PENBEAT

Eruva Akhil[1], Adireddy Aniketh Reddy[2], B. Sreeja[3], D. Vedasarayu[4], G. Preethi Reddy[5], K. Hyman Reddy[6]

[1,2,3,4,5,6]B. Tech Students, Department of Artificial Intelligence and Machine Learning, Vardhaman College of Engineering, Shamshabad, Telangana, India.

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Abstract - The potential idea that could have been done in the college days is PENBEAT. It is a device used to signal the user when their heart rate increases or decreases. Due to increase in deaths related to heart attacks, we came up with this idea of helping them with this IOT[Internet Of Things] enabled device. In this idea, we insert a sensor(pulse) inside the pen and connect it to button cells for power and connect the sensor to the mobile device making it an IOT device. With this, whenever there is an abnormal change in the heart rate, the user will be notified to control his heart rate. And if still the problem continues, the message will be sent to his/her family members. It helps in Monitoring your resting heart rate throughout the day.

Key Words: Heartbeat, problem, pen, sensor, IOT .

1.INTRODUCTION

This Heart rate /pulse is an important information about physical and mental state of a person. When a person is showing abnormal behaviour then his pulse is checked. By knowing the pulse rate, we can also say a person is saying truth or lie. There are various mechanisms to measure the heartbeat, such as touching the throat gently and counting beats, using a stethoscope for counting beats, using an electrocardiogram (ECG), or using a blood pressure monitor. [1]According to the latest report from the Times of India, nearly 2000 citizens lose their life every year due to heart attacks.

Sometimes, due to stress or pressure, people don't feel the symptoms of having a heart attack. There are new technologies entering into the medical field such as bypass, artificial heart valve surgery. Some which people can afford and some which cannot but what if we try to warn the person before having a heart attack.?. After observing the pain and problems faced by heart attack and conferences on many heart attack symptoms. After calculating the minimum monthly salary of an individual, we figured how much a person can spend on our idea. After conducting surveys and people's review, we decided to make a pen. We also decided to conduct awareness program to make people aware about the pen and importance of heart.

Instead of detecting the pulse with conventional devices, such as an ECG or stethoscope, nowadays we find wearable devices that also provide vital parameters. In this section we will explain different approaches of sensing the user's HR. A common way of pulse rate detection is to manually grab the wrist and to feel and count the pulse within a given time period. Many wearable devices in turn make use of optical sensors in order to detect the user's heart rate and saturation of peripheral oxygen. A common system to achieve this is palpitation- oximetry, which is extensively used. similar detectors are frequently enforced into cutlet-clips, or at the bottom point of a wrist worn device, similar as a smartwatch.

In [2]Amon Anliker, demonstrate a dimension of heart rate, blood pressure, ECG- exertion, supplemental oxygen achromatism, temperature and physical exertion at the wrist position.

Still, in general, optic heart rate detectors, similar as the ones used in smartwatches, aren't precise enough to be used for medical purposes. thus, others use electrocardiography (ECG) to calculate the stoner's HR. Hereby, the detector measures a bit's electrical change on the skin that originates from the heart muscle compression and depolarizes during each twinkle. This system is demonstrated with colourful wearables, similar as shirts with ECG electrodes

Other approaches, such as the one from [3]Garverick, use a continuous-wave Doppler ultrasound device for measuring the heart rate of a fetus. Another option is detecting the pulse from mechanical movements (e.g., through an accelerometer), such as demonstrated by Bieber, who place a smartwatch directly onto the user's chest.

