International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 02 | Feb-2018 www.irjet.net p-ISSN: 2395-0072

Smart wearable health monitoring system for diagnosing diseases in patients

S.S. Abarna[1], D. Renija[2], S. Saffana Parveen[3], S. Saradha Preetha[4]

[1]Assistant professor, Department of ECE, Jeppiaar SRR college, Tamil Nadu, India
[2,3,4]Student, Department of ECE, Jeppiaar SRR college, Tamil Nadu, India

---

Abstract - *Technology plays the major role in healthcare not only for sensor devices but also used in communication, recording and display devices. It is very important to monitor various medical parameters. Hence the latest trend in Healthcare communication method IoT is adapted. Internet of things serves as a catalyst for the healthcare and plays prominent role in wide range of healthcare applications. In this project the ATMEGA328 microcontroller is used as a gateway to communicate to the various sensors such as temperature sensor, blood pressure sensor, MEMS sensor and pulse sensor. The microcontroller picks up the sensor data and sends it to the network through Wi-Fi and hence provides real time monitoring of health care parameters . The data can be accessed anytime by the doctor. The security issue is been addressed by transmitting the data through the password protected Wi-Fi module ESP8266 which will be encrypted by standard AES128 and the users/doctor can access the data by logging to the html webpage. Hence quick provisional medication can be easily done by this system. This system is very efficient with low power consumption capability, easy setup, high performance and time to time response*

Key Words*: *ATMEGA328 , IoT, Pulse Sensor ,temperature sensor, MEMS accelerometer, blood pressure sensor, Wi-Fi module,

1. INTRODUCTION

Today Internet has become one of the important part of our daily life. The new mega trend of Internet is Internet of Things (IoT). The IoT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring.

Health is one of the global challenges for humanity . According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. A modernized healthcare system should provide better healthcare services to people at any time and from anywhere in an economic and patient friendly manner. Currently, the healthcare system is undergoing a cultural shift from a traditional approach to a modernized patient centered approach. In the traditional approach the healthcare professionals play the major role. They need to visit the patients for necessary diagnosis and advising.

There are two basic problems associated with this approach. Firstly, the healthcare professionals must be on site of the patient all the time and secondly, the patient remains admitted in a hospital, wired to bedside biomedical instruments, for a period of time. In order to solve these two problems the patient oriented approach has been conceived. The key element of this second approach is a reliable and readily available patient monitoring system (PMS).

1.1 Internet of Things

Internet of things is used for exchanging data about the health parameters. Internet of things is the network of physical devices, embedded with sensors, actuators, and network connectivity which enables these objects to connect and exchange data.

The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

Fig-1: IoT

1.2 Arduino ATMEGA328 Microcontroller

Arduino is an open-source electronics prototyping platform.The Arduino Uno can be programmed with the Arduino software IDE.

The Atmega328 on the Arduino Uno comes preburned with a Bootloader that allows you to upload new code to it without the use of an external hardware programmer. We can also bypass the Bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header. Arduino IDE works on windows , linux as well as Mac lion X platforms

