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Doctors Assistive System using Augmented Reality for Critical Analysis

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***Abstract*: AR is an artificial information that allows the user to perform tasks more efficiently. In this project, a system which provides an important information for the doctors are displayed on semi-transparent glasses included in an AR glass and therefore are mixed with the real-world view. The real-time data of patients in hospital are collected by the sensors attached to patient. The measured sensor values are given as input to the "Arduino UNO "and the values are processed. The wireless transceiver receives and displays the body parameters in augmented reality glass through "ZigBee" and alert if abnormal condition occurs. The doctor can take appropriate action based on the patient's current health condition.**

***Keywords*: Augmented Reality, Arduino UNO, Wireless Transceiver, ZigBee, AR glass**

1. Introduction

Surgeons are regularly on the lookout for technologies that will enhance their operating environment. They are often the early adopters of technologies that allow their field to offer a better surgical and patient experience. The continuing enhancement of the surgical environment in the digital age has led to a number of innovations being highlighted as potential disruptive technologies in the surgical workplace. Augmented reality (AR) are rapidly becoming increasingly available, accessible and importantly affordable, hence their application into healthcare to enhance the medical use of data is certain. Whether it relates to anatomy, intraoperative surgery, or post-operative rehabilitation, applications are already being investigated for their role in the surgeons. AR is the addition of artificial information to one or more of the senses that allows the user to perform tasks more efficiently.

2. Hardware

A. Arduino UNO

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. 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 electronic, chemical, mechanical, and biological system. The Arduino software runs on Windows, Macintosh OSX, and Linux systems. Most microcontroller systems are limited to Windows operating. Arduino simplifies the process of working with microcontrollers,

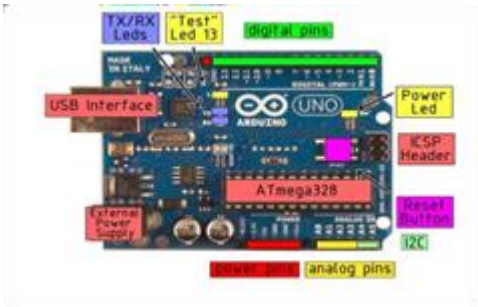

Fig.1. Arduino board

and offers great advantage for teachers, students, and interested amateurs. The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. The Arduino is based on Atmel's ATMEGA8 and ATMEGA168 microcontrollers. The plans for the modules are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.

B. Temperature sensor

Temperature is the most often-measured environmental quantity since most ph. s are affected by temperature. Certain chemical reactions, biological processes, and even electronic circuits perform best within limited temperature ranges. Temperature sensing can be done either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead. An example for a temperature sensor is LM35. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius temperature. The LM35 operates at -55˚ to +120˚C. The LM35 can be connected easily

in the same way as other integrated circuit temperature sensors. It can be established to a surface and its temperature will be within around the range of 0.01˚C of the surface temperature

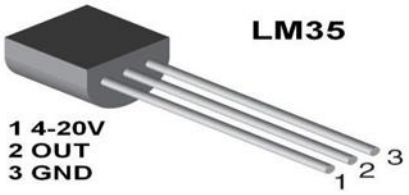

Fig. 2. LM35 sensor

This presumes that the ambient air temperature is just about the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature.

C. Heartbeat sensor

The heartbeat sensor is based on the principle of photo plethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

D. Respiratory sensor

Respiratory Sensor includes a sensitive and repeatable girth sensor using an easy fitting high durability latex rubber band fixed with self-adhering belt for monitoring respiration rate, waveform and amplitude. It can be worn either thoracic ally or abdominally, over clothing. A Respiratory sensor is usually a pressure sensor which acts as a transducer; it generates a signal as a function of the pressure imposed (such a signal is electrical). Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude.

