IMAGE PROCESSING BASED COMA PATIENT MONITORING SYSTEM WITH FEEDBACK

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RESEARCH ARTICLE

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ABSTRACT

Image processing based coma patient monitoring system provides high quality healthcare services in the future. To provide more convenient and comprehensive medical monitoring in big hospitals since it is tough job for medical personnel to monitor each patient for 24 hours. The latest development in patient monitoring system can be used in intensive care unit (ICU), critical care unit (CCU), and emergency rooms of hospital. During treatment, the patient monitor is continuously monitoring the coma patient to transmit the important information. Also in the emergency cases, doctor are able to monitor patient condition efficiently to reduce time consumption, thus it provides more effective healthcare system. This project investigates about the effects seen in the patient using "image processing based coma patient monitoring system with feedback" which is a very advanced project related to physical changes in body movement of the patient and It also provide a system for monitoring patient heartbeat rate and gives warning in form of alarm & LCD Display. It also passes a SMS to a person sitting at the distant place if there exists any movement in any body part of the patient.

INTRODUCTION

The coma-patients who are in ICU to be carefully monitored by nurses for any body movements. Since the nurses have multiple responsibilities in ICU, they may miss such events. Same situation arises when a patient, highly sedated after a complex surgery, brought to ICU, little changes in face such as eye opening; lip motion and facial colour are very welcome for surgeons to take next clinical step. For this also, the nurses are made to be responsible. The importance of automated systems to assists the nurses in these responsibilities are very eminent. With the help of this system we can monitor the patient regularly and if there exist any physical change in body of the coma patient then it will alarm the signal and send a SMS through a GSM mobile to a person at a distant place.

Viola Jones algorithms use for real time body movement. There are three key contribution fast and accurate detection; the integral image for feature computation, adaboost for feature selection and an attentional cascade for efficient computational resource allocation.

This system will consist of an input unit Digital camera to study the movement in any part of the bodyof patient and measure heartbeat of patient using heartbeat sensor. For indication of warning we will use by sending SMS through the GSM mobile to a distant person and display warning on LCD display. Moreover the warning will be deactivated manually rather than automatically. So for this purpose a deactivation switch will be used to deactivate warning.

MATERIALS AND METHODS

GSM Module

A GSM modem is a specialized type of wireless module which accepts a SIM card and is built with Dual Band GSM engine SIM 900A, works on 900/1800Mhz.it operates like a mobile phone. The modem is connected with RS2332 interface which allows to connect with computer as well as microcontroller to communicate over mobile network. GSM modem provides mobile internet connectivity, which are used for sending receiving SMS and audio calls through AT commands. The power supply is allowed to connect through unregulated power supply. The GSM modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. GSM modem is a modem device which is connected with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides

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GSM modem capabilities. When modem is powered "on" , the network Led will light up for every second at slow rate. At this stage we can start using Modem for our application. it states that modem is registered with the network.

Fig 1GSM SIM 900A Module

Arduino

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino board are able to read inputs light on a sensor, a finger on a button and turn it into an output activating a motor, turning on an LED. Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and even the pre-assembled Arduino modules cost less.
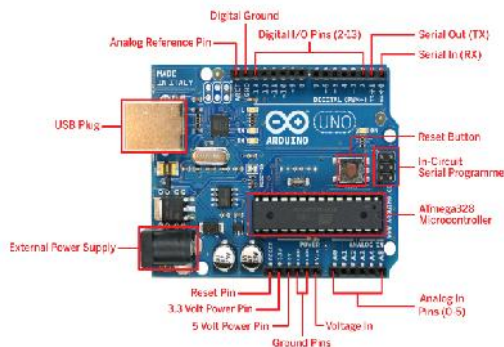

Fig 2 Arduino Uno board with Atmega 328 controller

The Arduino Software (IDE) runs on Windows, Mac OS X, and Linux. The environment is written in Java, C and C++ programming that allows making computer to drive both functional and creative projects. The ATMEGA 328 on the ArduinoUno comes with the boot loader that allows you to upload new code without the use of the external hardware programming. It communicates using the original STK500 protocol.

Heartbeat Sensor

Fig 3 Heartbeat 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 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. Connect regulated DC power supply of 5 Volts. Black wire is Ground, Next middle wire is Brown which is output and Red wire is positive supply. These wires are also marked on PCB.