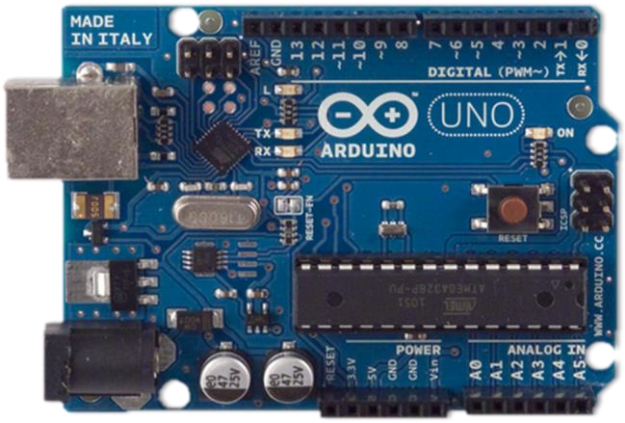
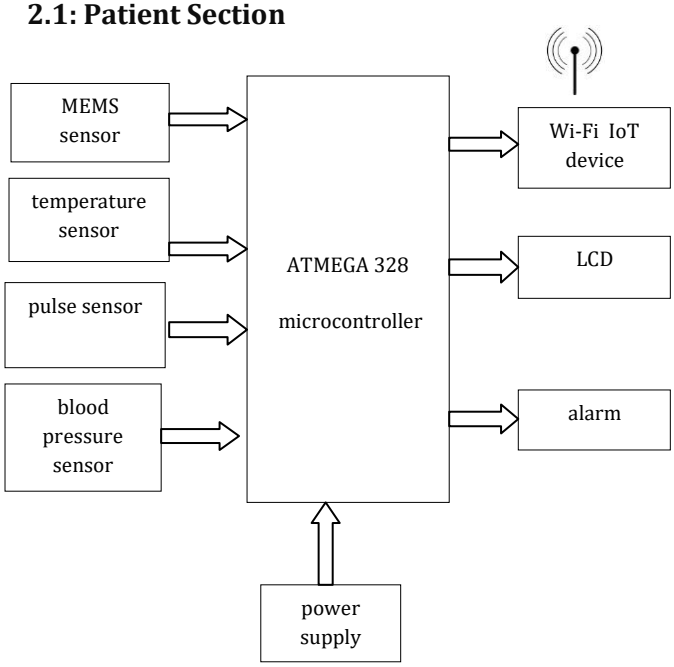


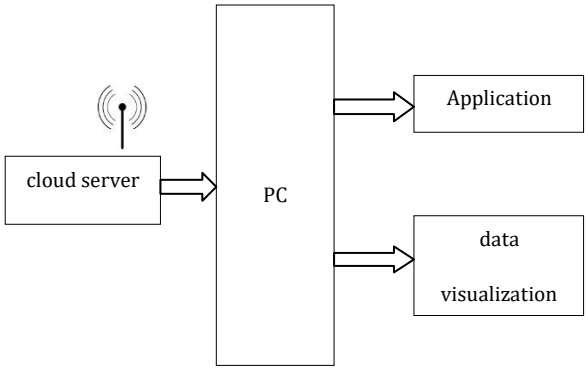
Fig -2: Arduino processor

2. BLOCK DIAGRAM

2.1: Patient Section



2.2:Doctor Section



3. SENSORS

In this project, we are going to use four sensors. They are explained below

3.1 Pulse Sensor

Pulse sensor is used to measure the heart beat rate.The Pulse Sensor Amped is a plug-and-play heart-rate sensor for Arduino. It essentially combines a simple optical heart rate sensor with amplification and noise cancellation circuitry making it fast and easy to get reliable pulse readings

