International Journal of Current Research and Modern Education (IJCRME)
Impact Factor: 6.725, ISSN (Online): 2455 - 5428
(www.rdmodernresearch.com) Volume 2, Issue 1, 2017

EMERGENCY PORTABLE HEALTH MONITORING DEVICE USING MOBILE APPLICATION

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Cite This Article: P. M. Jai Ganesh & G. Nallavan, "Emergency Portable Health Monitoring Device Using Mobile Application", International Journal of Current Research and Modern Education, Volume 2, Issue 1, Page Number 177-183, 2017.

Abstract:

The Project Focuses on Monitoring of health instantly on the Field. For Instance we see lot of players having cardiac arrest or nerve injury and the time taken from the field to the ambulance takes time and that has lot of impact on players health in this project we use ECG Module, EMG Module , Respiration Sensor and body temperature sensor to monitor the players health instantly in Mobile App , We are Making this Parameter Monitoring device portable so that it is easy to carry and could see the parameters in Mobile App and could share the results to doctor so that they can start their treatment based on the result of sensors rather checking the parameters again that will save time and will also save the life of a player.

Introduction:

The domestic smart device market has continued to experience an explosive growth until now., this system introduces a wearable device that can be used with smart devices to frequently check and warn against collected data to create a smart wellness care service. This health monitoring system targets in the 30s~40s age bracket as well as families and allows users to compete against friends and families nearby as they take care of their health in a fun way2. Such wearable devices help to create an IoT where the internet is used to recognize situations in real life and provide smart services and is used together with big data, sensors

Trends in Health Monitoring System:

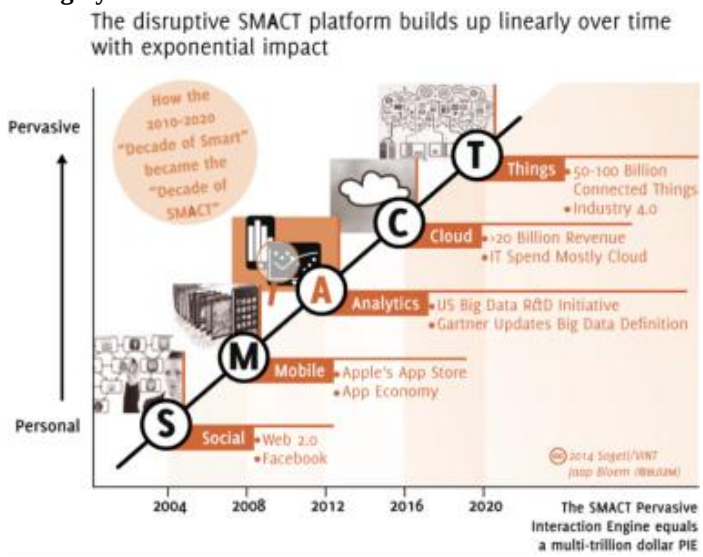

Figure 1

The trends in HMS is analyzed by a fascinating fact of SMAC Approach.

SMAC (Social, Mobile, Analytics and Cloud) is the Concept that Four Technologies are currently Driving Business Innovation:

SMAC creates an ecosystem that allows a business to improve its operations and get closer to the customer with minimal overhead and maximum reach. The proliferation of structured and unstructured data that is being created by mobile devices, sensors, social media, loyalty card programs and website browsing is creating new business models built upon customer-generated data. None of the four technologies can be an afterthought because it's the synergy created by social, mobile, analytics and cloud working together that creates a competitive advantage. Social media has provided businesses with new ways to reach and interact with customers, while mobile technologies have changed the way people communicate, shop and work. Analytics allow businesses to understand how, when and where people consume certain goods and services and cloud

computing provides a new way to access technology and the data a business needs to quickly respond to changing markets and solve business problems. While each of the four technologies can impact a business individually, their convergence is proving to be a disruptive force that is creating entirely new business models for service providers.

The integration of the technologies requires clear policies and guidelines as well as management tools that can automate business processes. The media company Netflix is often cited as an example of a business that has successfully harnessed the power of SMAC. For example, when a Netflix member streams a TV show from the Netflix cloud to their iPod, they are given the option of signing into Netflix with Face book's social login. After viewing a show, members are given multiple ways to provide social feedback. They can rate content with stars, write reviews and/or share what they just watched with friends on Face book or Twitter. Customer data is stored in the cloud and Netflix can break down its analysis to such a granular a level that its recommendation engine can personalize suggestions for individual family members who share the same account, a concept known as 1:1 marketing.