E. Zigbee IEEE 802.15.4

ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless M2M networks. The ZigBee standard operates on the IEEE 802.15.4 physical radio specification and operates in unlicensed bands including 2.4 GHz, 900 MHz and 868 MHz. Though its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics, ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking. ZigBee has a defined rate of 250 Kbit/s, best suited for intermittent data transmissions from a sensor or input device. The technology defined by the ZigBee specification is intended to be simpler than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi.

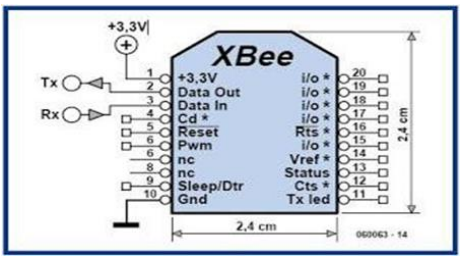

Fig. 3. ZigBee

3. Software

A. Embedded C

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. This system uses Embedded System to combine the hardware and software used to achieve monitoring of body parameters. Embedded systems are computer systems that monitor, respond to, or control an external environment that are International Journal of Research in Engineering, Science and Management connected to systems through sensors, actuators and other I/O interfaces.

B. Arduino IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, mac OS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board. The Arduino IDE supports the languages C and C++ using special rules of code structuring.

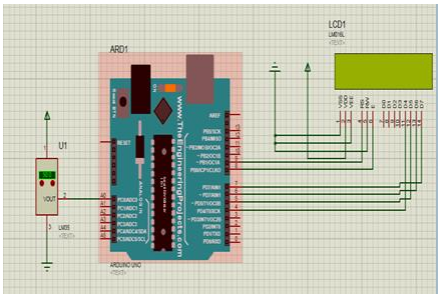

Fig. 4. Arduino IDE

4. Methodology

Body parameters like heartbeat, temperature and pressure are measured using the sensors. The analog outputs from the sensors are given as inputs to the Arduino UNO microcontroller and processed.

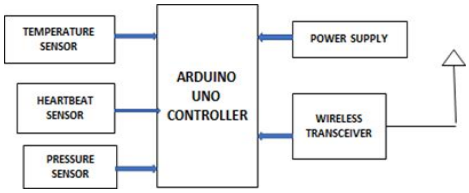

Fig. 5. Block diagram

The processed digital outputs are transmitted to the wireless transceiver through ZigBee protocol using Arduino proteus software. The receiver section consists of a 9V battery powered VR glass, adjusting mirror and the ZigBee receiver. Now the VR reality ray falls on the adjusting mirror and reflects on the OLED. The output is displayed on the wearable glass using augmented technology.

5. Conclusion

In this project, the real-time data of patients in hospital are collected by the sensors attached to patients, once the sensor measures the values they are processed in the Arduino UNO microcontroller. The digital outputs are sent to doctors augmented reality glass through wireless communication and alert if abnormal condition occurs. The doctor can take appropriate action based on the patient's current health condition.

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References

[1] Filip Malawski, AGH University, "Driver Assistance System Using Augmented Reality Headset," IEEE Transactions on Electronics and Telecommunications, vol. 3, pp. 978-1-5386, 2018.
[2] Nianchenn Deng, Yanqing Zhou, Jiannan Ye, Xubo Yang, "A Calibration Method for On-Vehicle AR-HUD System Using Mixed Reality Glasses," IEEE Conference on Virtual Reality and 3D user interfaces, vol 6, pp. 978-1-3365, 2018.
[3] Y. Xu, D. Xu, S. Lin, T. X. Han, X. Cao, and X. Li, "Detection of sudden pedestrian crossings for driving assistance systems," IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics), vol. 42, no. 3, pp. 729–739, 2012.
[4] Q. Liu, J. Zhuang, and J. Ma, "Robust and fast pedestrian detection method for far-infrared automotive driving assistance systems," Infrared Physics & Technology, vol. 60, pp. 288– 299, 2013.
[5] S. P. Narote, P. N. Bhujbal, A. S. Narote, and D. M. Dhane, "A review of recent advances in lane detection and departure warning system," Pattern Recognition, vol. 73, pp. 216–234, 2018.