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# Wireless Augmented Visualisation Module Using Semi-Transparent Glasses

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**ABSTRACT**: Augmented Reality (AR) is the addition of artificial information to one or more of the senses than the user can perform the task accurately. AR is becoming increasingly at low cost. In medical environment, the doctors has to know the details of the patients they treat such as blood pressure, body temperature and pulse rate of the general ward patient's in order to treat them. Many physical equipment are available in attaining such information. But they all need some time to acquire results. In this project, we propose a system for the medical specialists that display the mentioned details on semi-transparent glasses (goggles). 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 often a better surgical and patient experience. We propose a system in which important information for the doctors are displayed on semi-transparent glasses which are mixed with real world view.

**KEYWORDS:** Augmented Reality, Semi transparent glasses, Respiratory sensor, Heart rate sensor

## I. INTRODUCTION

A new technology that superimpose a computer generated image on a user's view of the real world by prevailing a great thought. Augmented Reality (AR) interface has been used for varied tasks, and have shown a great promise for increasing users, performance compared to traditional. They provide a better understanding of spatial relations. Augmented reality is the technology that expands our physical world, adding layers of digital information one it. AR appears in direct view of an existing environment and adds sounds, videos, and graphics to it. AR can be displayed on various devices: screens, glasses, handheld devices, mobile head-mounted displays. It involves technologies like S.L.A.M. (simultaneous localization phones, and mapping), depth tracking (briefly, a sensor data calculating the distance to the objects). AR plays a vital role in future of medicine.

AR can help doctors access the latest and most relevant information about their patients. Augmented reality can be beneficial for healthcare professionals in two ways in the aspect of education and training, and in the in the aspect of diagnostics and treatment providing access to real-time patient data. We use augmented reality to visualize the basic medical report of the patients. The paper is organized in the following structure section 2 related work for augment reality, section 3 demonstrates the various sensors connected to the arduino, section 4 various sensor collect the information and then transmit to the goggles through the zigbee transmitter. Finally conclusion and future work and reference.

Augmented Reality browsers enrich your camera display with contextual information. For example, you can point your smartphone at a building to display its history or estimated value. The last way that Augmented Reality is generally experienced is through gaming, creating immersive gaming experiences that utilize your actual surroundings. Imagine shooting games with zombies through mobile device like smartphones and tables, Augmented Reality acts like a magic window; through the viewer you can see holograms and manipulate 3D models. Hundreds of Augments Reality apps are available on iphone, ipad, and Android. On PC and connected TV players, Augmented Reality works through a webcam and relayed through the screen. This can be quite cumbersome when you have to manipulate a tracker in front of your screen. On head mounted display, glasses, and lenses, Augmented Reality becomes a part of your entire field of view, marking for more life-like Augmented Reality experiences. It almost feels like ironman with the help of Jarvis.

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## II. RELATED WORKS

**Stepping Into the Operating Theatre: Arav-Augmented Reality Aided Vertebroplasty**

The inclusion of an AR system as a standard tool into the real clinical workflow has not been presented so far. This research paper reports on the strategies and intermediate results of the ARAV-Augmented Reality Aided Vertebroplasty project that has been initiated to make an AR system based on stereo video see-through head mounted display that is permanently available in the operating room(OR).

So far, only a small number of clinical studies report on the integration and evaluation of Augmented Reality (AR) systems inside an operating room. Most of these approaches are add-on solution for products that have already been certified, integrated and accepted for use in OR. However, innovation and creativity can be restricted due to implicated limitations of an existing product. The research follows the strategy of investigating a system design together with surgeons that take full advantage of AR in order to determine its potential in the OR. This paper gives an intermediate report on their project ARAV with the objective of a permanent installation of an AR system in the OR. [1]

**AUGMENTED REALITY VS VIRTUAL REALITY FOR 3D OBJECTS**

In this work they present the result f a user study in which they compare user performance measured in task completion time near degree of freedom object selection. Transformation task perform either in AR or VR, both with 3D input device and a mouse. Apart from avoiding collision with the environment, interaction with virtual objects may also be affected by seeing the real environment. Whether these effects are positive or negative has not been identified.