Proposed Work:

The wearable device system proposed in this study utilizes previous research, a connection to a 365 homecare health service and a small Wireless Body Area Network (WBAN) between the devices to swiftly alert relevant authorities and guardians when problems arise with the user's health. The temperature sensors, ECG, EMG, Temperature, Respiration and the GPS sensors embedded in the wearable device can sense fires and other emergency situations to use 4G or 3G to forward the user's status and location information via Wi-Fi or the Bluetooth on smart phones to the 365 homecare health service TAB as shown in Figure 5. The TAB forwards the information to relevant institutions and persons so that swift action can be taken. This portable health monitoring system can be made to look like an accessory in general as it does not require a large device since it does not process information in itself, nor a big display monitor as shown in circuit diagram.

Technical Description:

Software Requirements:

- ✓ Arduino IDE, AVR Studio
- ✓ Embedded c
- ✓ MIT APP INVERTER

Hardware Requirements:

- ✓ LCD DISPLAY
- ✓ ATMEGA328
- ✓ ECG
- ✓ EMG
- ✓ RESPIRATION
- ✓ TEMPERATURTE
- ✓ BLUETOOTH

Block Diagram:

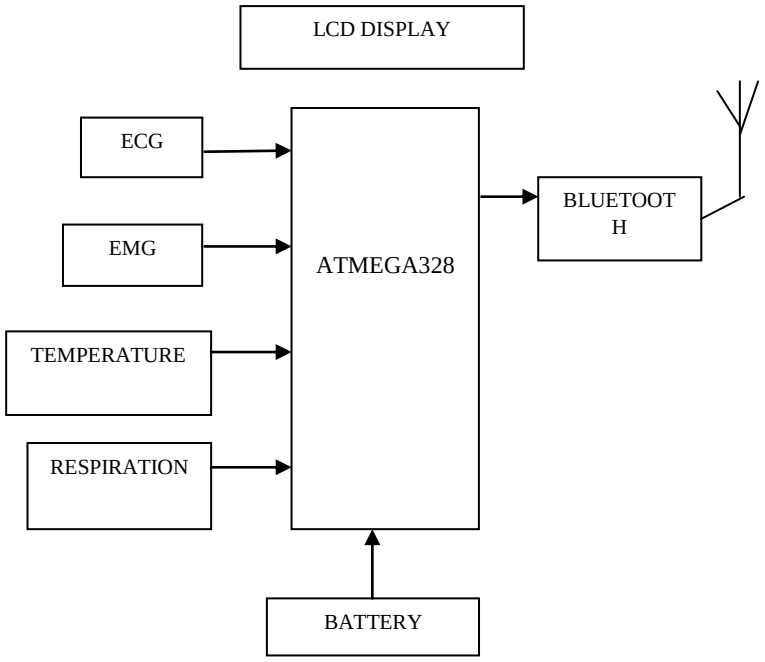

Figure 4

Circuit Diagram:

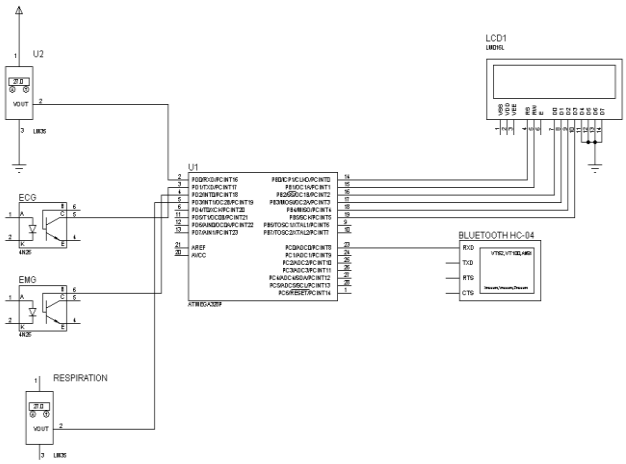

Figure 2

LCD Display:

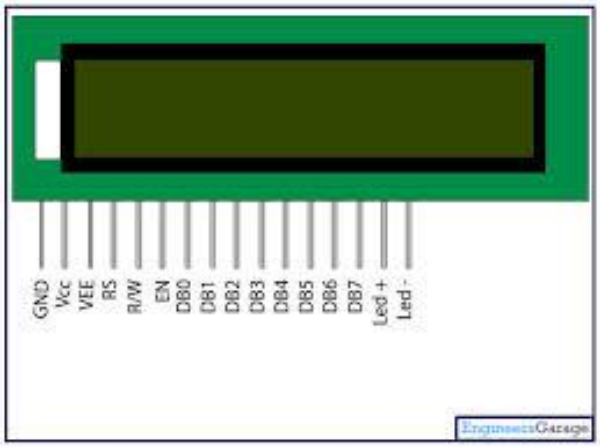

Figure 3

Introduction:

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.

