Final Year Project Report 2020-21

WEARABLE ANGER MONITORING SYSTEM

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ABSTRACT

Nowadays, emotion detection based on the physiological changes of the body is a major concern. Anger is one of the most destructive emotional states and needs continuous monitoring for a healthy lifestyle. In this study, we developed and implemented a wearable anger-monitoring system, which analyses various physiological changes during the state of anger in humans and notifies the monitoring unit using a global system for mobile communication. This is unique as it detects the human mood swing and realizes it on hardware. The developed low-cost noninvasive wrist band can be used all-day and anywhere for detecting anger.

INTRODUCTION

Health-monitoring systems are used for improving the quality of human healthcare with the help of fabricated biosensors, which are mostly noninvasive. Internet-of-Things (IoT) plays a major role in improving the healthcare services with low-cost and reliable sensors implanted in a wearable device in a body area sensor network. Every human reacts differently to the same situation; thus, there are no generalized parameters to detect mood swings. There is a need for some unique individual features that can provide accuracy toward an individual's emotion recognition. Anger or stress is one of the important emotions that can negatively affect health in the long-term. Thus, anger detection is extremely important and its symptoms can be identified by analyzing psychological, behavioral, physiological, or ergonomic parameters. Considering all these parameters would make the health monitoring system very accurate; however, such a system may be complicated, intrusive, and user position/mobility restricted. Anger is one of the most destructive emotions that affects the aforementioned physiological parameters leading to illness and is difficult to completely quantify and predict. The changes in physiological parameters are the result of the human body's reaction

to different emotions or moods and can be recognized through various biosensors integrated with IoT services.

Biosensors are commonly used in wearable health monitoring systems to measure physiological parameters such as pulse rate, respiration rate, skin conductivity, skin temperature, electrocardiogram, and sweat level. Different types of wearable sensor-based systems for monitoring health were thoroughly reviewed, analyzed, and presented by Pantelopoulos and Bourbakis.

LITERATURE SURVEY

THE DEVELOPED SYSTEM FOR ANGER AND VARIOUSEMOTIONS

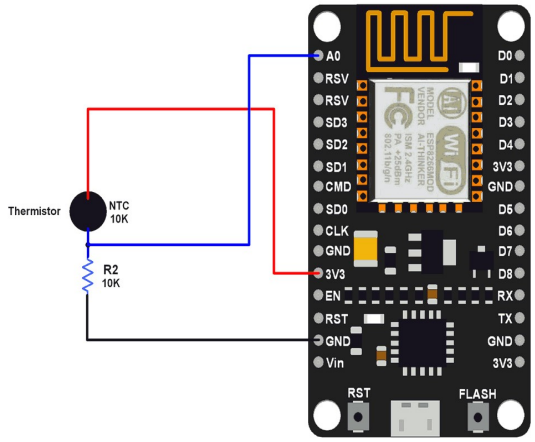
The currently developed WAMS is an integration of several biosensors and function modules, namely sensing of the sensor data, data processing, and data transmission. Figure 1 shows the prototype of the developed model and its components. This system is used as a wearable wrist band so that the sensors may remain in direct contact with the user's body and provide accurate measurements.

A global system for mobile communication (GSM) module was integrated with this system for providing mobile communication functionality. In addition, we developed an Android-based mobile application as a user interface for the WAMS so that data may be published on a graphical channel.

AccordingtotheAmericanAssociationfortheAdvancementofScience(AAAS),atmospherictemperatureandviolencearecorrelated.Theassociationpresented statisticalinformationinUSAabouttheincreaseinthevalueofparameters,suchas violentcrimerate,politicalissues,andcrimerateperapita,withtheincreasein atmospherictemperature.Thethresholdvaluesforthepulserateandskintemper

ature areestimatedusingthepre viouslyverifieddataobtai nedfromresearchconduct edinthis fieldearlier.

Inthisstudy,nospecificthresholdvaluewassetfor thepulserate.



Sensors integration:

Thermistor Sensor:

A thermistor is a type of resistor whose resistance is strongly dependent on temperature, more so than in standard resistors. The word is a combination of thermal and resistor. Thermistors are widely used as inrush current limiters, temperature sensors (negative temperature coefficient or NTC type typically), self-resetting overcurrent protectors, and self-regulating heating elements (positive temperature coefficient or PTC type typically).

