AN DIGITAL ASSISTIVE SYSTEM FOR DOCTORS DURING EMERGENCY SITUATION

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report **"AN DIGITAL ASSISTIVE SYSTEM FOR DOCTORS DURING EMERGENCY SITUATION"** is the bonafide work of **"JOTHISWARAN.S(211419105059), KAMALESH.M(211419105060), ANBU SELVAM(211419105007), VIGNESH.V(211419105164)"** who carried out the project work under my supervision.

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INTERNAL EXAMINER	**EXTERNAL EXAMINER**

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ABSTRACT

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, intra operative 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 moreefficiently. We propose a system in which important information for the doctors are displayed on semi-transparent glasses included in an AR-headset and therefore are mixed with the real-world view.

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CHAPTER 1

INTRODUCTION

Head-up display (HUD) is a transparent display that can present information in front of users' eyes so that users can see the information without moving sight away. AR-HUD is a special kind of HUD which can provide driving related information directly in the driving environment through windshield, such as overlaying a navigation path on the road, marking pedestrians with surrounding rectangles, or sticking labels on interesting buildings. It is challenge to keep virtual image registered accurately with real world objects with onvehicle AR-HUD due to the complex optical paths introduced by freeform reflectors in the system, such as the windshield. There are some researches on the calibration for AR-HUD. Wu et al. [4] built an indoor system prototype to simulate the actual driving situation on the road. They mainly focused on the distortion correction with fixed viewing angle and fixed head position. They projected a pattern and built a function to avoid the windshield distortion based on pre-warped points and interpolation. It provides primitive idea of augmenting the reality by 2D overlaying but lacking 3D registration of virtual world in the real world, which makes it unpractical for real car AR applications. Wientapper et al. [3] decomposed the calibration into two phases: view-independent geometry of the virtual plane and view-dependent image warping which is similar to the display-relative calibration method proposed by Owen et al [1]. For correcting the distortion, they employed a higherorder polynomial function of 5 parameters. They used vision-based tracking method by attaching textured patterns on the windshield to achieve accurate camera registration with the help of Structurefrom-Motion techniques. The setup was cheap but time-consuming during the preparation. Kaho Ueno and Takashi Komuro [2] took the diversity of road surface and practical face tracking into consideration. Wireless patient monitoring system became vital in day to day life because of fast growing diseases in human life and this reflects in rapidly increasing demands in hospitals. This whole system measure the physical parameter of the patient's body and this real time data transmit to the central PC, which is kept at doctors cabin. The goal is to design and construct an assistive system for doctors to test the condition of the patient. The details such as temperature, respiratory and heartbeat rate of the patient via sensors attached to them. Once the sensor measures the values, it is processed and sent to doctor's wireless augmented reality glass and alerts if an abnormal condition occurs. The doctor can take appropriate action based on the patient's current health condition. Augmented Reality (AR) makes the surrounding environment interactive by overlaying digital 3D models or some plain text information over and around the tangible objects in its radius. We propose a system in which important information for the doctors are displayed on semi-transparent glasses included in an AR-headset and therefore are mixed with the real-world view. Augmented Reality interface so far has been used for a great number of tasks, and have shown a great promise for increasing user's performance compared to traditional GUI. This technology expands our physical world, adding layers of digital information onto it. AR appears in direct view of an existing environment and adds sounds, videos and graphics to it. 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 the aspect of diagnostics and treatment providing access to real-time patient data. AR provides opportunities for more authentic learning and appeals to multiple learning styles, providing students a more personalized and explorative learning experience. There are two systematic reviews about AR; one is on AR in rehabilitation to improve physical outcomes, and the other is focuse

TYPES OF AR'S:

Fig.1.1 Types of AR'S

Superimposition augmented reality uses object recognition to create the virtual experience. The augmented image replaces the original image either partially or fully. The two core types of superimposition augmented reality are marker-based and markerless.

Marker-Based AR:

Marker-based AR leans on a visual marker to activate the altered, interactive experience. The most common markers used are two-dimensional QR codes. Short for quick response, a device's camera recognizes the machine-readable barcode and responds by producing visual effects.

Though marker-based augmented reality was once groundbreaking, it has some limitations. The technology can usually only be used with mobile devices, such as a smartphone or tablet. Also, users have to download the app or software in order to experience the content, so it doesn't have that instantaneous allure we've become so accustomed to in today's digital age.

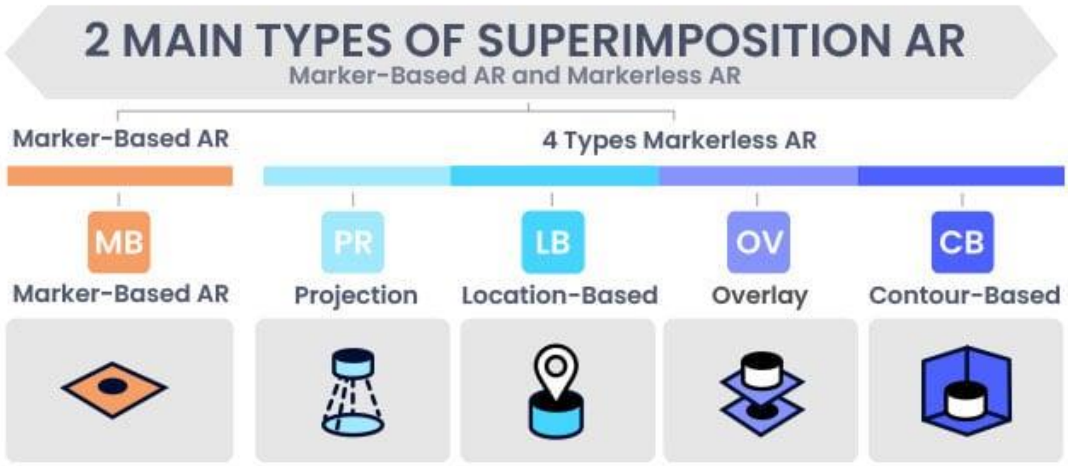

Fig.1.2 Marker based and Markerless AR

Markerless AR

Markerless augmented reality doesn't require image recognition to produce visual effects. Instead, the technology uses a device's camera, location software, and accelerometer to detect positional information, including the orientation of different objects and the space between them.

From there, it calls on simultaneous localization and mapping (SLAM) to interpret the surrounding three-dimensional environment. Then the AR content is displayed on top of the physical worldview and observable from any position or angle.

Developing markerless AR is undoubtedly complex. Still, the technology is quickly eclipsing its marker-based counterpart as the top choice among forward-thinking manufacturers and aggregators.

4 Types of Markerless Augmented Reality

The two primary types of markerless AR include projection-based and location-based, but you may also run into overlay and contour-based.

Projection-Based Augmented Reality:

As its name suggests, projection-based AR projects immersive light onto a flat surface to create 3D imagery. It then uses SLAM to detect human interaction with the augmentation. For instance, the projection-based AR can be used to create holograms that can be used for business purposes or just for fun.

Location-Based Augmented Reality:

With location-based AR, the content is fixed to a specific physical space. It maps the real-world environment and defines visual positions in your surroundings. Once your device detects a match with the mapped location, it superimposes digital imagery accordingly. Pokémon GO is the most well-known example of location-based augmented reality.

Overlay AR:

Overlay markerless AR replaces the un-augmented view of an object with an enhanced virtual image of the same item, complete with multiple visual perspectives. The Nextech Configurator is a great example of this technology. The product configurator tool allows users to change the color of a 3D product model as well as its arrangement. This lets customers customize how it visually looks and then place it within their room to see how it fits in their own space.

Contour-Based AR:

Then there's contour-based augmented reality (or outlining AR), which leverages SLAM to outline the silhouettes of objects and simulate a realistic human interaction. For example, it might be used to develop a safe-driving application for nighttime, poorly-lit roads, heavy precipitation, and other low-visibility situations.

AR Industries, Applications and Active users:

The sky's the limit with augmented reality as companies continue to combine the physical and virtual worlds to create real-time interactions . The technology has enormous potential in a wide range of industries, including e-commerce, manufacturing, transportation, travel, education, and healthcare. It can be harnessed for endless applications, such as interactive demos, 3D product imagery, translations, lessons, facial recognition, autonomous processes, and marketing.

