ISOEVA-2022

6th INTERNATIONAL SYMPOSIUM OF EDUCATION AND VALUES

(6. ULUSLARARASI EĞİTİM VE DEĞERLER SEMPOZYUMU)

27-30 Ekim/October 2022

Kemer/ANTALYA

TAM METİN KİTABI

(FULL TEXT BOOK)

ISBN: 978-605-73901-6-5

KORİNT YAYINCILIK

THE MONITORING HEALTH SYSTEM: RESEARCH NEEDED

MR MUHAMMAD HAZİM BİN RAMROUSE MAZLAN
Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Malaysia
muhdhazim156@gmail.com

MRS MARIANA BINTI ROSDI
Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Malaysia,
annemariarose77@gmail.com

ABSTRACT

This study focused on a monitoring health system of measuring heart rate (bpm), body temperature, room humidity, and room temperature by using a DHT11 Temperature and Humidity sensor, temperature sensor, and heart rate sensor. Nowadays, people need to go to healthcare to check their body temperature or heart rate. In this way, people need to take a long time to get the results. This device can get the result immediately. Then, the user needs to connect the device to the phone and use the Apps to know the results. The data will be saved into the Apps. Methods for this monitoring system were users just put the devices whenever they wanted. There are four types of measurement included. The user can receive four measurements at the same time through the app.

Keywords: Health System, Temperatures, Humidity Sensor

INTRODUCTION

This project is conducted in order to develop a device and system that can measure data on health and surroundings. The data of health are body temperature and heart rate while the data of surroundings include room temperature and room humidity.

Humidity is the amount of water vapor in the air. If there is a lot of water vapor in the air, the humidity will be high. The higher the humidity, the wetter it feels outside. Typically, it the recommended that the home has a humidity level between 30 and 50 percent. If there is too much humidity, it is harder for the body to monitor internal temperatures. Meanwhile, too little humidity also has undesirable implications inside the home. Dry air can cause the skin to be itchy and cold and end with sore throats and chapped lips.

Temperature is the measure of hotness or coldness expressed in terms of any of several scales, including Fahrenheit, Kelvin, and Celsius. Temperature indicates the direction in which heat energy will spontaneously flow from a hotter body (one at a higher temperature) to a colder body (one at a lower temperature). Measuring body temperature is very important in medicine. A number of diseases are characterized by a change in body temperature. With other illnesses, the course of the disease can be followed by measuring body temperature. This allows the doctor to analyze the effectiveness of treatments based on body temperatures.

Heart rate is the speed of the heartbeat measured by the number of contractions of the heart per minute. Heart rate measurement is important because the heart's function is so important. The heart circulates oxygen and nutrient-rich blood throughout the body. When it's not working properly, just about everything is affected. Heart rate is central to this process because the function of the heart (called "cardiac output") is directly related to heart rate and stroke volume (the amount of blood pumped out with each beat). A normal heart rate is usually stated as 60 to 100 beats per minute. Slower than 60 is bradycardia ("slow heart"); faster than 100 is tachycardia ("fast heart"). Slow heart rate may be due to medication or sleep. Some signs of the disease might be hyperkalemia and Lyme disease. Healthy people can have a fast heart rate because they are exercising especially if it's rigorous or associated with dehydration. However, a fast heart rate also can develop a disease such as anemia and cardiomyopathy. Therefore, the user can track their heart rate to be concerned about their health.

PROBLEM STATEMENT

In the traditional healthcare system, people are required to visit clinics or medical centers regularly for medical checkups, which is less effective and time-consuming. The high medical cost and long waiting will discourage people from performing medical checkups regularly. A monitoring health system that collects multiple data and monitors the health status of the user in real-time will benefits the people by saving their money and time visiting clinics and medical centers unless there is a need for it.

Besides, the security of the health system is vital to safeguard the privacy of the user. People may avoid healthcare in sensitive areas due to health information privacy concerns. Smart wearable gadgets using IoT are

storing the collected health data in the cloud. Cloud storage allows users to enjoy high-quality services without any burden of storage maintenance. However, cloud users are more vulnerable to issues such as theft, confidentiality, and information leaked to the third party compared to local storage users. Storing confidential health information in the health system itself will help reduce the chance of information leakage, as the health information will only be accessible by authorized users which improve the security and privacy of the system.