How does a thermistor Sensor Works:

Thermistors are temperature-dependent resistors, changing resistance with changes in temperature. They are very sensitive and react to very small changes in temperature. They are best used when a specific temperature needs to be maintained, and when monitoring temperatures within 50°C of ambient.

Pulse sensor:

Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. ... The sensor clips onto a fingertip or earlobe and plugs right into Arduino with some jumper cables. It also includes an open-source monitoring app that graphs your pulse in real time.

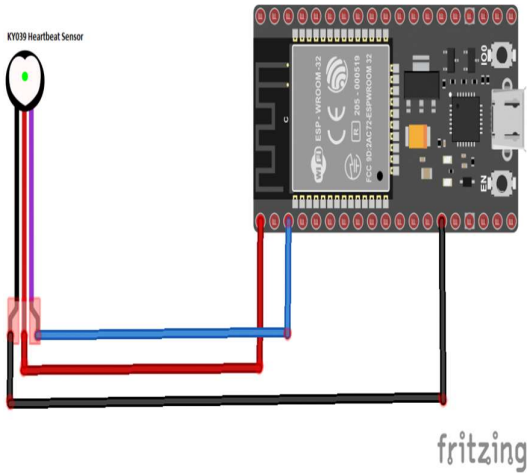
How does pulse sensor work:

Transmission types measure pulse waves by emitting red or infrared light from the body surface and detecting the change in blood flow during heart beats as a change in the amount of light transmitted through the body. This method is limited to areas where light can easily penetrate, such as the fingertip or earlobe.

Pulse sensor interfacing with esp32:

- Connect the “+” pin of the pulse sensor to the 3V3 of the ESP32 board.
- Connect the “-” pin to the ESP32 ground.

- The signal pin of the pulse sensor must be connected to an analog pin of ESP32. Connect the Analog pin of the pulse sensor to the A0 pin of the ESP32 (ADC values from 0 to 4095).
- Last, connect your ESP32 to the computer through a USB cable. The ESP32 will be powered from the USB 5V.



Accelerometer:

An accelerometer is a tool that measures proper acceleration. Proper acceleration is the acceleration of a body in its own instantaneous rest frame; this is different from coordinate acceleration, which is acceleration in a fixed coordinate system.

An accelerometer is an electronic sensor that measures the acceleration forces acting on an object, in order to determine the object's position in space and monitor the object's movement.

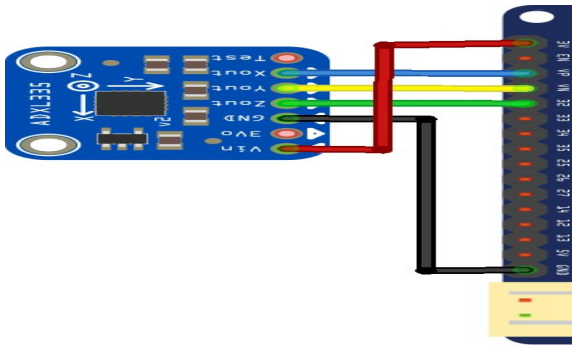
How does an accelerometer sensor work?

An accelerometer is a device that measures the vibration, or acceleration of motion of a structure. The force caused by vibration or a change in motion (acceleration) causes the mass to "squeeze" the piezoelectric material which produces an electrical charge that is proportional to the force exerted upon it.

Accelerometer interfacing with esp32:

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

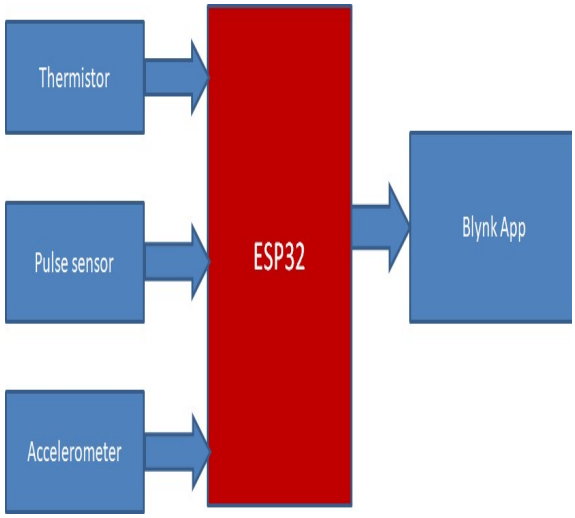
The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis.