2. MODELING AND ANALYSIS
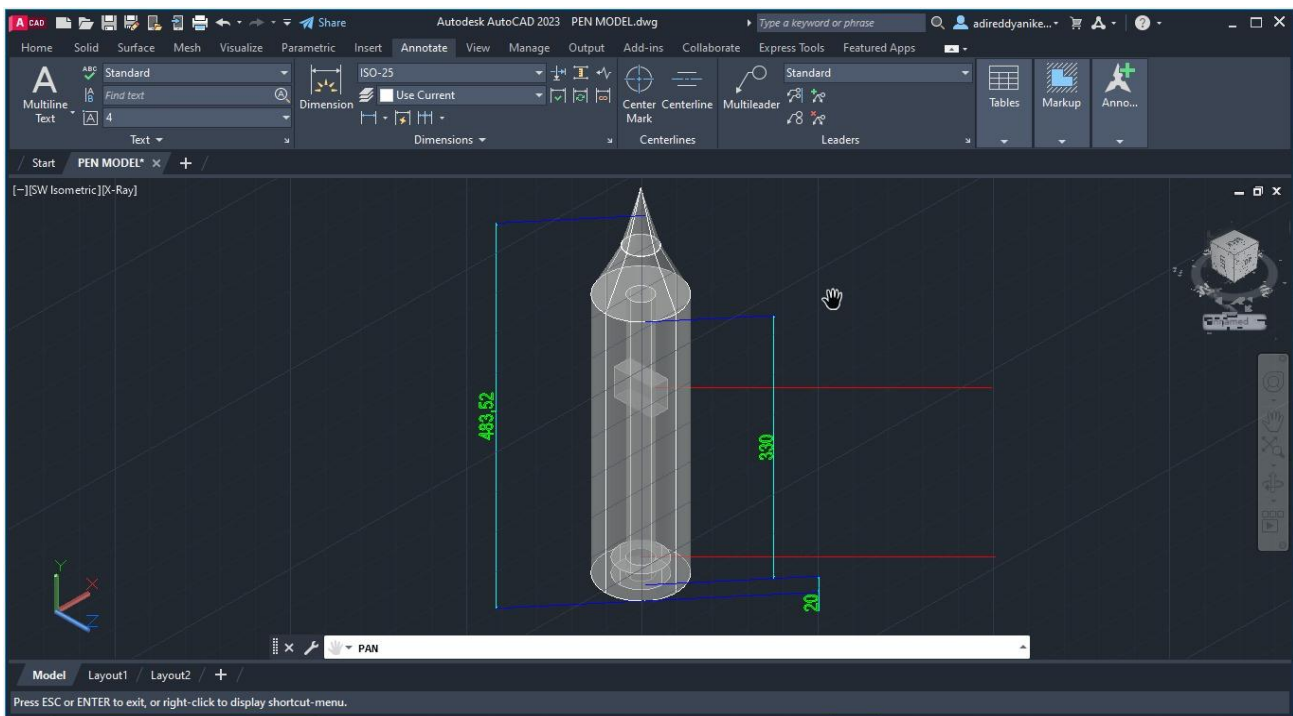
Figure 1: External Model of PENBEAT
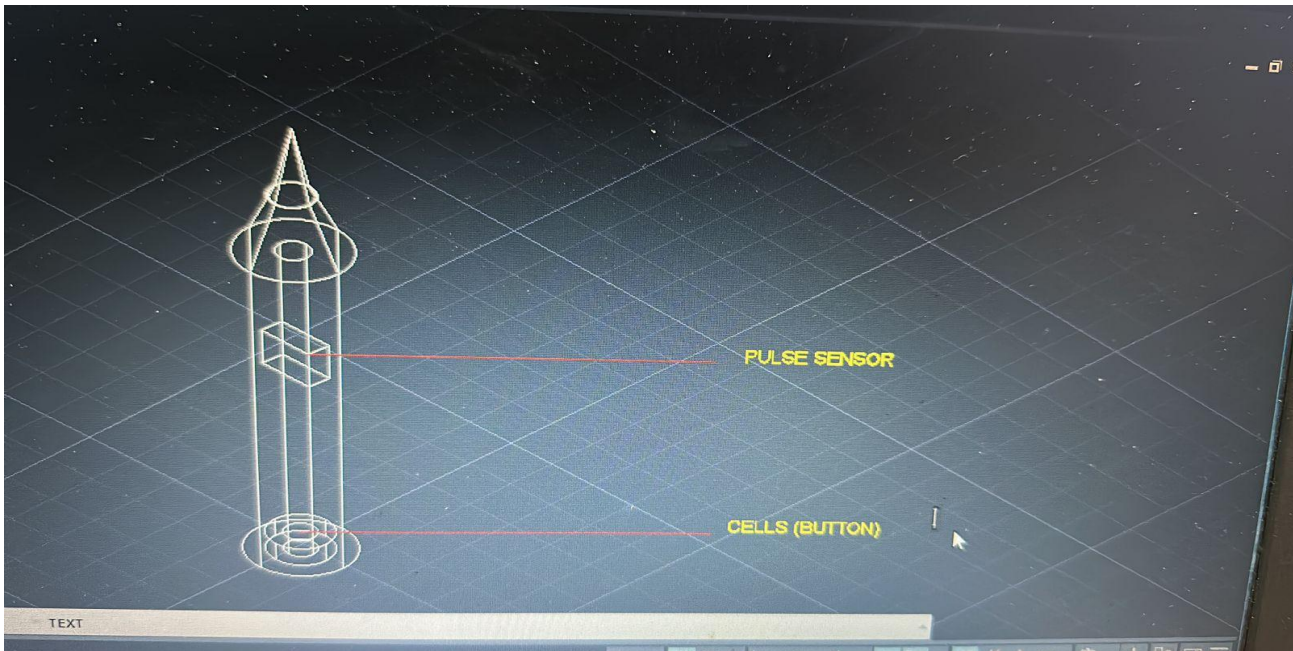
Figure 2: Internal Model of PENBEAT