Number of mobile augmented reality (AR) active user devices worldwide from 2019 to 2024(in billions)

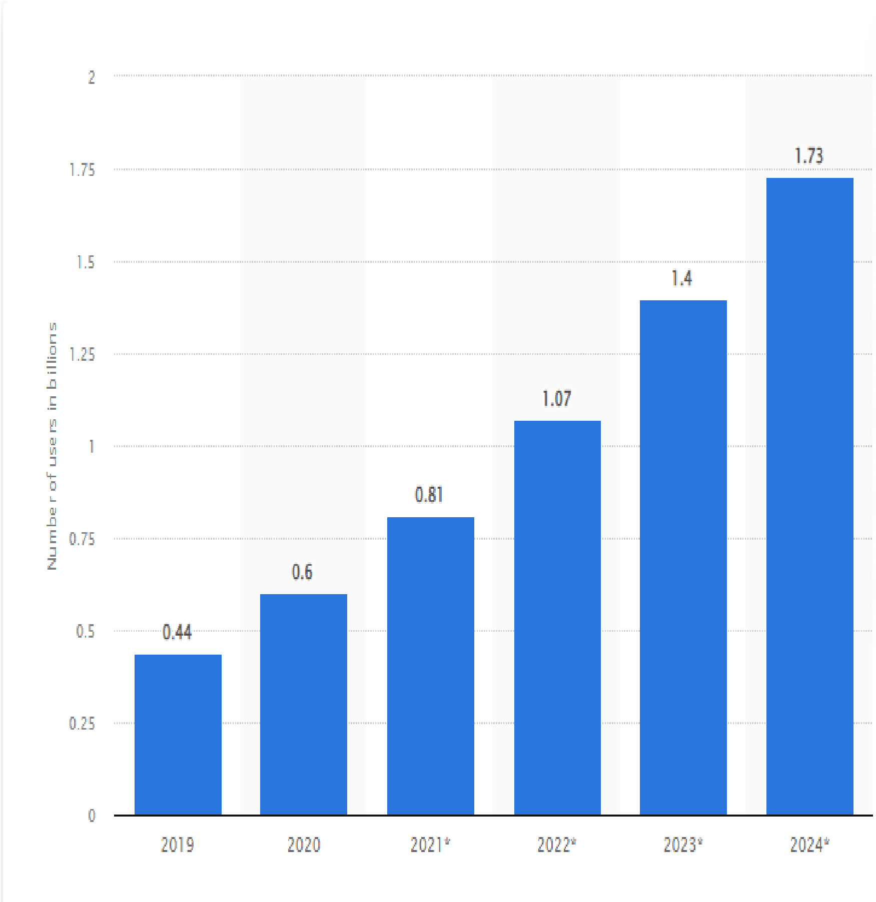

Fig. 1.3 Stats of Active users

CHAPTER 2

LITERATURE SURVEY

A variable shape and variable stiffness controller for haptic virtual interactions: This paper presents an entirely compliant controller handle for use in virtual and augmented reality environments. The controller handle transitions between two static states: a semi-rigid, large diameter state when pneumatically pressurized and a soft, compressible, smaller diameter state when depressurized. We integrated the controller with a modified version of NVIDIA's VR Funhouse employing the two controller states to simulate the physical feel of two virtual objects. We used finite element modeling to downselect an internal elastomer lattice within the controller that controls deformation upon inflation. Finally, we show an example of using the compliance of the handle as an interaction input by designing an algorithm to identify rapid compressions of the handle as a signal to swap objects in the virtual environment.

AUTHOR: Benjamin C. Mac Murray, Bryan N. Peele, Patricia Xu

Published in: 2018 IEEE International Conference on Soft Robotics (RoboSoft)

A lightweight soft exosuit for gait assistance: In this paper we present a soft lower-extremity robotic exosuit intended to augment normal muscle function in healthy individuals. Compared to previous exoskeletons, the device is ultra-lightweight, resulting in low mechanical impedance and inertia. The exosuit has custom McKibben style pneumatic actuators that can assist the hip, knee and ankle. The actuators attach to the exosuit through a network of soft, inextensible webbing triangulated to attachment points utilizing a novel approach we call the virtual anchor technique. This approach is designed to transfer forces to locations on the body that can best accept load. Pneumatic actuation was chosen for this initial prototype because the McKibben actuators are soft and can be easily driven by an off-board compressor. The exosuit itself (human interface and actuators) had a mass of 3500 g and with peripherals (excluding air supply) is 7144 g. In order to examine the exosuit's performance, a pilot study with one subject was performed which investigated the effect of the ankle plantar-flexion timing on the wearer's hip, knee and ankle joint kinematics and metabolic power when walking. Wearing the suit in a passive unpowered mode had little effect on hip, knee and ankle joint kinematics as compared to baseline walking when not wearing the suit.

Engaging the actuators at the ankles at 30% of the gait cycle for 250 ms altered joint kinematics the least and also minimized metabolic power. The subject's average metabolic power was 386.7 W, almost identical to the average power when wearing no suit (381.8 W), and substantially less than walking with the unpowered suit (430.6 W). This preliminary work demonstrates that the exosuit can comfortably transmit joint torques to the user while not restricting mobility and that with further optimization, has the potential to reduce the wearer's metabolic cost during walking.

AUTHOR: Michael Wehner, Brendan Quinlivan, Ernesto Martinez-Villalpando
Published in: 2013 IEEE International Conference on Robotics and Automation

Design and Evaluation of a Novel Haptic Interface for Endoscopic Simulation: Inspection of the colon with an endoscope for early signs of cancer (colonoscopy) has become an extremely widespread procedure, since early treatment radically improves the outlook of patients. The procedure requires a close coordination between the sense of touch and vision to navigate the endoscope along the colon. This raises the need to develop efficient training methods for physicians. Training simulators based on virtual reality, where realistic graphics are combined with a mechatronic system providing haptic feedback, are alternative to traditional training methods. To provide physicians with realistic haptic sensations of an endoscopic procedure, we have designed a haptic interface, instrumented a clinical endoscope and combined them with a simulation software for colonoscopy. In this contribution, we present the mechatronic components of the simulator. The haptic interface is able to generate high forces using the combination of electrical motors and brakes in a compact design. Experiments were performed to determine the characteristics of the device. A model-based control has been implemented and the results show that the control successfully compensates for the device nonlinearities, such as friction. The proposed haptic interface, together with the virtual reality, form a highly realistic training simulator for endoscopic surgeons, applicable not only to colonoscopy, but also to similar interventions.

AUTHOR: EvrenSamur, HannesBleuler, Lionel Flaction
Published in: IEEE Transactions on Haptics (Volume: 5 , Issue: 4 , Fourth Quarter 2014)

A low-cost highly-portable tactile display based on shape memory alloy micro-actuators: This paper presents a new concept of low-cost, high-resolution, lightweight, compact and highly-portable tactile display. The prototype consists of an array of 8 /spl times/ 8 upward/downward independent moveable pins based on shape memory alloy (SMA) technology. Each actuator is capable of developing a 320 mN pull force at 1.5 Hz bandwidth by using simple forced-air convection. The proposed concept allows the development of 60 g weight tactile devices of compact dimensions easily carried in the user's hand. SMA active element, tactile actuator and tactile display are presented and discussed.

AUTHOR: R. Velazquez, E. Pissaloux, J. Szewczyk, M. Hafez
Published in: IEEE Symposium on Virtual Environments, Human-Computer Interfaces and Measurement Systems, 2015.

A Helping Hand: Soft Orthosis with Integrated Optical Strain Sensors and EMG Control: Human fingers and hands are frequently injured because they are delicate, complex, and used constantly. More than 3 million people in the United States suffer from hand or forearm disabilities [1], and, worldwide, hand injuries account for one-third of all work injuries [2]. Due to the importance of hands and the prevalence of hand issues, there is an increasing effort toward developing hand orthotics. These efforts have resulted in active hand orthoses that have been used for rehabilitation training and restoring partial hand function [3]. To ensure safety and to reduce control complexity, some orthoses use mechanical compliances [4], [5] such as underactuated linkages [6] or low-stiffness materials and structures (e.g., rubbers and flexible wires) [7], [8]-[11]. The orthoses made of elastomeric materials tend to be more comfortable, perhaps because their low elastic modulus (10 kPa<; G' <; 1 MPa) [12] is similar to that of human skin (~100 kPa) [13].