Fig -3: ADBS 9008 pulse sensor

3.1.1 Schematic Diagram of Pulse Sensor

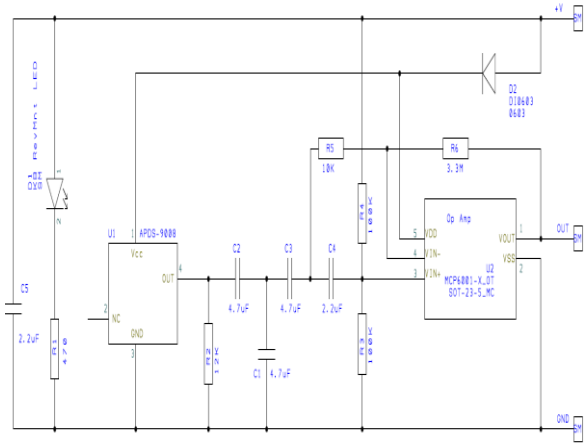


Fig-4: Pulse sensor Schematic diagram

3.2 Temperature sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in ^{o}C).

The LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

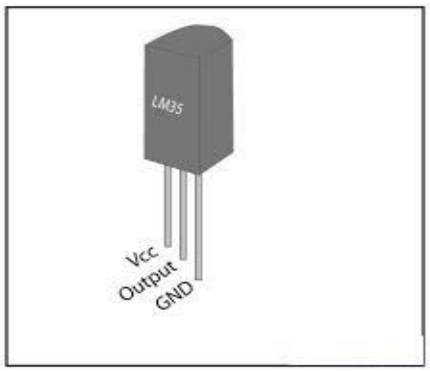


Fig-5: LM35 Temperature sensor

3.2.1.Interfacing Temperature sensors and LCD with Arduino

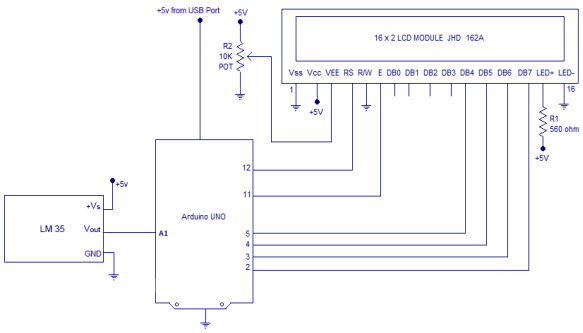


Fig-6: Temperature sensor and LCD interfacing

3.3 MEMS Acclerometer

Mems sensor is a triple axis accelerometer. Triple axis in the sense that it can measure acceleration along three axes viz x, y and z. The measured values appear as change in voltage at three output pins with respect to a common ground.

The sensor measures acceleration with the help of a layer of polysilicon suspended above silicon wafer with the help of polysilicon springs. The motion of this mass is translated into the motion of the plates of a differential capacitor and thereby providing an output proportional to acceleration

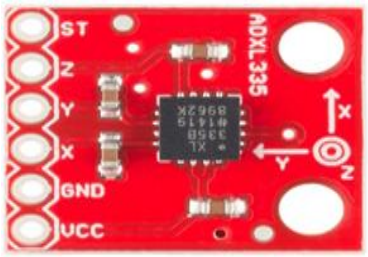


Fig -7: ADXL335 MEMS Accelerometer

3.3.1 Schematic Diagram of MEMS Sensor

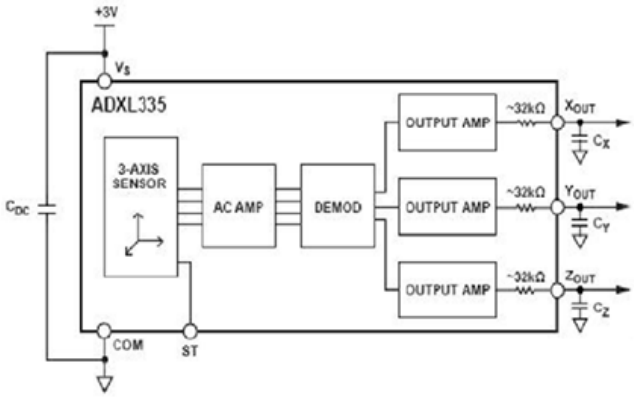


Fig-8:MEMS Sensor Schematic Diagram

3.4 BLOOD PRESSURE SENSOR

Blood pressure sensor is used to measure the blood pressure of the patient.Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart. When your heart beats, it contracts and pushes blood through the arteries to the rest of your body.

The most suitable and feasible solution for building a prototype is to use the Blood Pressure Sensor (Sphygmo-manometer) The Blood Pressure Sensor has been designed for auto-matic measurements of systolic, diastolic blood pressures with time and date. Sensor has a large LCD screen with LED backlight, also a touch pad key is attached to the blood pressure sensor. Blood Pressure Sensor is designed as fully compatible with Arduino board.

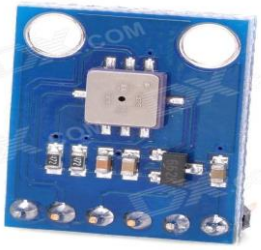


Fig-9: MP3V5050 Blood Pressure Sensor

4.ESP8266 Wi-Fi MODULE

ESP8266 is an single-chip device capable of connecting to Wi-Fi.