The AutoCAD drawing shown in the above two pictures is the way we want our pen to be designed. The box shown near the grip where we hold the pen is the pulse sensor which is going to measure our pulse. It is powered by the box type diagram shown at the bottom of the pen. It is the button cells which we are using. The dimension that we have given are temporary because if we give more width then the person holding the pen may have a problem writing with it. And if we make it thinner than the pulse sensor and button cells won't fit in the pen.
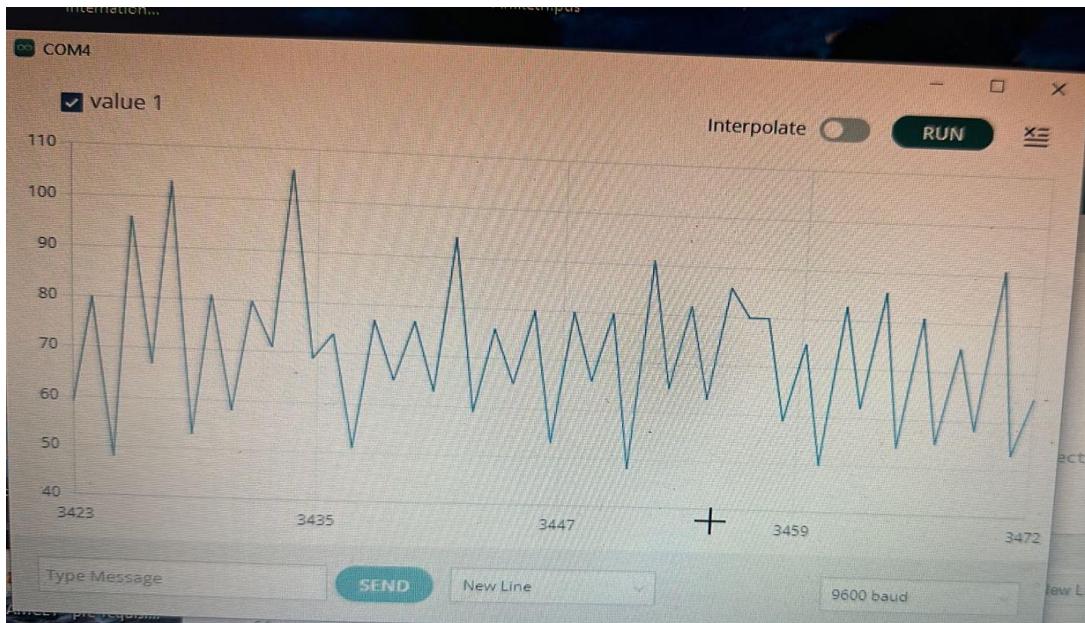
3.RESULTS