AUTHOR: Jonathan Jalving, Rukang Huang, Ross Knepper
Published in: IEEE Robotics & Automation Magazine (Volume: 23 , Issue: 3 , Sept. 2016)

CHAPTER 3

SYSTEM DESIGN

EXISTING SYSTEM:

The sensors used to gather patient data's and display it in the display unit. In cases where doctor perform a critical operations, it is difficult for them to note the patients data's. So to monitor the patients data they get distracted easily causing accidents.

PROPOSED METHOD:

In this project, the real time data of patients in hospital collected by the sensors attached to patients once the sensor measured the values then it is processed and send to doctors augmented reality glass through wireless and alert if abnormal condition occurs.

The doctor can take appropriate action based on the patient's current health condition.

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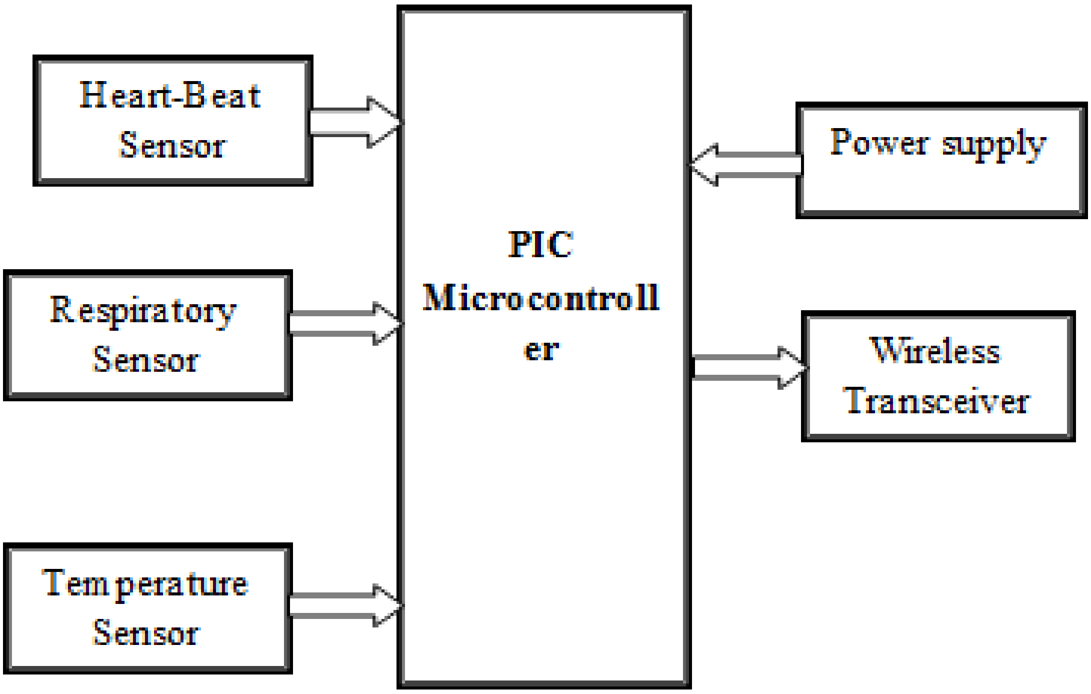

Figure 3.1 Block Diagram of Proposed System

PROPOSED SYSTEM WORKING:

The Microcontroller is connected to temperature, heartbeat and respiratory sensor which is shown in fig.1.The microcontroller is connected to an external power supply. These are placed near the patient bed. As soon as the patient gets admitted the details are inputted to the microcontroller through the sensors. The information is recorded in the microcontroller and sent to the doctor's goggles through wireless transmitter and received through the zigbee receiver placed at the goggle.

CIRCUIT DIAGRAM:

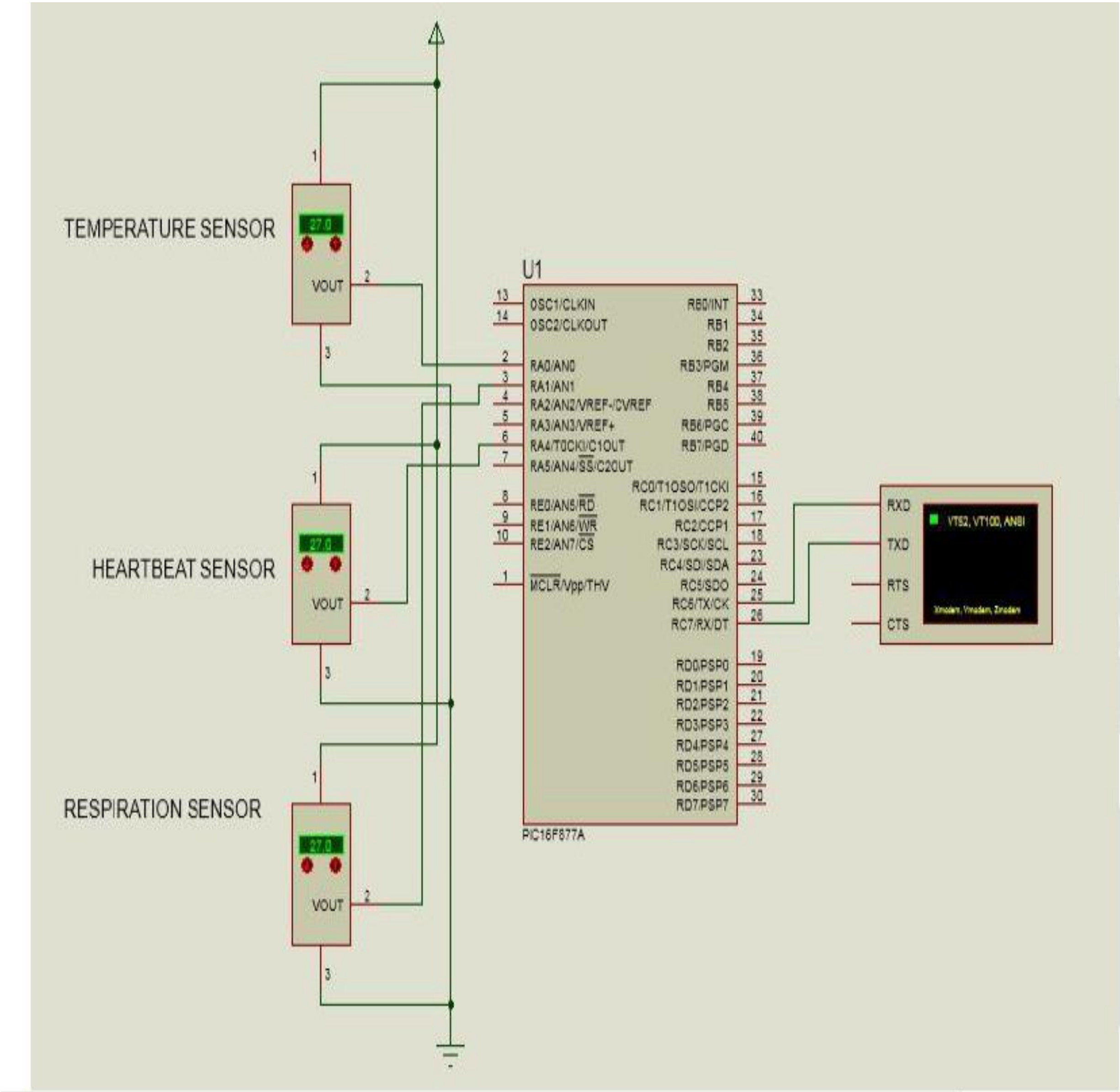

Figure 3.2 Circuit diagram

HARDWARE REQUIREMENTS:

1. POWER SUPPLY
2. PIC MICROCONTROLLER
3. HEART BEAT SENSOR
4. RESPIRATORY SENSOR
5. TEMPERATURE SENSOR
6. WIRELESS TRANSCEIVER
7. WIRELESS AUGMENTED VISUALIZATION MODULE

SOFTWARE REQUIREMENTS:

1. EMBEDDED C
2. MPLAB IDE

HARDWARE REQUIREMENTS:

Power Supply:

Transformer

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

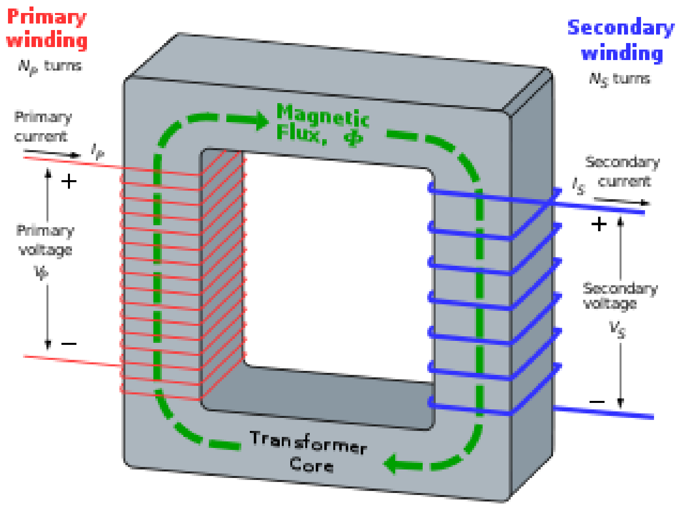

Fig.3.3 Tranformer

Bridge rectifier

When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners.

Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward bias D3 and reverse bias D4.

The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1 are forward biased and will allow current flow to pass through them;

D4 and D2 are reverse biased and will block current flow.

The path for current flow is from point B through D1, up through RL, through D3, through the secondary of the transformer back to point B. this path is indicated by the solid arrows. Waveforms (1) and (2) can be observed across D1 and D3.

One-half cycle later the polarity across the secondary of the transformer reverse, forward biasing D2 and D4 and reverse biasing D1 and D3.Current flow will now be from point A through D4, up through RL, through D2, through the secondary of T1, and back to point A. This path is indicated by the broken arrows. Waveforms (3) and (4) can be observed across D2 and D4. The current flow through RL is always in the same direction. In flowing through RL this current develops a voltage corresponding to that shown waveform (5). Since current flows through the load (RL) during both half cycles of the applied voltage, this bridge rectifier is a full-wave rectifier.

One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

IC voltage regulators

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to tens of watts.

A fixed three-terminal voltage regulator has an unregulated dc input voltage, Vi, applied to one input terminal, a regulated dc output voltage, Vo, from a second terminal, with the third terminal connected to ground.

The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts.

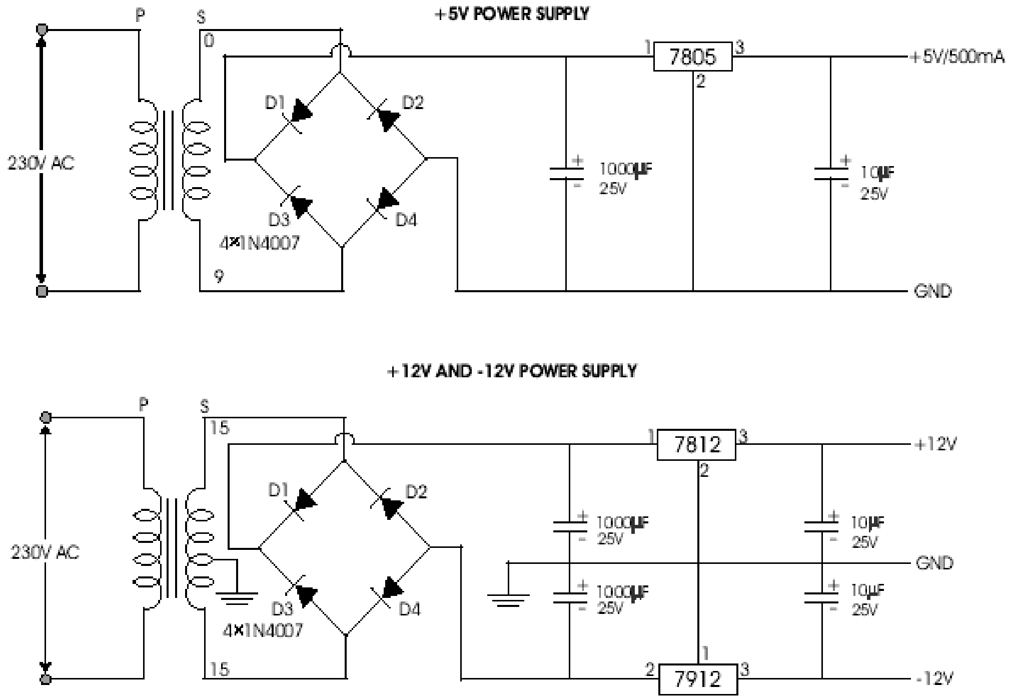

Fig.3.4 Voltage Regulators

MICROCONTROLLER ARDUINO UNO

GENERAL DESCRIPTION

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

PRODUCT DESCRIPTION

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.

Arduino UNO

Fig.3.5 Arduino UNO

FEATURES

- Microcontroller: ATmega328P
- Operating voltage: 5V
- Input voltage: 7-12V
- Flash memory: 32KB
- SRAM: 2KB
- EEPROM: 1KB

APPLICATIONS

- Real time biometrics
- Robotic applications
- Academic applications

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.

FEATURES:

- Microcontroller based SMD design
- Heat beat indication by LED
- Instant output digital signal for directly connecting to microcontroller
- Compact Size
- Working Voltage +5V DC

APPLICATIONS:

- Digital Heart Rate monitor
- Patient Monitoring System
- Bio-Feedback control of robotics and applications

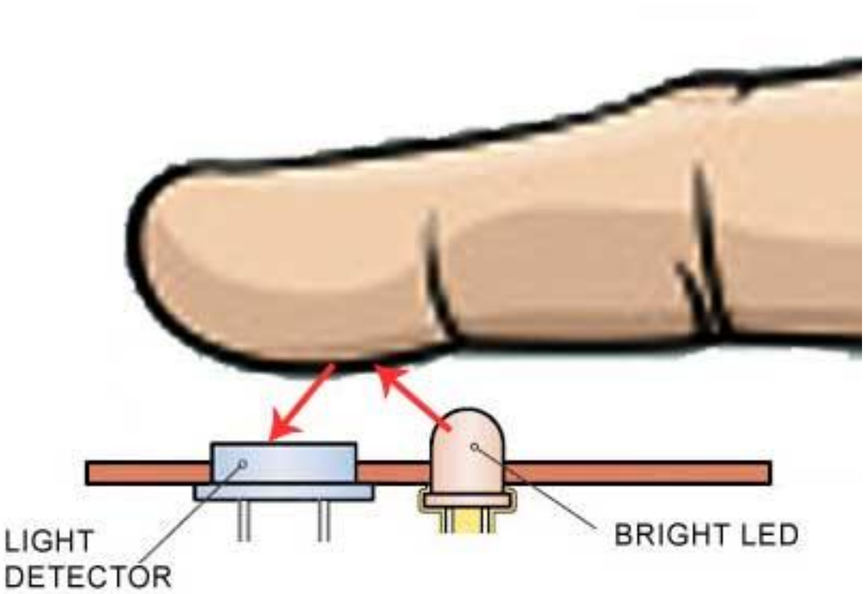

Fig.3.6 Heart Sensor

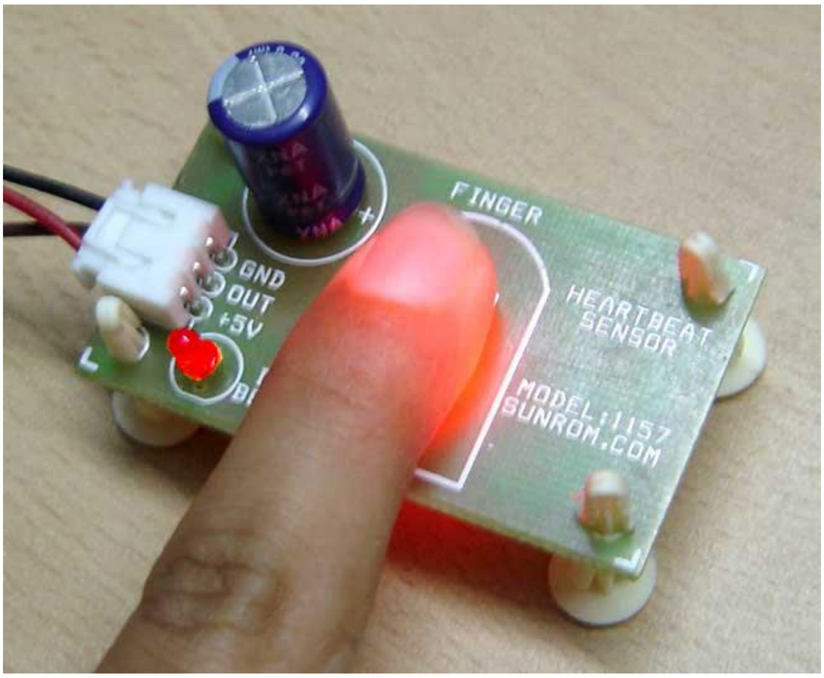

Fig.3.7 Heart sensor

Medical heart sensors are capable of monitoring vascular tissue through the tip of the finger or the ear lobe. It is often used for health purposes, especially when monitoring the body after physical training.