Arduino Overview:

Figure 5

Arduino is a single-board microcontroller to make using electronics in multidisciplinary projects more accessible.

The hardware consists of a simple open source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM.

The software consists of a standard programming language compiler and a boot loader that executes on the microcontroller.

Specifications:

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Dital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

ECG:

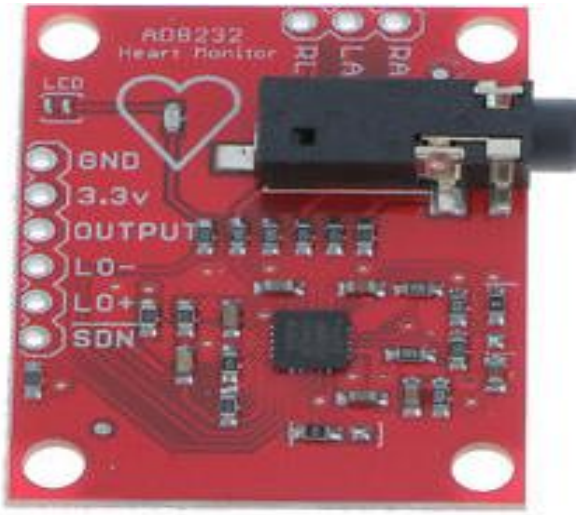

Figure 6

- ✓ Fully integrated single-lead ECG front end Low supply current: 170 µA (typical)
- ✓ Common-mode rejection ratio: 80 dB (dc to 60 Hz) Two or three electrode configurations
- ✓ High signal gain (G = 100) with dc blocking capabilities 2-pole adjustable high-pass filter
- ✓ Accepts up to ±300 mV of half cell potential Fast restore feature improves filter settling uncommitted op amp
- ✓ 3-pole adjustable low-pass filter with adjustable gain leads off detection: ac or dc options
- ✓ Integrated right leg drive (RLD) amplifier Single-supply operation: 2.0 V to 3.5 V
- ✓ Integrated reference buffer generates virtual ground Rail-to-rail output

EMG Sensor:

Electromyography (EMG) is an electrodiagnostic medicine technique for evaluating and recording the electrical activity produced by skeletal muscles.[1] EMG is performed using an instrument called an electromyography to produce a record called an electromyogram. An electromyograph detects the electric potential generated by muscle cells [2] when these cells are electrically or neurologically activated. The signals can be analyzed to detect medical abnormalities, activation level, or recruitment order, or to analyze the biomechanics of human or animal movement.

EMG Signal Decomposition:

EMG signals are essentially made up of superimposed motor unit action potentials (MUAPs) from several motor units. For a thorough analysis, the measured EMG signals can be decomposed into their constituent MUAPs. MUAPs from different motor units tend to have different characteristic shapes, while MUAPs recorded by the same electrode from the same motor unit are typically similar. Notably MUAP size and shape depend on where the electrode is located with respect to the fibers and so can appear to be different if the electrode moves position. EMG decomposition is non-trivial, although many methods have been proposed.

Layout (Top View):

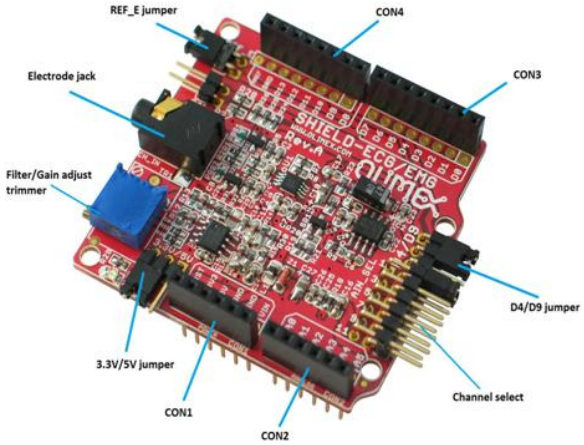

Figure 7

Force Sensing Resistors:

An Overview of the Technology:

Force Sensing Resistors (FSR) are a polymer thick film (PTF) device which exhibits a decrease in resistance with an increase in the force applied to the active surface. Its force sensitivity is optimized for use in human touch control of electronic devices. FSRs are not a load cell or strain gauge, though they have similar properties. FSRs are not suitable for precision measurements.