Lack of security on privacy, IoT devices undoubtedly provide consumers with a fantastic experience, but security issues have always surrounded the IoT. To achieve the desired results, IoT devices must first exchange data over the internet, which is a place where hackers can often be found in large numbers. A data breach of any magnitude can severely disrupt an individual's personal life. IoT devices must share information with top-notch encryption to avoid data leakage. It would take a long time for this to happen. Increased complexity is another aspect that raises doubts about the reliability of the system. Since the IoT is such a vast and diverse network, it is possible for apps to malfunction or for the IoT infrastructure to collapse.

OBJECTIVE

The main objective of this project is to provide simultaneous data about body t°, heart rate, room humidity, and t° data.

More specifically the principle objective of this research are:

a) transmit the data to a host device.

b) testing the prototype on a human being.

c) access to the collected data stored in the database to keep track of the patient's health data.

d) collects and monitors the user's body temperature and heart rate in real-time.

SCOPE OF PROJECT

- Personal room
- Patient control room

IMPORTANT OF RESEARCH

- Detect heart rate early
- Easier handling

METHODLOGY

(Arduino Uno)

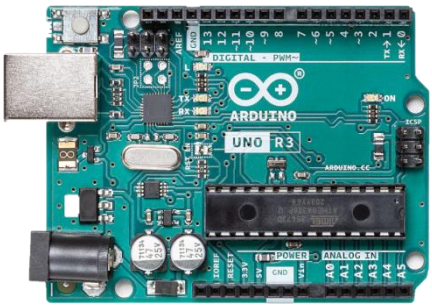


Figure 1: Arduino Uno board

Arduino UNO R3 is a microcontroller board which contains 14 digital input and output pins which 6 of it can act as PWM outputs, and another 6 act as analog inputs. It also includes with a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller by simply connect it to a computer using a USB cable or power it with a DC adapter or battery to get started. There are a few types of Arduino board that used nowadays but the most commonly used nowadays are Arduino UNO and MEGA. The difference between these two is only the number of input and output pins which Arduino MEGA have better number of input and output pins compared to 9 arduino UNO. In this modern day, Arduino are commonly used in microcontroller programing among other things due to its user friendly and easy to use setting, like any microcontroller, an Arduino is a small circuit board with chip that can be programmed to do numerous numbers of tasks, it sends information from the computer program to the Arduino microcontroller and finally to the specific circuit or machine with multiple circuits in order to execute the specific command. According to Yusuf Abdullahi Badamas, Arduino can help to read information from input devices such as sensors, antenna, Trimmer potentiometer and can also send information to output devices such as LED, Speakers, LCD Screen, and DC motor. According to Shamsul Aizal Zulkifli and Mohd Najib Russin, Arduino also can be used as microcontroller for 3 phase inverters while Tiffany Tang state that there was also a project that linking Arduino with Kinect to control motion This shows that there are so many applications an Arduino can be used for and in this project, Arduino will be used to process data gained before being transmitted to mobile phone.

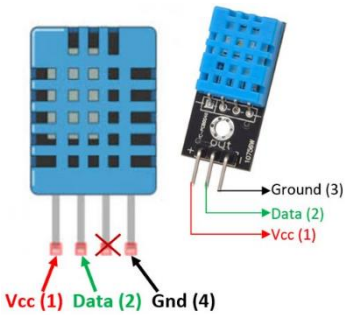


Figure 2: DHT11 Humidity and Temperature Sensor

DHT11, is a temperature and humidity sensor has four pins- VCC, GND, Data Pin and a not connected pin. A pull-up resistor of 5k to 10k ohms is probed for communication between sensor and micro-controller. DHT11

sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature. The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form [15,16,17]. For measuring temperature this sensor uses a Negative Temperature coefficient thermistor, which causes a decrease in its resistance value with increase in temperature.

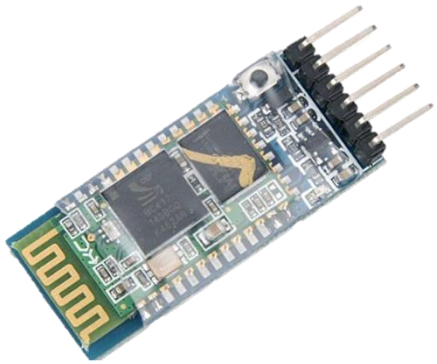


Figure 3: HC-05 Bluetooth Module

Bluetooth is a wireless data communication module that uses radio frequencies. The main function of this module is to replace the serial communication that used to be wired now to be wireless. Bluetooth consists of two types of devices, namely Master (data sender) and Slave (receiver). This HC-05 module is set by 9.600 bps by default (can be customized between 1200 bps to 1.35 Mbps). There are 2 types of types namely Bluetooth Module HC-06 series which can only act as slave devices, and Bluetooth Module HC-05 can also play a role as a bluetooth master device or slave, by default slave. (Dendi, Dkk, 2016).