HEART BEAT is sensed by using a high intensity type LED and LDR. The finger is placed between the LED and LDR. As Sensor a photo diode or a photo transistor can be used. The skin may be illuminated with visible (red) using transmitted or reflected light for detection. The very small changes in reflectivity or in transmittance caused by the varying blood content of human tissue are almost invisible. Various noise sources may produce disturbance signals with amplitudes equal or even higher than the amplitude of the pulse signal. Valid pulse measurement therefore requires extensive preprocessing of the raw signal. The new signal processing approach presented here combines analog and digital signal processing in a way that both parts can be kept simple but in combination are very effective in suppressing disturbance signals.

The setup described here uses a red LED for transmitted light illumination and a LDR as detector. With only slight changes in the preamplifier circuit the same hardware and software could be used with other illumination and detection concepts. The detectors photo current (AC Part) is converted to voltage and amplified by an operational amplifier (LM358).

Common types of devices

Chest-band devices. These devices use electrical detection to track your heart rate. They detect electrical activity through a band that wraps around your chest. For most of these devices to work as designed, the band must be wet, or you need to use a conductive gel where the sensors touch your skin. Water or conductive gel improves electrical conduction, so it’s easier for the device to detect your heart’s electrical current.

Wrist- or forearm-worn wearables: There are two major arteries in your forearm and wrist. The radial artery runs toward your thumb, and the ulnar artery runs toward the pinky and ring fingers. These two arteries provide plenty of blood flow to the skin at the surface of your wrist and forearm. These wearables have light-emitting diodes (LEDs) and sensors that rest against the skin in that area. The sensor uses LED light to detect the tiny expansions of the blood vessels underneath the skin's surface.

Smart rings: These are devices you wear on one of your fingers like a piece of jewelry. They also use optical detection to track your heart rate and other vital signs. These devices are still very new, and there's limited data on their accuracy.

Pulse oximeters. These devices, many of which clip onto a finger, also use the optical detection method. These track pulse rate and blood oxygen levels. They're common in hospital settings, but you can also get portable, battery-powered versions of these devices for personal use.

Smartphones. Various smartphone apps across the different platforms offer the ability to measure your pulse rate. Some of these use optical detection to find your pulse rate by holding your finger to the camera lens, with the camera's flash used to illuminate the blood vessels under your skin. Others use the camera itself, pointed at your face, to detect your pulse rate based on visible — but undetectable with your eyes — changes in your skin.

RESPIRATORY SENSOR

Respiration Sensor is used to monitor abdominal or thoracical breathing, in biofeedback applications such as stress management and relaxation training. Besides measuring breathing frequency, this sensor also gives you an indication of the relative depth of breathing. The Respiration Sensor for Nexus can be worn over clothing, although for best results we advise that there only be 1 or 2 layers of clothing between the sensor and the skin. 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.

Fig.3.8 Respiratory Sensor

Respiratory wearable sensors

Wearable sensors for respiratory monitoring employ various types of electronic sensors that can be mounted into clothes , attached to belts , fixed on the skin , etc. There are many ways to make wearable devices and some of them are described separately by the type of primary sensor in the following sections.

Pressure sensors We can take advantage of the events of diaphragm contraction and relaxation to create wearable devices based on pressure sensors. As an example, researchers have used an electromechanical film to develop a respiratory rate sensor designed as a belt. They attached the sensor to the belt so that the expansion of the chest during breathing applies a force to the sensor, and produces a voltage change 30 proportional to this movement. EMfit is a capacitive pressure sensor that has a thin porous polypropylene film structure with a sensitivity of 30–170 pC/N.

The EMFit sensor is less intrusive and performed well in the detection of respiratory rate. However, body movements affect the accuracy of the measurement, so the sensor only worked well for still or moderate moving patients. The facemask sensor also performed well and estimated the respiratory impedance satisfactorily. Nevertheless, it was a prototype and its use was not comfortable .

Acoustic sensors

As seen , it is possible to monitor lung sounds using acoustic sensors. Acoustic signals related to breathing are usually obtained with the sensors located close to the nose, mouth, throat, and suprasternal notch .A wireless microphone that is a portable, cheap, and easy-to-use wearable device positioned next to the nose . The purpose was to measure the respiratory rate in sleep. The microphone is fixed near the nose with a tape, and the signals are sent to a smartphone via wireless communication.

Acoustic wearable sensors can be very practical. However, some challenges are faced during the project design phase such as determining the optimal sensor position, canceling the acoustic ambient noise and the detection of movement artifacts. Depending on the setting, its use is not possible.

Humidity sensors

Wearable humidity sensors based on the porous graphene network (a chemical structure capable of detecting moisture) have been tested for breathing analysis. The sensors are capable of sensing the human respiration, apnea, speaking, and whistle rhythm. The sensors are attached to the body with a facemask. The disadvantage of using this sensor is that long time use is also uncomfortable. It still needs some improvements to further commercialization.

Oximetry sensors

Oximetry is the technique used to measure oxygen saturation. It consists, basically, of a small infrared emitter that illuminates a small portion of the skin and a receiver that measures the light absorption depending on the oxygenated and deoxygenated blood levels . Wearable oximetry sensors can be worn on the wrist, finger, head, earphones, earlobe, thigh, and ankle, and they have been widely commercialized.

FEATURES

- Input voltage: 5v
- Output voltage: 5v
- Output: Analog
- Range: 30% – 65%
- Size (Approx.):132cm (52" Long)

APPLICATIONS

- Medical purpose
- Environmental Control System
- Emergency response System

TEMPERATURE SENSOR

The first slave connected to a temperature sensor LM35. This senses the temperature of an engine and provides the level of temperature.

General Description

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus 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.

The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10° with improved accuracy).

The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

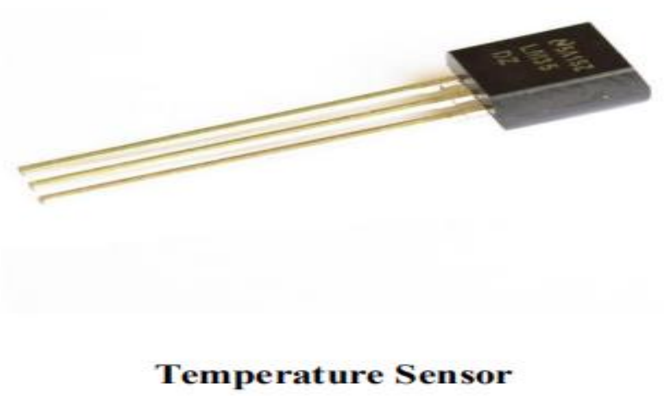

Fig.3.9 LM35 Temperature Sensor

The basic principle of working of the temperature sensors is the voltage across the diode terminals. If the voltage increases, the temperature also rises, followed by a voltage drop between the transistor terminals of base and emitter in a diode.

Besides this, Encardio Rite has a vibrating wire temperature sensor that works on the principle of stress change due to temperature change.

The vibrating wire temperature meter is designed on the principle that dissimilar metals have a different linear coefficient of expansion with temperature variation.

It primarily consists of a magnetic, high tensile strength stretched wire, the two ends of which are fixed to any dissimilar metal in a manner that any change in temperature directly affects the tension in the wire and, thus, its natural frequency of vibration.

The dissimilar metal, in the case of the temperature meter, is aluminium (Aluminum has a larger coefficient of thermal expansion than steel.) As the temperature signal is converted into frequency, the same read-out unit which is used for other vibrating wire sensors can also be used for monitoring temperature also.

The change in temperature is sensed by the specially built Encardio Rite vibrating wire sensor and is converted to an electrical signal which is transmitted as a frequency to the read-out unit.