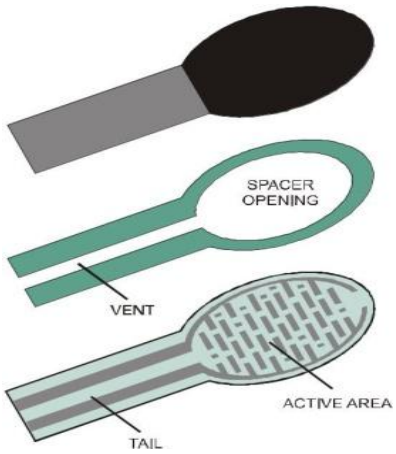

Figure 8

Blue Tooth:

Overview:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

Results and Discussion:

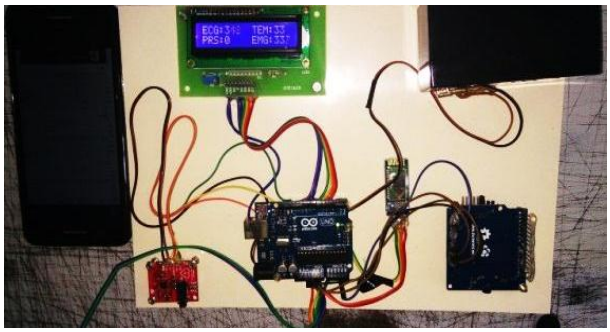

Figure 11

The developed protype is tested & verified. The parameters (ECG, EMG, respiration, force) has been taken from the athletic Mr.Sigamani at normal condition and post his regular workout. The below figure depicts the evidence of data collection. The liquid electrode applied on pressure points of right and left hand. The wire connected to the pressure point to the sensors. The results and graph is shown below.

In this study, a MOBILE APP based portable wireless health monitoring and clinical alarm system is performed. Human's ECG, body temperature and heart rate information are acquired and sent to a MOBILE APP using IEEE802.15.1 Bluetooth standard. If an emergency situation occurs, the MOBILE APP sends the information to the central server using either WLAN or BLUETOOTH wireless technology. Figure 8 shows the ARDUINO IDE and MOBILE APP worn by a player.

The Developed Protyped has been check on real time with player (Body Builder). A.Sigamani aged 25 years.

Figure 9

Figure 10

The above picture deipicts players health Para Meters before work out increases the players' movement freedom. Additionally, MOBILE APP's integrated technologies like Bluetooth, WLAN and BLUETOOTH are used in the proposed system. So, there is no need to implement extra hardware for communication. Also, ARDUINO IDE's physical size becomes smaller. On the other hand ARDUINO IDE can communicate any device that uses Bluetooth e.g. smart phone, laptop or desktop PC not only with the MOBILE APP.

Easy usage and portability of the system with alarming features has an important role in diagnosing the cardiac diseases and treatment. Also this system can be used to record events for some diseases like cardiac arrest, ventricular tachycardia or arrhythmia. The main advantage of the proposed system is decreasing the

intervention time to the player in an emergency situation. Consequently, proposed low-cost system can increase the life quality of players.

Furthermore, ARDUINO IDE and MOBILE APP are separated devices. ARDUINO IDE- MOBILE APP and MOBILE APP-central server communication is realized by wireless technologies. Therefore, whole system constitutes a distributed architecture and the system OUT PUT GRAPH MOBILE.

EMG ECG Presure Tempereture Seems normal condition further analysis has been done post work out also.

Below graph indicates the parameters post work out. The graph depicts the health parameters with a standard deviation which is been accepted as normal. If the value shoots up beyond standard deviation the health condition is abnormal

Figure 12

Conclusion:

We have analysed the Emergency portable health monitoring Device using Mobile Application for monitoring ECG, EMG, Pressure, Temperature of Player using Blue tooth, Wifi Etc. Any abnormalities in health conditions.

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