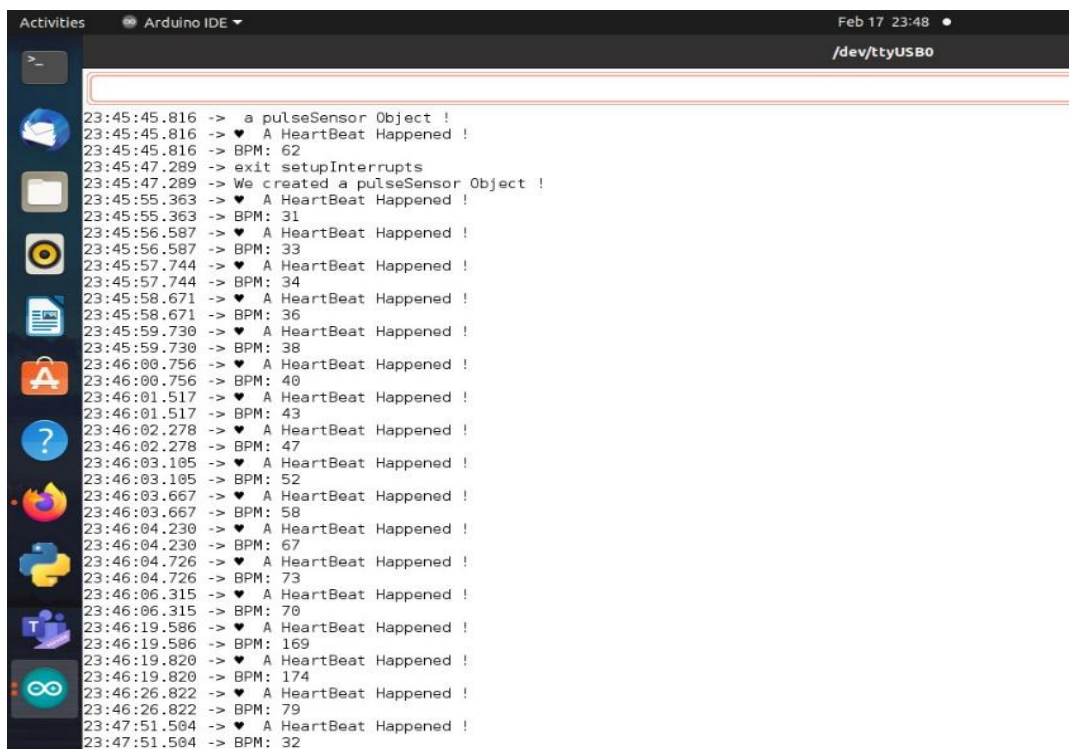