Figure 4: Pulse Sensor

Pulse Sensor is a simple sensor which is used in many places. The basic sensor has three pins namely, ground, Vcc and the input signal(which is also known as A0 signal). The term pulse sensor represents that in order to find the heart beat rate. Thus, the sensor is in heart shape in its nature. The pin is constructed in such a way to indicate the heart rate. It can be used either in the breadboard or in the printed circuit board(PCB). When it is connected with the Arduino or with the ESP8266 Wi-Fi module, the LED is in ON condition. It works either in 3v or 5v with the help of internet connection.

BLOCK DIAGRAM

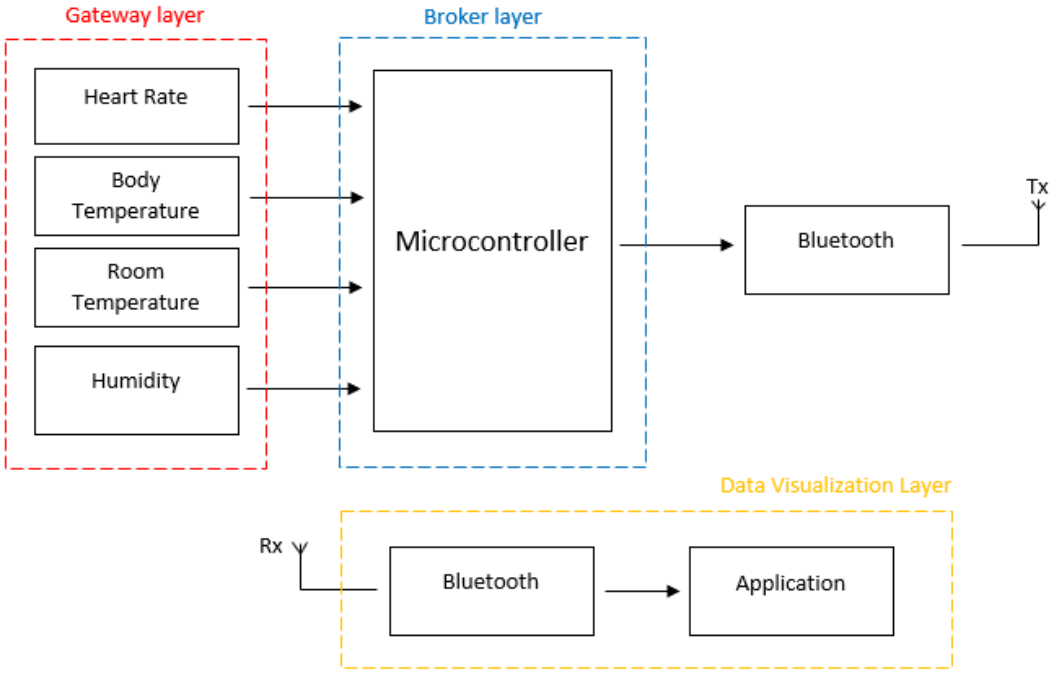


Figure 5: Block Diagram of the Project

This monitoring health system consists of three primary layers which are the gateway layer, the broker layer, and the data visualization and storing layer. The gateway layer consists of the LM35 temperature sensor, pulse sensor, DHT11, and Arduino UNO. The pulse sensor is connected to the Arduino UNO that sends the heart rate data via serial communication, the LM35 temperature sensor collects the body temperature of the user, and DHT11 sends the room temperature and humidity data that is connected to the HC-05 Bluetooth Module directly.

The broker layer consists of a broker that acts as the central processing unit in the system. The main processing unit used in this project is the Arduino Uno which is a simpler version of Arduino Mega 2560 that has less software installed in it and consumes fewer operating system sources. However, this project compatibility to use Arduino Uno R3 instead using Mega 2560 which reduces the cost of implementation. The health data collected by the broker will be visualized on the HC-05 Bluetooth Module and application software in real time. The Arduino broker will process all the data and direct every action programmed in the Bluetooth module.

The data visualization and storing layer consists of an HC-05 Bluetooth Module and MIT App Inventor an application for data preview as the data visualization platform. The health data of the user will be visualized in the application and updated in real time. Only authorized users will have access to view the data.