The frequency, which is proportional to the temperature and in turn to the tension 'σ' in the wire, can be determined as follows:

$f = 1/2\ [\sigma g/\rho]\ /\ 2l$ Hz

Where:

σ = tension of the wire

g = acceleration due to gravity

ρ = density of the wire

l = length of wire

The Different Types Of Temperature Sensors

Temperature sensors are available of various types, shapes, and sizes. The two main types of temperature sensors are:

Contact Type Temperature Sensors: There are a few temperature meters that measure the degree of hotness or coolness in an object by being in direct contact with it. Such temperature sensors fall under the category contact-type. They can be used to detect solids, liquids or gases over a wide range of temperatures.

Non-Contact Type Temperature Sensors: These types of temperature meters are not in direct contact of the object rather, they measure the degree of hotness or coolness through the radiation emitted by the heat source.

The contact and non-contact temperature sensors are further divided into:

Thermostats

Fig.3.10 Thermostats

A thermostat is a contact type temperature sensor consisting of a bi-metallic strip made up of two dissimilar metals such as aluminium, copper, nickel, or tungsten.The difference in the coefficient of linear expansion of both the metals causes them to produce a mechanical bending movement when it’s subjected to heat.

Thermistors

Fig.3.11 Thermisters

Thermistors or thermally sensitive resistors are the ones that change their physical appearance when subjected to change in the temperature. The thermistors are made up of ceramic material such as oxides of nickel, manganese or cobalt coated in glass which allows them to deform easily.

Most of the thermistors have a negative temperature coefficient (NTC) which means their resistance decreases with an increase in the temperature. But, there are a few thermistors that have a positive temperature coefficient (PTC) and, their resistance increases with a rise in the temperature.

Resistive Temperature Detectors (RTD)

Fig.3.12 Resistive Temperature Detectors

RTDs are precise temperature sensors that are made up of high-purity conducting metals such as platinum, copper or nickel wound into a coil. The electrical resistance of an RTD changes similar to that of a thermistor.

Thermocouples

Fig.3.13 Thermocouples

One of the most common temperature sensors includes thermocouples because of their wide temperature operating range, reliability, accuracy, simplicity, and sensitivity.

A thermocouple usually consists of two junctions of dissimilar metals, such as copper and constantan that are welded or crimped together. One of these junctions, known as the Cold junction, is kept at a specific temperature while the other one is the measuring junction, known as the Hot junction.

On being subjected to temperature, a voltage drop is developed across the junction.

Negative Temperature Coefficient (NTC) Thermistor

Fig.3.14 Negative Temperature Coefficient(NTC) Thermistor

A thermistor is basically a sensitive temperature sensor that reacts precisely to even the minute temperature changes. It provides a huge resistance at very low temperatures. This means, as soon as the temperature starts increasing, the resistance starts dropping quickly.

Due to the large resistance change per degree Celsius, even a small temperature change is displayed accurately by the Negative Temperature Coefficient (NTC) Thermistor. Because of this exponential working principle, it requires linearization. They usually work in the range of -50 to 250 °C.

Features

1. Calibrated directly in ° Celsius (Centigrade)
2. Linear + 10.0 mV/°C scale factor
3. 0.5°C accuracy guaranteeable (at +25°C)
4. Rated for full −55° to +150°C range
5. Suitable for remote applications

6. Low cost due to wafer-level trimming
7. Operates from 4 to 30 volts
8. Less than 60 µA current drain
9. Low self-heating, 0.08°C in still air
10. Nonlinearity only ±1⁄4°C typical
11. Low impedance output, 0.1 W for 1 mA load

Capacitive Load

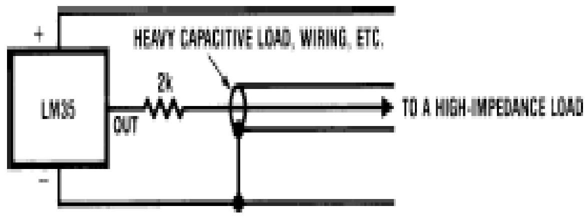

Fig.3.15 LM35 With Decoupling From Capacitive Load

Like most micro power circuits, the LM35 has a limited ability to drive heavy capacitive loads. The LM35 by itself is able to drive 50 pf without special precautions. If heavier loads are anticipated, it is easy to isolate or decouple the load with a resistor

CHAPTER 4

SYSTEM IMPLEMENTION AND RESULT

SOFTWARE REQUIREMENTS:

EMBEDDED C

ABOUT EMBEDDED C

High-level language programming has long been in use for embedded-systems development. However, assembly programming still prevails, particularly for digital-signal processor (DSP) based systems. DSPs are often programmed in assembly language by programmers who know the processor architecture inside out. The key motivation for this practice is performance, despite the disadvantages of assembly programming when compared to high-level language programming.

If the video decoding takes 80 percent of the CPU-cycle budget instead of 90 percent, for instance, there are twice as many cycles available for audio processing. This coupling of performance to end-user features is characteristic of many of the real-time applications in which DSP processors are applied. DSPs have a highly specialized architecture to achieve the performance requirements for signal processing applications within the limits of cost and power consumption set for consumer applications. Unlike a conventional Load-Store (RISC) architecture, DSPs have a data path with memory-access units that directly feed into the arithmetic units. Address registers are taken out of the general-purpose register file and placed next to the memory units in a separate register file.

A further specialization of the data path is the coupling of multiplication and addition to form a single cycle Multiply-accumulate unit (MAC). It is combined with special-purpose accumulator registers, which are separate from the general-purpose registers. Data memory is segmented and placed close to the MAC to achieve the high bandwidths required to keep up with the streamlined data path. Limits are often placed on the extent of memory-addressing operations. The localization of resources in the data path saves many data movements that typically take place in a Load-Store architecture.

The most important, common arithmetic extension to DSP architectures is the handling of saturated fixed-point operations by the arithmetic unit. Fixed-point arithmetic can be implemented with little additional cost over integer arithmetic. Automatic saturation (or clipping) significantly reduces the number of control-flow instructions needed for checking overflow explicitly in the program.Changes in technological and economic requirements make it more expensive to continue programming DSPs in assembly. Staying with the mobile phone as an example, the signal-processing algorithms required become increasingly complex. Features such as stronger error correction and encryption must be added. Communication protocols become more sophisticated and require much more code to implement. In certain markets, multiple protocol stacks are implemented to be compatible with multiple service providers. In addition, backward compatibility with older protocols is needed to stay synchronized with provider networks that are in a slow process of upgrading.

Today, most embedded processors are offered with C compilers. Despite this, programming DSPs is still done in assembly for the signal processing parts or, at best, by using assembly-written libraries supplied by manufacturers. The key reason for this is that although the architecture is well matched to the requirements of the signal-processing application, there is no way to express the algorithms efficiently and in a natural way in Standard C. Saturated arithmetic.

For example, is required in many algorithms and is supplied as a primitive in many DSPs. However, there is no such primitive in Standard C. To express saturated arithmetic in C requires comparisons, conditional statements, and correcting assignments. Instead of using a primitive, the operation is spread over a number of statements that are difficult to recognize as a single primitive by a compiler.

DESCRIPTION

Embedded C is designed to bridge the performance mismatch between Standard C and the embedded hardware and application architecture. It extends the C language with the primitives that are needed by signal-processing applications and that are commonly provided by DSP processors. The design of the support for fixed-point data types and named address spaces in Embedded C is based on DSP-C. DSP-C [1] is an industry-designed extension of C with which experience was gained since 1998 by various DSP manufacturers in their compilers. For the development of DSP-C by ACE (the company three of us work for), cooperation was sought with embedded-application designers and DSP manufacturers.

The Embedded C specification extends the C language to support freestanding embedded processors in exploiting the multiple address space functionality, user-defined named address spaces, and direct access to processor and I/O registers. These features are common for the small, embedded processors used in most consumer products. The features introduced by Embedded C are fixed-point and saturated arithmetic, segmented memory spaces, and hardware I/O addressing. The description we present here addresses the extensions from a language-design perspective, as opposed to the programmer or processor architecture perspective.

MULTIPLE ADDRESS SPACES

Embedded C supports the multiple address spaces found in most embedded systems. It provides a formal mechanism for C applications to directly access (or map onto) those individual processor instructions that are designed for optimal memory access. Named address spaces use a single, simple approach to grouping memory locations into functional groups to support MAC buffers in DSP applications, physical separate memory spaces, direct access to processor registers, and user-defined address spaces.

The Embedded C extension supports defining both the natural multiple address space built into a processor's architecture and the application-specific address space that can help define the solution to a problem.