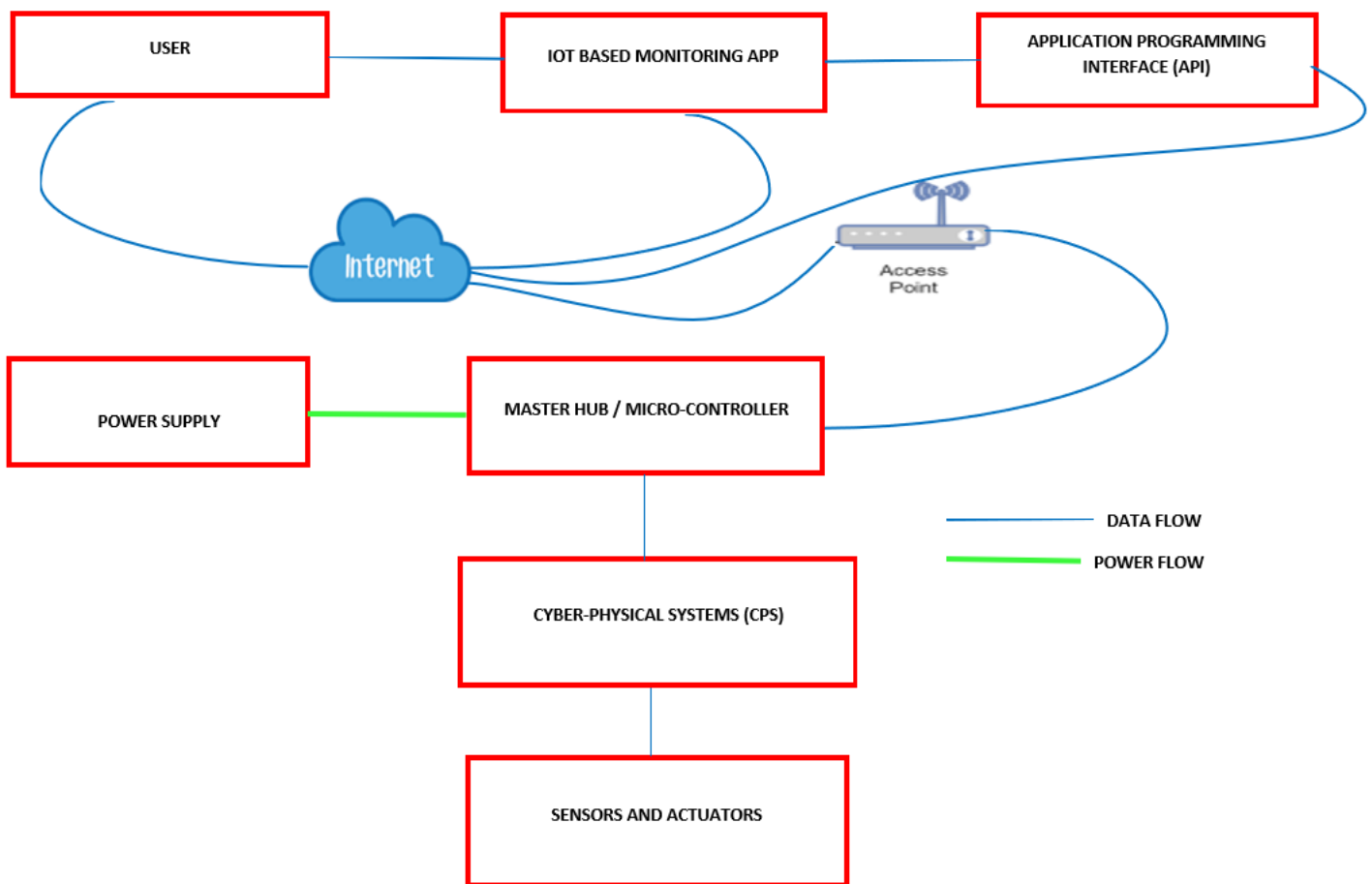**Figure 1:** pulse graph