FLOWCHART

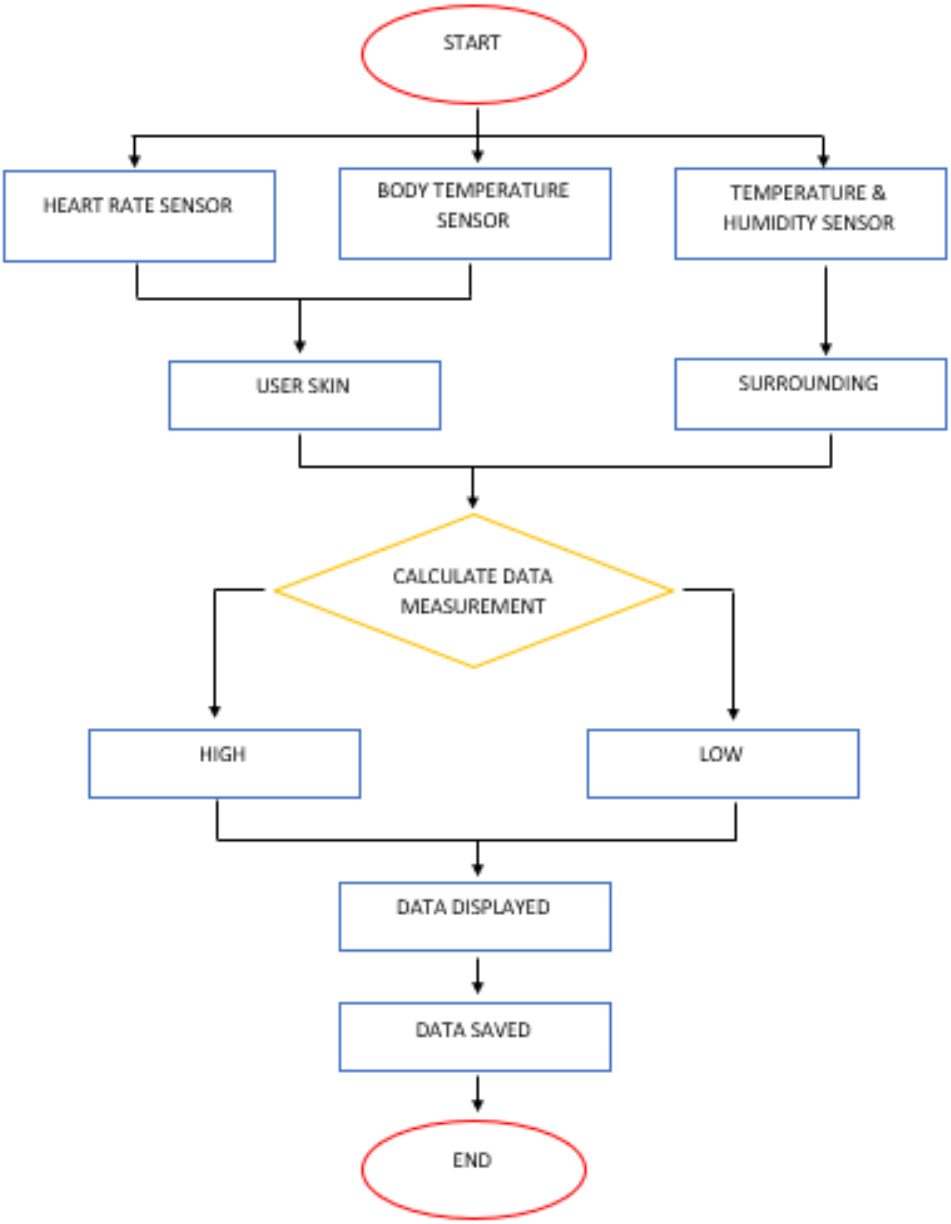


Figure 6: Flow chart of Monitoring Health System

SCHEMATIC CIRCUIT

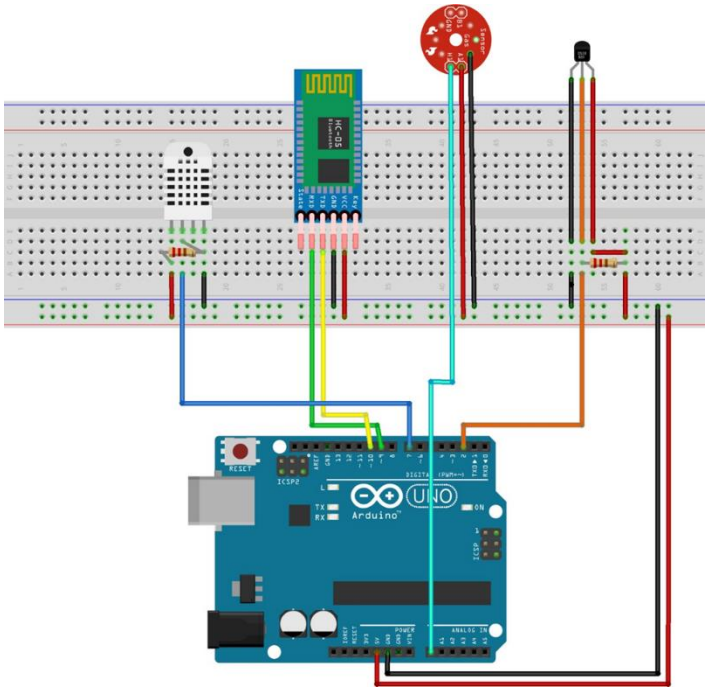


Figure 7: Schematic Circuit of Project

CIRCUIT DIAGRAM

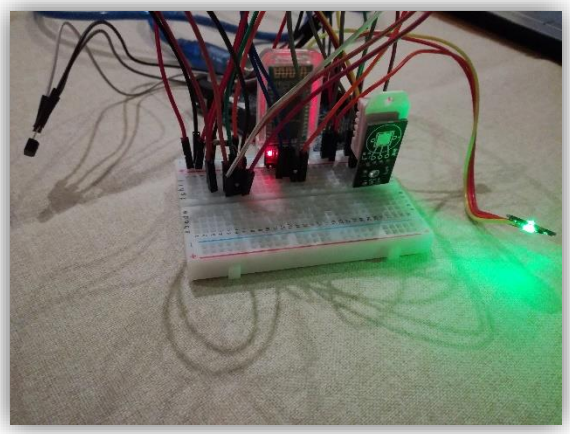