When using a 3D input device, a purely VR environment increased task completion time by 22.5% on average compared to AR. Surprisingly, a similar effect occurred when using a mouse: user were about 17.3% slower in VR than in AR. Mouse and 3D input device produced similar task completion times in each condition (AR or VR) respectively. We further found no differences in reported comfort. This project result show faster task completion time in AR over VR. Prototype 3D modeling UI (User Interface). [2]

**E-LEARNING SYSTEM USING AUGMENTED REALITY**

In this paper, they collate education content with information Technology using AR that helps student studying concisely with auxiliary visual content available on the personal computer. The use of Augmented Reality in education is useful in this case, which helps the students to understand the lesson in a better way. Our e-learning system not only provides the students with visual augmented contents, but also improve the learning efficiency and concentration of students. This paper proposes an e-learning system for three-dimensional geometry, which makes use of Augmented Reality to enable the user to comprehend the three-dimensional geometry concepts faster and better. It facilitates the students understanding of three-dimensional space. Based on the marker, the system generates the three-dimensional object and blends it in the real world footage.

The system allows the user to manipulate the object through virtual buttons, while also allowing him/her to access the object's properties. Furthermore, the system provides interactive videos to aid the users understanding as well as a quiz by which the user can access his/her knowledge of three-dimensional concepts. [3]

## III. SYSTEM ANALYSIS

**Objectives:**

- To implement the AR technology and to monitor the patient health.
- To select biomedical sensor to maintain the patient health condition
- To process the sensor output value using PIC controller.
- To generate alerts under abnormal conditions in the AR glass and headset.

The patient education is expensive in terms of money and time on the other hand, it is one of the most important tasks of the physician as 25% office time is spent on patient counselling. In recent years, the mobile technology in hand help devices has made big leaps, both in terms of computational power and in user friendliness. Furthermore, a technology known by the team "Augmented Reality". Combination AR with mobile handsets and applying them to medical issues allows an easy exchange of information, plus a visual representation of not only organs, but – depending on the case – even of the procedure. This is especially helpful for invasive therapies. Augmented Reality in healthcare is a bit of a novelty in medical education, but is already being applied in medical training. Research in doctor– patient education vs. computer- patient education indicates that computer education by educational software, without additional doctor counselling might be able to substitute personal education.

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For doctors, an accurate understanding about the patient is an important factor to give proper consent and, furthermore, to make an informed choice. It is a necessary condition for the patient to negotiate effectively about tests or treatments. It shows that patients, who actively take part in the decision finding process of care, are more satisfied. This active role even improves the biological outcome of the administered therapy.

We propose a system in which important information about patient such as heart rate, pressure, temperature for the doctors are displayed on the semi-transparent glasses. The real time data of patients in hospital collected by the sensors attached to patient's body. Once the sensor measured the values, then it is processed and sent to the doctor's augmented reality glass through wireless communication. If any abnormal condition occurs, it will alert the doctor immediately. The doctor can take appropriate action based on the patient's current health condition. Proposed system helps the doctor identify the critical patient's faster by using the AR goggles and the microcontroller with sensors, which displays the primaryvital information like temperature, pressure and heartbeat of the patient which helps to classify if the patient requires immediate attention or not.

System configuration: The project work consists of three sensors namely heartbeat sensor, temperature sensor, and respiratory sensor. The PIC 16f877a microcontroller is programmed with MP LAB IDE and is connected to the receiver, where the information from the sensors are collected and stored in PIC and is transmitted through the wireless communication. The data which are received is displayed on the doctor's goggles.

Heart rate refers to how many times a heart contracts and relaxes in a unit of time (usually per minute). Heart rate varies for different age groups. For a human adult of age 18 or more years, a normal resting heart rate is around 72 beats per minute(BPM). The functioning of heart can be called as efficient if it is having lower heart rate when the patient is at rest. If the heart rate is lower than the normal heart rate, it is an indication of a condition known as bradycardia and if the heart rate higher than the normal heart rate, it is an indication of condition known as tachycardia.