Embedded C uses address space qualifiers to identify specific memory spaces in variable declarations. There are no predefined keywords for this, as the actual memory segmentation is left to the implementation. As an example, assume that **X** and **Y** are memory qualifiers. The definition:

```
X inta[25] ;
```

Means that **a** is an array of 25 integers, which is located in the **X** memory. Similarly (but less common):

```
X int * Y p ;
```

Means that the pointer **p** is stored in the **Y** memory. This pointer points to integer data that is located in the **X** memory. If no memory qualifiers are used, the data is stored into unqualified memory.

For proper integration with the C language, a memory structure is specified, where the unqualified memory encompasses all other memories. All unqualified pointers are pointers into this unqualified memory. The unqualified memory abstraction is needed to keep the compatibility of the **void *** type, the **NULL** pointer, and to avoid duplication of all library code that accesses memory through pointers that are passed as parameters.

NAMED REGISTERS

Embedded C allows direct access to processor registers that are not addressable in any of the machine's address spaces. The processor registers are defined by the compiler-specific, named-register, storage class for each supported processor. The processor registers are declared and used like conventional C variables (in many cases volatile variables). Developers using Embedded C can now develop their applications, including direct access to the condition code register and other processor-specific status flags, in a high-level language, instead of inline assembly code.

Named address spaces and full processor access reduces application dependency on assembly code and shifts the responsibility for computing data types, array and structure offsets, and all those things that C compilers routinely and easily do from developers to compilers.

I/O HARDWARE ADDRESSING

The motivation to include primitives for I/O hardware addressing in Embedded C is to improve the portability of device-driver code. In principle, a hardware device driver should only be concerned with the device itself. The driver operates on the device through device registers, which are device specific. However, the method to access these registers can be very different on different systems, even though it is the same device that is connected. The I/O hardware access primitives aim to create a layer that abstracts the system-specific access method from the device that is accessed. The ultimate goal is to allow source-code portability of device drivers between different systems. In the design of the I/O hardware-addressing interface, three requirements needed to be fulfilled:

- The device-drive source code must be portable.
- The interface must not prevent implementations from producing machine code that is as efficient as other methods.

- The design should permit encapsulation of the system-dependent access method.

The design is based on a small collection of functions that are specified in the <iohw.h> include file. These interfaces are divided into two groups; one group provides access to the device, and the second group maintains the access method abstraction itself.

To access the device, the following functions are defined by Embedded C:

```
unsignedintiord(  ioreg_designator );

voidiowr(  ioreg_designator, unsigned int value );

voidioor(  ioreg_designator, unsigned int value );

voidioand( ioreg_designator, unsigned int value );

voidioxor( ioreg_designator, unsigned int value );
```

These interfaces provide read/write access to device registers, as well as typical methods for setting/resetting individual bits. Variants of these functions are defined (with **buf** appended to the names) to access arrays of registers. Variants are also defined (with l appended) to operate with **long** values.

All of these interfaces take an I/O register designator **ioreg_designator** as one of the arguments. These register designators are an abstraction of the real registers provided by the system implementation and hide the access method from the driver source code. Three functions are defined for managing the I/O register designators. Although these are abstract entities for the device driver, the driver does have the obligation to initialize and release the access methods. These functions do not access or initialize the device itself because that is the task of the driver. They allow, for example, the operating system to provide a memory mapping of the device in the user address space.

```
voidiogroup_acquire( iogrp_designator );

voidiogroup_release( iogrp_designator );

voidiogroup_map( iogrp_designator, iogrp_designator );
```

The **iogrp_designator** specifies a logical group of I/O register designators; typically this will be all the registers of one device. Like the I/O register designator, the I/O group designator is an identifier or macro that is provided by the system implementation.The map variant allows cloning of an access method when one device driver is to be used to access multiple identical devices.

EMBEDDED C PORTABILITY

By design, a number of properties in Embedded C are left implementation defined. This implies that the portability of Embedded C programs is not always guaranteed. Embedded C provides access to the performance features of DSPs. As not all processors are equal, not all Embedded C implementations can be equal For example, suppose an application requires 24-bit fixed-point arithmetic and an Embedded C implementation provides only 16 bits because that is the native size of the processor. When the algorithm is expressed in Embedded C, it will not produce outputs of the right precision.

In such a case, there is a mismatch between the requirements of the application and the capabilities of the processor. Under no circumstances, including the use of assembly, will the algorithm run efficiently on such a processor. Embedded C cannot overcome such discrepancies. Yet, Embedded C provides a great improvement in the portability and software engineering of embedded applications. Despite many differences between performance-specific processors, there is a remarkable similarity in the special-purpose features that they provide to speed up applications.

Writing C code with the low-level processor-specific support may at first appear to have many of the portability problems usually associated with assembly code. In the limited experience with porting applications that use Embedded C extensions, an automotive engine controller application (about 8000 lines of source) was ported from the eTPU, a 24-bit special-purpose processor, to a general-purpose 8-bit Freescale 68S08 with about a screen full of definitions put into a single header file. The porting process was much easier than expected. For example, variables that had been implemented on the processor registers were ported to unqualified memory in the general-purpose microprocessor by changing the definitions in the header definition and without any actual code modifications. The exercise was to identify the porting issues and it is clear that the performance of the special-purpose processor is significantly higher than the general-purpose target.

MPLAB IDE

MPLAB Integrated Development Environment (IDE) is a comprehensive editor, project manager and design desktop for application development of embedded designs using Microchip PICmicro MCUs and dsPIC DSCs. The initial use of MPLAB IDE is covered here. How to make projects, edit code and test an application will be the subject of a short tutorial. By going through the tutorial, the basic concepts of the Project Manager, Editor and Debugger can be quickly learned. The complete feature set of MPLAB IDE is covered in later chapters. This section details the installation and uninstall of MPLAB IDE. It is followed by a simple step-by-step tutorial that creates a project and explains the elementary debug capabilities of MPLAB IDE. Someone unfamiliar with MPLAB IDE will get a basic understanding of using the system to develop an application. No previous knowledge is assumed, and comprehensive technical details of MPLAB IDE and its components are omitted in order to present the basic framework for using MPLAB IDE.

COMPONENTS OF MPLAB IDE

The MPLAB IDE has both built-in components and plug-in modules to configure the system for a variety of software and hardware tools.

Project Manager: The project manager provides integration and communication between the IDE and the language tools.

Editor: The editor is a full-featured programmer's text editor that also serves as a window into the debugger.

Assembler/Linker and Language Tools: The assembler can be used stand-alone to assemble a single file, or can be used with the linker to build a project from separate source files, libraries and recompiled objects. The linker is responsible for positioning the compiled code into memory areas of the target microcontroller.

Debugger: The Microchip debugger allows breakpoints, single stepping, watch windows and all the features of a modern debugger for the MPLAB IDE. It works in conjunction with the editor to reference information from the target being debugged back to the source code.

Execution Engines: There are software simulators in MPLAB IDE for all PIC micro MCU and ds PIC DSC devices. These simulators use the PC to simulate the instructions and some peripheral functions of the PICmicro MCU and dsPIC DSC devices. Optional in-circuit emulators and in-circuit debuggers are also available to test code as it runs in the applications hardware.

MPLAB IDE FEATURES AND INSTALLATION

MPLAB IDE is a Windows® Operating System (OS) based Integrated Development Environment for the PICmicro MCU families and the dsPIC Digital Signal Controllers.

The MPLAB IDE provides the ability to:

• Create and edit source code using the built-in editor.

• Assemble, compile and link source code.

• Debug the executable logic by watching program flow with the built-in simulator or in real time with in-circuit emulators or in-circuit debuggers.

• Make timing measurements with the simulator or emulator.

• View variables in Watch windows.

• Program firmware into devices with device programmers (for details, consult the user's guide for the specific device programmer).

Install/Uninstall MPLAB IDE

To install MPLAB IDE on your system:

• If installing from a CD-ROM, place the disk into a CD drive. Follow the on-screen menu to install MPLAB IDE. If no on-screen menu appears, use Windows Explorer to find and execute the CD-ROM menu, menu.exe.

• If downloading MPLAB IDE from the Microchip web site (www.microchip.com), locate the download (.zip) file, select the file and save it to the PC. Unzip the file and execute the resulting file to install.

To uninstall MPLAB IDE:

• Select Start>Settings>Control Panel to open the Control Panel.

• Double click on Add/Remove Programs. Find MPLAB IDE on the list and click on it.