Figure 2: pulse readings

4. METHODOLOGY

In this block diagram, we are converting a normal electronic device into an IOT based device. IOT- (Internet of Things) The connection of hardware of a machine to a software is known as IOT. Using the micro controller, we load the sensor code into it and run it. We connect the Arduino with the esp32c3 through Tx and Rx pins. Tx-Transmitter-Receiver

These pins are connected in the devices (Tx of Arduino to Rx of Esp32c3 and vice versa.)

In this way, the output will be sent to the esp32c3 device and based on the condition we provide, the message will be sent. ESP32C3 has an inbuilt Wi-Fi and Bluetooth in it. So based on the condition and nearby connections, it will provide the information. The basic idea of this project is calculating the pulse of a person using the pulse sensor and inform the person when his/her heart beat is abnormal(high/low). And all this will be done inside a pen.! Yes, this project is to make a pen which can sense the pulse at our finger tips and send a notification to the person's mobile phone. We are going to provide a voltage of 3.3v to the pulse sensor through ESP32 Devkit. And for signal we will place it in A0 of the kit.

5. LITERATURE SURVEY

Besides conventional methods like ECG and stethoscopes, wearable devices now offer HR monitoring. They use optical sensors based on pulse oximetry to detect the user's HR and oxygen saturation. Manual pulse detection is another approach. However, accuracy may vary, and consultation with healthcare professionals is advised. A common way of pulse rate detection is to manually grab the wrist and to feel and count the pulse within a given time period. Many wearable devices in turn make use of optical sensors in order to detect the user's heart rate and saturation of peripheral oxygen. A common method to achieve this is pulse-oximetry, which is widely used. Such sensors are often implemented into finger-clips, or at the bottom site of a wrist

[2]Amon Anliker's device measures heart rate, blood pressure, ECG activity, peripheral oxygen saturation, temperature, and physical activity at the wrist position. Unlike optical sensors in smartwatches, it uses ECG to accurately calculate heart rate by detecting the electrical changes during each heartbeat. This ensures precise measurements for medical purposes.

This method is demonstrated with various wearables, such as shirts with ECG electrodes. Other approaches, such as the one from Garverick, use a continuous-wave Doppler ultrasound device for measuring the heart rate of a fetus. Another option is detecting the pulse from mechanical movements (e.g., through an accelerometer), such as demonstrated by Bieber, who place a smartwatch directly onto the user's chest.

6. CONSTRUCTION OF PRODUCT:

- The vcc of the pulse sensor will be connected to 3.3v of esp32, GND of pulse sensor to GND of esp32 and signal pin of pulse sensor to A0.

- We initially set the limit to 95 i.e. if our heart beat is less than 95 it is going to send a notification to our mobile through the Xiao esp.

- We are going to place the sensor at the place where we hold the pen and keep button cells at the end of the pen for the sensor to get the power.

- We want to supply power to the sensor when the pen is turned on(to save the life of sensors).

7. CONCEPTUALIZATION:

The basic idea of this project is calculate the pulse of a person using the pulse sensor and inform the person when his/her heart beat is abnormal(high/low).

And all this will be done inside a pen based on the sensors and algorithm embedded in the ESP32.

Yes, this project is to make a pen which can sense the pulse at our finger tips and send a notification to the person's mobile phone.

Connect the pulse sensor to the ESP32 Devkit, providing 3.3V power and connecting the signal pin to A0.

Develop a program to read the analog value from A0, representing the pulse sensor output.

Set a threshold for high heartbeats and trigger an alert for the user when it's exceeded.

Continuously monitor the user's heartbeat and, if it remains high, notify their family members through SMS, email, or another chosen method.

Reset the alert status when the heartbeat falls below the threshold.

FUTURE WORK

Future research will be devoted to the adoption of other application areas, such as the detection of respiration rate, blood pressure, and muscle vibrations through the pen. Even though the accelerometer signal looks noisy, we believe this sensor to have the most potential, since it is very sensitive and accumulates the aforementioned bio signals as wel

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9. CONCLUSION

In this paper we proposed new design for a pulse measuring device, which is a simple ballpoint pen. Our design incorporates several benefits: it is small, lightweight, highly mobile, unobtrusive, and potentially more accepted by patients. We investigated pulse sensor and found the sensor is able to sufficiently recognize the patient's pulse rate. A concluding user study also revealed the **PENBEAT** to be potentially more accepted than other pulse measuring methods.

10. ACKNOWLEDGMENTS

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