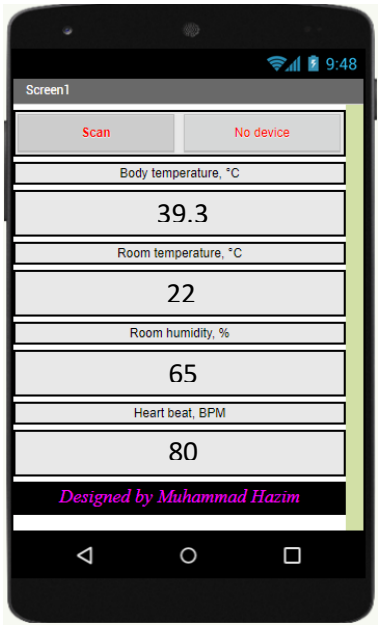
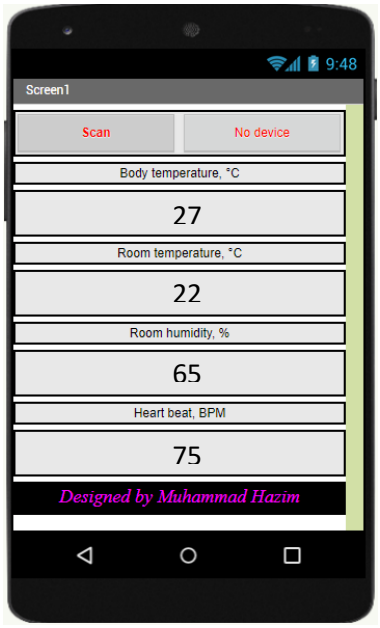
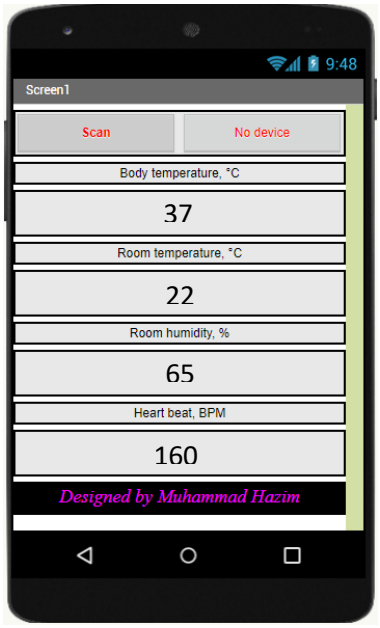
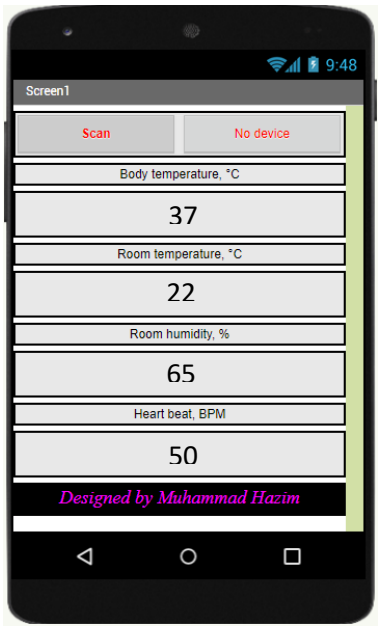
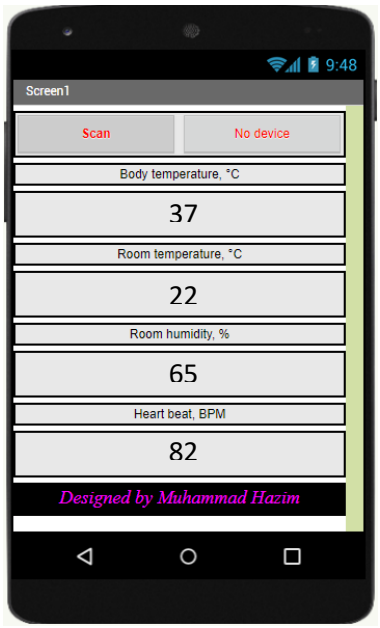
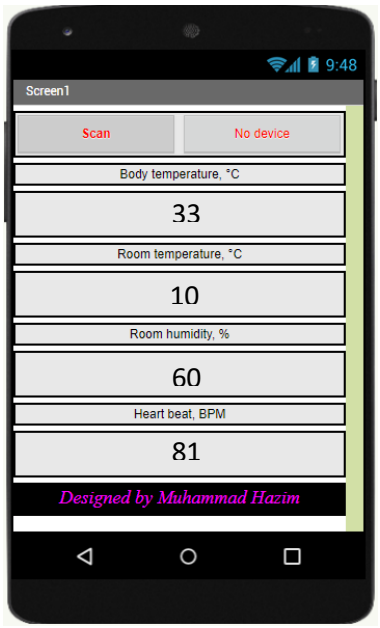