To test sensor you only need power the sensor by connect two wires +5V and GND. You can leave the output wire as it is. When Beat LED is off the output is at 0V.Put finger on the marked position, and you can view the beat LED blinking on each heartbeat. The output is active high for each beat and can be given directly to microcontroller for interfacing applications.
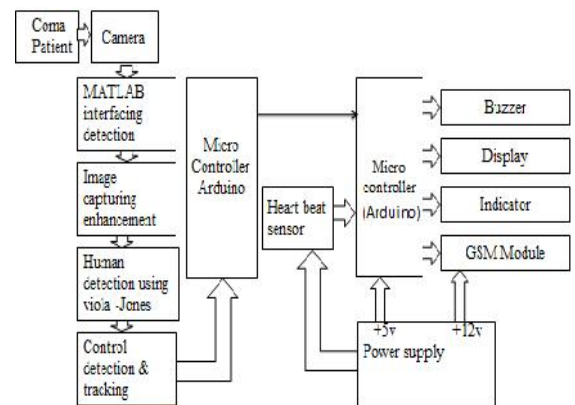
Block Diagram

Fig 4. Block Diagram of Image Processing Based Coma Patient Monitoring System with Feedback
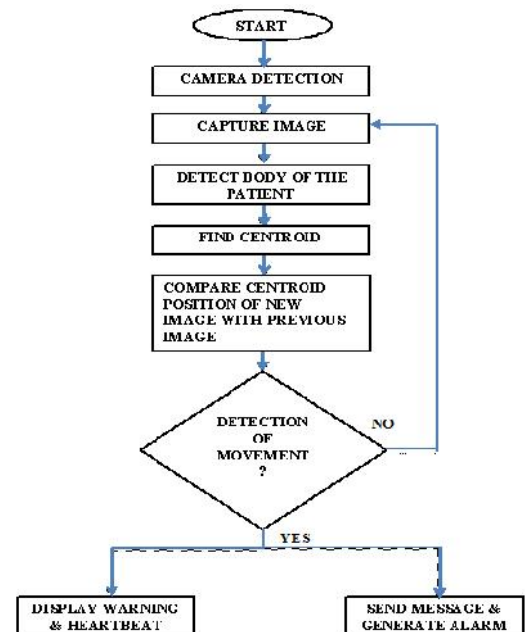
Flow Chart

Figure 5 flow chart of image processing based coma patient monitoring system with feedback

Input Stage

This system will consist of an input unit digital camera to study the movement in any part of the body of patient and measure heartbeat of patient using heartbeat sensor. Output from computer and Heartbeat sensor provides acknowledge to Arduino.

Fig 5 Working of input stage heartbeat sensor and camera

Output Stage

The output stage of this system has Alarm, LCD display and GSM mobile. The LCD display will provide us the warning about the Movement of patient. According to the acknowledgement provide to Arduino by input stage the Arduino provides acknowledgement to the alarm and send SMS on mobile using GSM module and gives heartbeat rates. It also display warning on LCD display.
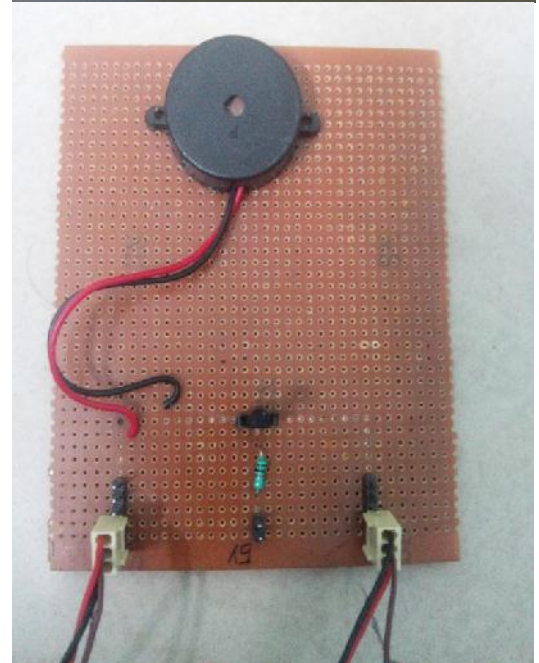

Fig 6. operation of output stage buzzer and LCD

Overview of Block Diagram

Firstly, we set the digital camera on the patient lying on the bed. Input of this system is camera to study the movement in any part of the body of patient and heartbeat sensor measure heartbeat of comapatient. The Detection of the movement of patients via video taken by camera. This camera will automatically take frames and we will compare the one by one frame with the help of the frames taken by the camera. Then patient will made movement in any part of his body. The output from computer and Heartbeat sensor provides acknowledge to Arduino. According to the acknowledgement provide to Arduino by computer and heartbeat sensor the Arduino get acknowledgement to output stage. Then itwill generate the alarm and send SMS on mobile using GSM module and gives heartbeat rates. It also display warning on LCD display.

CONCLUSION

In this study a new method of coma patient movement monitoring system by using the viola jones algorithm we can detect the whole body of a coma patient and comparing the one by one frame taken by the camera and if there exists a change in any part of the body of a patient then, It will automatically generates an alarm and send a SMS via GSM module to a person sitting at a distant place (doctor and nurse) and display the warning on LCD Display and it also measure heartbeats of patient using heartbeat rate sensor.

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