4.1 CPU

- 32 bit
- 26MHz-52MHz
- 64KB instruction RAM,96KB data RAM

4.2 Wi-F

- 802.11b/g/n
- Access point or node

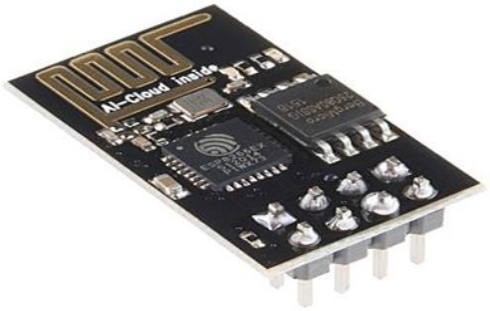


Fig-10:ESP8266 Wi-Fi Module

4. HARDWARE INTERFACING

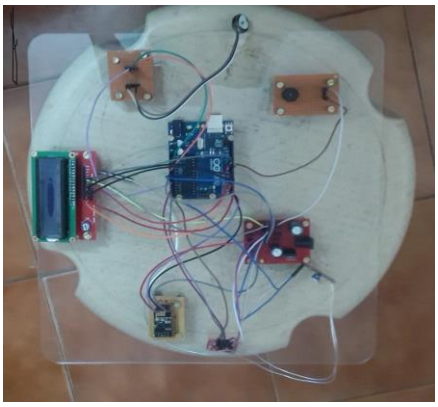


Fig-11: Hardware Interfacing

CONCLUSION

By this project it is observed that with the combination of electronic sensing internet of things, the medical services can be improved significantly by continuously monitoring the patients, consolidating reports and alerting concerned doctors in case of emergencies.

REFERNCES

[1] Alexis Bell, Paul Rogers, Chris Farnell, Brett Sparkman and Scott C.Smith, "Wireless Patient Monitoring System," Health innovations and point-of-Care Technologies conference seattle, Washington, USA, Vol.37,No.3,October. 2016.

[2] Shyr-Kuen chen, Tsair Kao, Chia-Tai Chan, Chih-Ning Huang, Chih-yen Chiang, Chin-Yu Lai, Tse-Hua Tung, and Pi-Chung Wang "A Reliable Transmission Protocol for ZigBee-Based Wireless Patient Monitoring," IEEE Transaction on Information Technology in Bio Medicine, Vol.16, No.1, January.2015.

[3]U.Varshney,"Improving wireless Health Monitoring Using incentive-Based Router Cooperation," Computer, vol.41, pp.56-62, May, 2013.

[4] U.Varshney and S.Sneha, "Patient Monitoring using ad hoc wireless networks: Reliability and power management," IEEE commun. Mag.,Vol.44, no.4, pp.49-55, Apr. 2011.

[5] C.-N.Huang, G.-C. Chen, C.-Y. Chiang, J.-S. Chang, S.J.Hsu, W.-C.Chu, and C.-T.Chan, "Fall detection system for healthcare quality improvement in residential care facilities," J.Med.Biol. Eng., Vol.30, no.4, pp.247-252, 2010.

[6] M.M.Baig and H. Gholam Hosseini, "Wireless remote patient monitoring in older adults," in Engineering in Medicine and Biology Society (EMBC), 2013 35th Annual International conference of the IEEE, 2013, pp.2429-2432.

[7] M.M.Baig and H.Gholam Hosseini, " A remote monitoring system with early diagnosis of hypertension and hypotension," in Point-of-Care Healthcare Technologies(PHT), 2013 IEEE, DOI:10.1109/pht.2013.646178, 2013, pp.34-37.

[8] R. Steele, A. Lo, C.secombe, and Y.K. Wong, "Elderly persons perception and acceptance of using wireless sensor networks to assist healthcare," International Journal of medical Informatics, Vol.78(12), pp.788-801, 2009.

[9] P.Kullkarni and Y.Ozturk, "mPHASIS: Mobile patient healthcare and sensor information system," Journal of Network and Computer Applications, Vol.34(1), pp. 402-417, 2011.