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Doctors Assistive System using Augmented Reality for Critical Analysis

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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) is rapidly becoming increasingly available, accessible and importantly affordable, hence their application into health care 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. 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. 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.

I. INTRODUCTION

Augmented reality (AR) is used in many fields including medicine, education, manufacturing, and entertainment. With advances in optics, computer systems, and surgical instruments, AR application to medicine is being vigorously researched. Particularly, as surgery using laparoscopy, endoscopy, or catheterized intervention has increased, AR takes an important role in many medical applications [1-4]. AR denotes a technique to combine a real world and virtual objects which are artificially generated digital content by a computer [5]. As another aspect of AR is a registration between the real world and virtual objects, it aims to estimate three dimensional (3D) positions of virtual objects related to the real world. Therefore, AR can allow the user to see 3D virtual objects superimposed upon the real world. With the help of AR in medicine, a surgeon can see hidden organs inside a body and improve the perception of treatment procedure by interacting with the real world. After a brief description of three components of the medical AR, its applications will be presented.

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II. SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS:-

- PIC microcontroller
- Respiratory sensor
- Temperature sensor
- Heartbeat sensor
- Power supply

III. SYSTEM REQUIREMENT SPECIFICATIONS

Hardware & Software Requirement PIC MICROCONTROLLER

PIC microcontrollers have a data memory bus of 8-bit and a program memory bus of 12, 14 or 16 bit length depending on the family. All PIC microcontrollers have a mix of different on-chip peripherals like A/D converters, Comparators, weak pull-ups, PWM ideal to start with and out of them the PIC16F84 seems to be the most popular microcontroller. Although the PIC16F84 and the PIC16F84A (later silicon revision of the PIC16F84) have been replaced by the higher spec, lower priced PIC16F628 and the PIC16F628A,

RESPIRATORY SENSOR

A respiratory sensor is a sensitive girth sensor worn using an easy fitting high durability woven elastic band fixed with a length adjustable webbing belt. It detects chest or abdominal expansion/contraction and outputs the respiration waveform

TEMPERATURE SENSOR

A temperature sensor is a device, typically a thermocouple or RTD that provides for temperature measurement through an electrical signal. Thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature.

HEARTBEAT SENSOR

Heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. 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
- Heart beat indication by LED
- Instant output digital signal for directly connecting to microcontroller
- Compact Size
- Working Voltage +5V DC

POWER SUPPLY

The power supply section consists of a transformer, a bridge circuit, a filter and a regulator. The step down

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transformer is used to convert 230v ac to 12v ac The bridge circuit converts ac to dc. A power supply provides a constant output regardless of voltage variations."Fixed" three-terminal linear regulators are commonly available to generate fixed voltages of plus 3 V, and plus or minus 5 V, 9 modules, UARTs, Timers, SPI, I2C, USB, LCD, and CAN etc. PIC microcontrollers come in various sizes, from the 6-pin smallest microcontroller in the world to the high pin count, high memory devices. But from a student's/hobbyist's perspective the 16F series of PICs are the most

Features

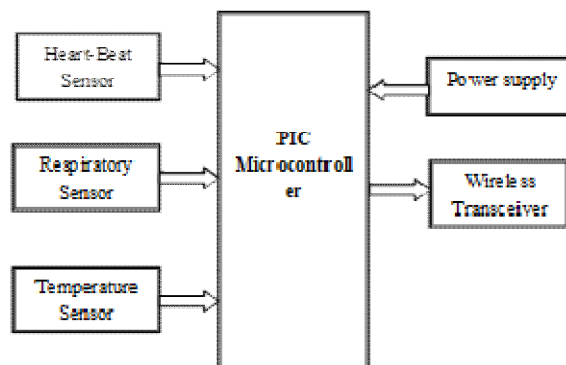
Thermal Overload Protection

1. Short Circuit Protection

When you have a requirement for a project of say 12V, or even 5V if it's a digital project, then these are the types you use. 7805 or 7812 are the types. There are of course negative voltage regulators with the numbers 79XX which are substantially the same as those discussed here excepting they are negative. We will not consider them further. Assume your project calls for a basic fixed 12V D.C. to operate. Looking back to our earlier tutorial we apply all the same principles. Look at the original schematic.

IV. BLOCK DIAGRAM & WORKING

Transmitter section:



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.

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

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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. Since only one diode can conduct at any instant, the maximum voltage that can be rectified at any instant is 500 volts. The maximum voltage that appears across the load resistor is nearly-but never exceeds-500 volts, as result of the small voltage drop across the diode. In the bridge rectifier shown in view B, the maximum voltage that can be rectified is the full secondary voltage, which is 1000 volts. Therefore, the peak output voltage across the load resistor is nearly 1000 volts. With both circuits using the same transformer, the bridge rectifier circuit produces a higher output voltage than the conventional full-wave rectifier circuit.

IC VOLTAGEREGULATORS:

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, V_i , applied to one input terminal, a regulated dc output voltage, V_o , 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.

V. CONCLUSION

Surgery is changing from open procedures to minimally invasive approaches. AR technology has a great potential to assist this change, and is becoming more important 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. We believe AR will only become more ubiquitous in future medicine. Research on precise camera calibration and patient to image registration will help provide robust AR for clinical applications.

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