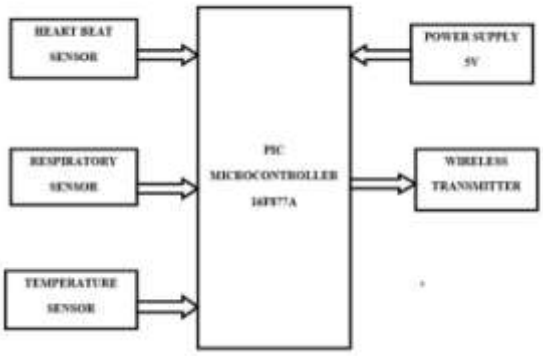
Like heart rate, normal body temperature also varies from person to person and changes throughout the day. The body temperature is lowest in the early morning and highest in the early evening. The normal body temperature is about 37◦C or 98.6◦F. However, it can be as low as 36.1◦C (97◦F) in the early morning and as high as 37.2◦C (99◦F) and still be considered normal. Thus, the normal range for body temperature is 97 to 100◦F or 36.1 to 37.8◦C. Temperature can be measured by using different types of sensors. These sensors come in different forms such as thermocouples, thermistors, resistance temperature detectors (RTD), and integrated circuits (IC) sensors. The temperature sensors produces analog output voltage which is proportional to the temperature. The temperature sensor requires analog to digital (A/D) converter. So that the analog output voltage can be converted into digital form.

The respiratory rate is the rate at which breathing occurs. This is usually measured in breaths per minute and is set, and controlled by the respiratory centre. The respiratory rate in humans measured by counting the number of breath per minute through counting how many times the chest rises. Respiration rates may increase with fever, illness or other medical conditions. For humans, the typical respiratory rate for a healthy adult at rest is 12-18 breaths per minute. Approximately half of the babies had a respiratory rate above 50 breaths per minute. It has also been reported that factors such as crying, sleeping, agitation and age have a significant influence on the respiratory rate.

## IV. ARCHITECTURAL DIAGRAM-TRANSMITTER/RECEIVER

### 1. Transmitter section

This transmitter section comprises the basic hardware components which includes the sensors for measuring the vital physical parameters of the patient's. The three sensors for measuring: heart rate, body temperature and respiration are connected with a PIC MC as shown in the fig. below.



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**2. Receiver Section**


Receiver section is simple user friendly set up comprises the wireless fidelity equipped with the goggles that receives and displays the patient's information.

**ADVANTAGES**

- Low power consumption.
- Provide more efficiency.
- It reduces mistakes and move ahead to multitask.

**APPLICATIONS:**

- In this project, the doctors can do their work without any diversion.
- The detailed parameters will be displaying in his assistive glass.
- The doctor can take appropriate action based on the patient current health condition.
- He gets alert immediately, if any patient condition is abnormal.

**REQUIREMENT ANALYSIS**

Requirement analysis determines the requirements of a newsystem. This project analyses on product and resourcerequirement, which is required for this successful system.

The product requirement includes input and outputrequirements it gives the wants in term of input to producethe required output. The resource requirements give in briefabout the software and hardware that are needed to achievethe required functionality.

**HARDWARE ENVIRONMENT**

Hardware is the collection of physical parts. This includes sensors, microcontroller, power supply etc. Hardware is typically directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system, although other system exists with only hardware.

**SOFTWARE ENVIRONMENT**

A device which detects or measures a physical property and records indicates or otherwise responds to it. Sensor responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomenon.

These physical quantities converted into desired output like electrical signal to measure applied physical quantity. We use sensors like heart beat sensor, respiratory sensor, temperature sensor.

**OUTPUT ANALYSIS:**

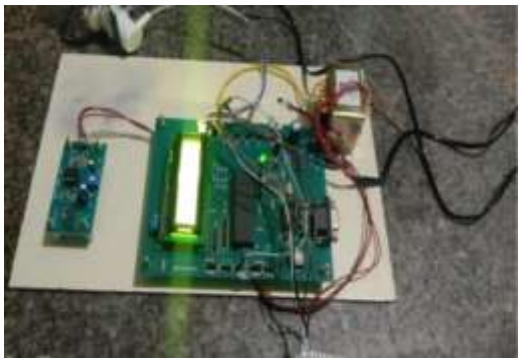

**Fig.** System set up

This output analysis section prints out the representation on how the system set up is done using the sensors and the microcontrollers. It also has the model of the receiver section and the output displayed section on the semi-transparent glasses.

**Fig**. Receiver section

**Fig**. Output display

## V. CONCLUSION

Augmented reality appears to be a powerful tool possibly capable of revolutionizing the field of surgery through a rational use. In this project, the real-time data of patients in hospital are collected by the sensors attached to them. Once the sensor measures the values they are processed in the PIC microcontroller. The digital outputs are sent to doctor's 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. In the future, AR will likely serve as an advanced human computer interface to surgeons, allowing them to achieve even better results. This technology will allow students to practice the surgery on a virtual environment rather than the patients. Smart medical with augmented reality can be used to practice in surgery, simulation to assist the doctor.

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