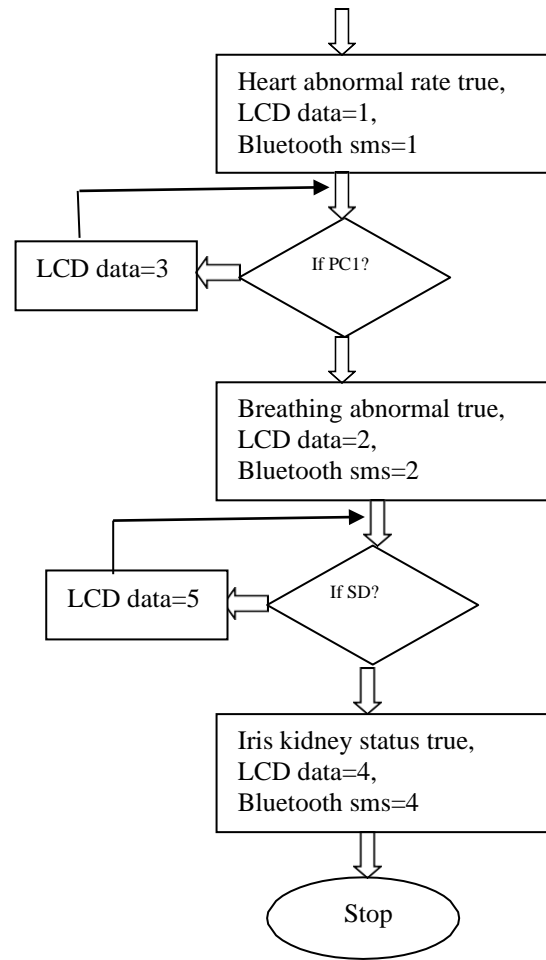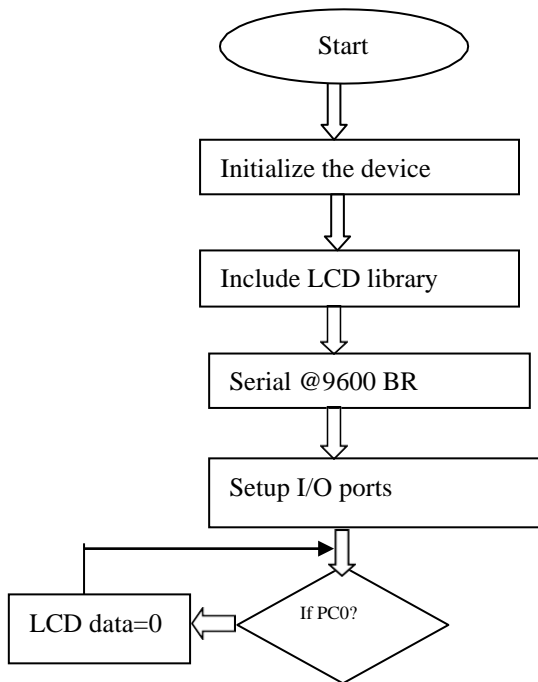
III. ALGORITHM OF THE PROPOSED SYSTEM

Figure3: Flowchart

Notes:
PC0: Heart beat sensor
PC1: Respiratory sensor
SD: Serial Data

IV. HARDWARE SPECIFICATION

➤Heart beat sensor: Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

➤Respiratory sensor: The Respiration Sensor is used to monitor abdominal or thoracical breathing, in biofeedback applications such as stress management and relaxation training. The Respiration Sensor is usually placed in the abdominal area, with the central part of the sensor just above the navel. The sensor should be placed tight enough to prevent loss of tension. A person's respiratory rate is the number of breaths you take per minute. The normal respiration rate for an adult at rest is 12 to 20 breaths per minute. A respiration rate under 12 or over 25 breaths per minute while resting is considered abnormal.

➢AVR Microcontroller: The Atmel®AVR® ATmega328 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1MIPS per MHz, allowing the system designer to optimize power consumption versus processing speed.

➢LCD Display: A liquid crystal display is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power.

➢**Bluetooth:** Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

➢Serial Communication device: Serial communication is common method of transmitting data between a computer and a peripheral device such as a programmable instrument or even another computer. Serial communication transmits data one bit at a time, sequentially, over a single communication line to a receiver. Serial is also a most popular communication protocol that is used by many devices for instrumentation; numerous GPIB-compatible devices also come with an RS-232 based port. This method is used when data transfer rates are very low or the data must be transferred over long distances.