Connect VCC pin to the 3.3V pin on the esp32 and connect GND pin to the Ground pin on the esp32. Also connect X, Y and Z output to the analog pins 32, 33 and 34 on esp32.

For accurate results, we need to change the analog reference(AREF) voltage of the esp32. This can be done by connecting the 3.3V pin on esp32 to the AREF pin.

BLOCK DIAGRAM:



SOFTWARE:

Blynk:

What is Blynk?

Blynk is a platform with iOS and Android apps to control Arduino, ESP8266, Raspberry Pi and the likes over the Internet. You can easily build graphic interfaces for all your projects by simply dragging and dropping widgets.

How Blynk Works:

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

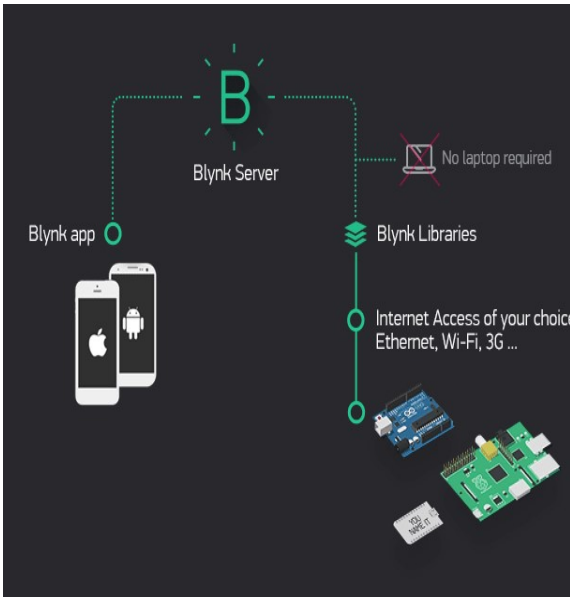
Blynk App - allows you to create amazing interfaces for your projects using various widgets we provide.

Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

Now imagine: every time you press a Button in the Blynk app, the

message travels to space the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.



APPLICATIONS:

- Health monitor.
- Security monitor.

RESULT:

After the connections of all the hardware components and dumping program code into the hardware of all the modules into the aurdino using arduinoIDE by installing all the necessary library files of Esp32 boards e.t.c then the result get successfully done compling.

FIG. SOFTWARE PREVIEW

ADVANTAGES AND APPLICATIONS:

- Portable devices.
- Easier than plugging into a power cable.
- Corrosion does not occur when exposed to the atmosphere.
- Safe for medical implants for medical devices.

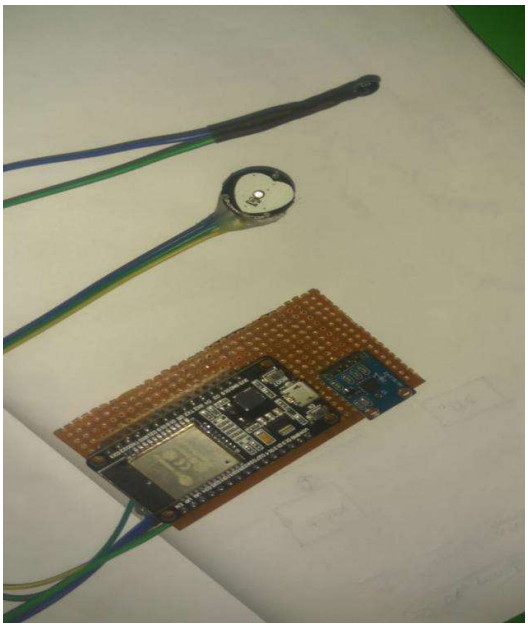


FIG. HARDWARE PREVIEW

CONCLUSION:

Thus, we implemented our code completel -y in arduino IDE and done compiling successfully.

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