Figure 8: Circuit Diagram of the Monitoring Health System

EXPECTED RESULT

The result of the output from the data is estimated by some conditions. The data of measurement will interface through the application on the mobile phone.

Fever Patient	Hypothermia	Tachycardia
		
Bradycardia	**Normal Person**	**Cold Room**
		

CONCLUSION

In conclusion, the system developed for patient monitoring based on the Internet of things is an alternative that can be used to help users with tracking data of health and surrounding. Likewise with this set of solutions the aim is to improve the quality of life of the user, not just by monitoring them, but also to enable directing them to improve their lifestyle.

The context model developed for the system proved to be efficient when making inferences related to the context, such as recommendations for taking measures through sensors, as well as recommendations and workout routines tips to improve the eating habits of users.

REFERENCES

National Geographic websites [Online]. Available: https://www.nationalgeographic.org/encyclopedia/humidity/

Air Temperature Control websites [Online]. Available: https://www.airtemperaturecontrol.net/blog/why-is-the-right-amount-of-humidity-so-important-for-your-home#:~:text=If%20there%20is%20too%20much,also%20result%20in%20energy%20savings.

Britannica Encyclopaedia [Online]. Available: https://www.britannica.com/science/temperature

Microlife websites [Online]. Available: https://www.microlife.com/magazine/fever/why-you-should-measure-body-temperature

Ronesh Sinha, M.D., Sutter Health [Online]. Available: https://www.sutterhealth.org/health/heart/get-to-know-your-heart-rate-it-might-save-your-life#:~:text=Track%20Your%20Heart%20Rate,dehydration%2C%20inactivity%20and%20persistent%20stress.

Robert H. Shmerling, MD, Senior Faculty Editor, Harvard Health Publishing; March 25, 2020 [Online]. Available: https://www.health.harvard.edu/heart-health/hows-your-heart-rate-and-why-it-matters

International Journal of Engineering Research & Technology (IJERT), Vol. 9 Issue 12, December-2020