V. SOFTWARE SPECIFICATION

➢ MATLAB: MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

➢ Arduino software: Arduino is a tool for making computers that can sense and control more of the physical world than our desktop computers. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors and controlling a variety of lights, motors and other physical outputs.

➢ Embedded C: Embedded C is a set of language extensions for the C programming language by the C standards committee to address commonality issues that exist between C extensions foe different embedded systems. The C language allows a range of programming styles from high-level application code down to direct low-level manipulation of hardware registers. As a result C has become the most popular programming language for embedded systems today.

VI.RESULT

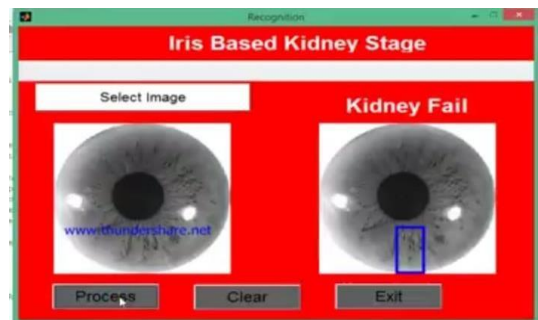Figure 4: Results shows on LCD

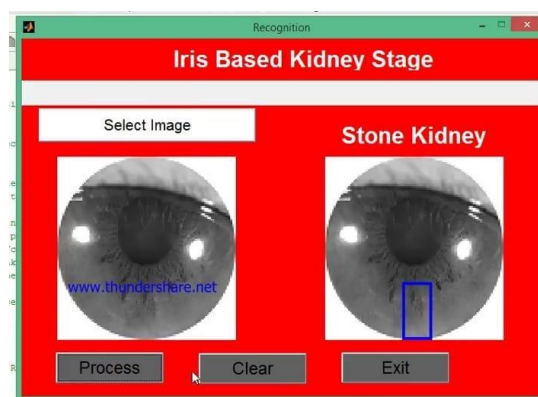Figure5: Iris based Kidney Fail

Figure 6: Iris based Kidney Stone

VII. CONCLUSION

IoT based patient monitoring system for remote doctor will design and demonstrate with AVR Microcontroller. This AVR is reprogrammable so that we can modify the program when we add more features related to E-Health Monitoring System. Iris methodology based kidney status is designed and demonstrated.

Special Issue - 2020

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
NCCDS - 2020 Conference Proceedings

ACKNOWLEDGEMENT

REFERENCES

[1] M. Gupta and H. Qudsi, "Low-Cost, Thermistor Based Respiration Monitor" in Bioengineering Conference (NEBEC), 2013 39th Annual Northeast.

[2] ECE 476 Final Design Project: Polygraph. Retrieved from 'https://courses.cit.cornell.edu/ee476/FinalProjects/s2007/jsc59 _ecl37/jsc59_ecl37/report2.html'.

[3] Heat Sensor Using LM359 IC. Retrieved from 'http://www.circuitdiagram.org/heat-sensor-using-lm358- ic.html'.

[4] Dr. Farida Sharan, School Of Natural Medicine, "Iridology" internet excerpt at www.purehealth.com

[5] Harri Wolf, Simon A, Worthen DM, Mitas JA, "Detecting Kidney Disease - JAMA and Rebuttal," Source JAMA, Vol. 242, No.13, pp.1385-9, 1979.

[6] Knipschild P, "Looking for gall bladder disease in the patient's iris," Source BMJ, Vol. 297, pp.1578-81, 1988.

[7] Daugman G," How Iris Recognition Works" IEEE Transaction on Circuits and System for Video Technology, Vol .14, No. I, pp. 21- 30, 2004.

[8] S.Sanderson, J.Erbetta, "Authentication for secure environments based on iris scanning technology," IEE Colloquium on Visual Biometrics, 2000.

[9] R. Wildes, "Iris recognition: an emerging biometric technology," Proceedings of the IEEE, Vol. 85, No. 9, 1997.

[10] S. M. Riazul Islam, Daehan Kwak, MD. Humaun Kabir, "The Internet of Things for Health Care: A Comprehensive Survey", Date of publication June 1, 2015, DOI 10.1109/ACCESS.2015.2437951.