• Click Change/Remove to remove the program from your system

Running MPLAB IDE

To start MPLAB IDE, double click on the icon installed on the desktop after installation or select Start>Programs>Microchip>MPLAB IDE vx.xx>MPLAB IDE. A screen will display the MPLAB IDE logo followed by the MPLAB IDE desktop.

TESTING CODE WITH THE SIMULATOR

In order to test the code, software or hardware is needed that will execute the PICmicro MCU instructions. A debug execution tool is a hardware or software tool that is used to inspect code as it executes a program (in this case cnt8722.asm). Hardware tools such as MPLAB ICE or MPLAB ICD 2 can execute code in real devices. If hardware is not available, the MPLAB SIM simulator can be used to test the code. The simulator is a software program that runs on the PC to simulate the instructions of the PICmicro MCU. It does not run in “real time,” since the simulator program is dependent upon the speed of the PC, the complexity of the code, overhead from the operating system and how many other tasks are running. However, the simulator accurately measures the time it would take to execute the code if it were operating in real time in an application.

Note: Other debug execution tools include MPLAB ICE 2000, MPLAB ICE 4000 and MPLAB ICD 2. These are optional hardware tools to test code on the application PC board. Most of the MPLAB IDE debugging operations are the same as the simulator but, unlike the simulator, these tools allow the target PICmicro MCU to run at full speed in the actual target application.

Select the simulator as the debug execution tool. This is done from the Debugger>Select Tool pull down menu. After selecting MPLAB SIM, the following changes should be seen. The status bar on the bottom of the MPLAB IDE window should change to “MPLAB SIM”. Additional menu items should now appear in the Debugger menu. Additional toolbar icons should appear in the Debug Tool Bar. TIP: Position the mouse cursor over a toolbar button to see a brief description of the button’s function. An MPLAB SIM tab is added to the Output window.

SYSTEM PROTOTYPE

Receiver Section:

Wireless Augmented Visualization Module

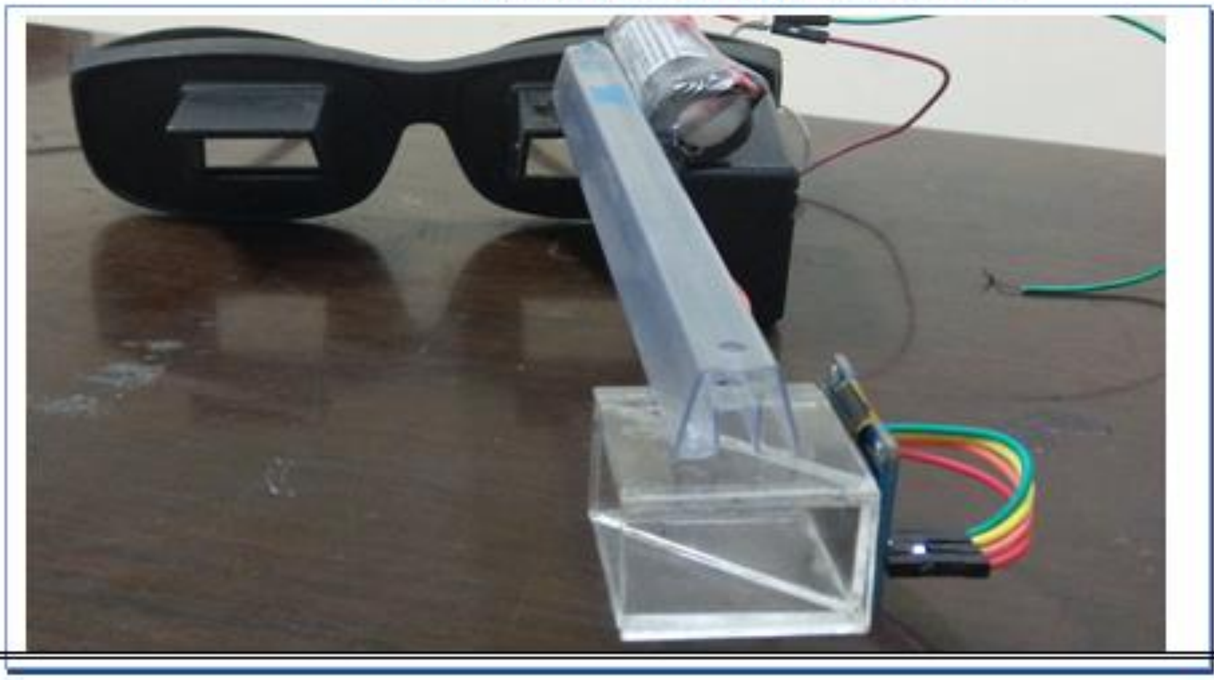

Fig.4.1 System Prototype

Augmented Reality in Medical Industry

Today, there are many applications and markets for Augmented Reality, including gaming, automotive, retail, and many others. Augmented Reality is also making a significant impact on Healthcare. Bringing together the senses of the real world and the technological capabilities of the digital world is revolutionary.The development of healthcare apps is on the rise to improve the quality of services and promote self-management behaviors among patients.As for patients, they are more than willing to use healthcare apps since they provide needed convenience. Health apps enable many people to schedule appointments, review prescriptions, and connect with doctors via video call for online diagnosis.

CHAPTER 5

CONCLUSION

In this project the doctor's assistive system is developed. It will be helpful for the doctor's to monitor the patient's vital parameters continuously. If this parameter goes above the threshold values, the alert message is send to the doctor through Zigbee communication to the AR glass. Here, a prototype shown below is only developed so the message is displayed only as "ALERT" given in Table but when we go for real time the message along with the values of the abnormal parameters are displayed.

AR's potential ability to concurrently display imaging data and other patient information could save lives and decrease medical errors. The AR glass provides necessary parameter details to the surgeon in digital manner. It reduces the risk of invasive surgery, which can be avoided by keeping the most important information in front of the surgeon. It significantly improves the quality of treatment. The AR glass is used to clearly demonstrate and visualize the abnormality. AR innovations can help enhance doctors and surgeons ability to diagnose, treat, and perform surgery on their patients more accurately by giving them access to real-time data and patient information faster, and more precisely than ever before.

The proposed system was implemented. It is used to monitor the patient health parameters like temperature and heartbeat continuously. And transmit to the doctor using augment reality.

The output gives the temperature (T),Heart beat rate (H) and Breathing rate (R) of a normal healthy person. In case of an abnormal condition it gives an alert to the doctor by displaying the message 'ALERT'. The range of abnormal value for temperature is above 40°C.The range of abnormal value for heartbeat is above 75 beats per minute (bpm) and for breathing rate is above 100 breaths per minute (bpm). The proposed system was implemented. It is used to monitor the patient health parameters like temperature and heartbeat continuously. And transmit to the doctor using augment reality.

The analog processing circuitry and the sensors were assembled on PCBs which were placed within the wrist strap. Fig 3 shows the flowchart of the system & Fig 4 shows the prototype hardware. The prototype was powered with a 9 V battery. The RF transmission using Zigbee has been tested to operate successfully at 30 meters range through obstacles such as concrete walls. When in operation, the wrist unit consumes 20 mA of current at 3.3 V power supply.

CONDITION	**RESULT**
HBR>100,HBR<60	ALERT
RS<12,RS>25	ALERT
TEMP>102,TEMP<95	ALERT

FUTURE SCOPE

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 doctors. This allows the doctors to interact with patient specific organs and tissue in an open 3D space. It enables doctors to immediately identify, evaluate and dissect clinically significant structures.

Future AR markets are more likely to resemble smartphone markets today. It enables independent self-care through self-diagnosis. Assume all wearable devices and smartphones become doctors. If that were to happen, we could significantly lower Healthcare costs, save thousands of lives, and improve our living standards. The AR telehealth devices and remote patient monitoring will make it less daunting for patients to see a doctor, even though they still need medical professionals and specialists. Through Augmented Reality and Artificial Intelligence, it is possible to detect and identify voice tones, facial expressions, and physical behaviors, helping doctors and families detect mental illness and depression in real-time.

As a result of an influx of software and hardware manufacturers, mobile data, and voice businesses, augmented Reality in Healthcare is witnessing mergers and acquisitions.

In addition to regularity and privacy, several companies are addressing these concerns within the Healthcare sector, which will benefit from the use of augmented Reality in behavioral and rehabilitation programs and staff training. People will be able to analyze health in real-time with a smartphone app in future years. The app will give them an overview of how unhealthy their lifestyle is and help them take precautions to avoid developing diseases.

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