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Research Article

Health Monitoring of Employees for Industry 4.0

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On a daily basis, young agers engage in a range of activities. There are numerous things to do, such as attending class, participating in a group project, and going grocery shopping, to mention a few. If a student becomes ill, he or she must visit the clinic for treatment and a note of discharge. Researchers contribute using IoT to display health status in order to decrease the likelihood of becoming unwell. Young agers can use this tool to see if their pulse rates are normal or not. Young agers can see their pulse rate by using the IoT to display their health status. This tool will also assist pupils in reaching their full potential and improving their personal health by determining their optimum pulse rate. Young agers will always keep a healthy lifestyle in order to function in the society. This tool can also serve as a reminder to kids that good health is essential for survival. This method can be used to detect whether a person's pulse rate is normal while exercising, according to the findings of this study. Such application can be applied in Industry 4.0 in order to evaluate young employee's health condition to produce better industry outcome.

1. Introduction

In your medical situation, thanks to the Internet of Things concept, young agers may look after their pulse rate. This process will assist them to get better in their skills. This tool can help young agers maintain their health by determining their pulse rates at the appropriate level. For example, in order to function in their daily lives, young agers will always maintain a healthy lifestyle. This is because you have a lot on your plate as a student, such as going to class, meeting for group projects, and going grocery shopping. If a student becomes unwell, he or she must seek care and obtain a note of discharge from a clinic. Additionally, sick kids are more likely to fail in school, keep their grades, and drop out [1].

In your medical situation, young agers can learn to regulate their pulse rates within acceptable limits by employing pulse and hand-held sensors as a display, based on the IoT concept. Pulse rate can be monitored by wearing a wrist pulse sensor and using pulse detector apps. This technology should be able to go much further and be used as effectively as possible to help young agers improve their health. This tool can also act as a reminder to children that maintaining good health is essential for survival. This tool is always available to young agers and can be used to assist them in making health-related decisions. This tool can be used by young agers to plan their daily activities and live a healthy lifestyle.

Because of the tool's broad breadth, everyone is encouraged to use it. This tool's objective is to ensure that a student's health is emphasized. This is because health is valued so highly in today's society. You will get issues like fever and high blood pressure [2] if you do not take care of your health. The purpose of showing health status using the IoT concept is to meet the needs of young agers who want to learn more about their health and how to improve their performance.

One of the key aspects of Industry 4.0 is employee health monitoring [1, 3], and in this work, it highlights the essence of health monitoring system for the betterment of the

employees. The end result of Industry 4.0 is fully depended on employee health perspective tracking their overall health status [4].

2. Methodology

To finish the investigation, information was gathered via exploring several websites to identify the necessary materials, as well as selecting and purchasing commodities. There are two types of purchases available. A bulk purchase is the first option. This is due to the fact that certain things are required at wholesale pricing, while others are identical. This method allows you to save time and money. Another item from the first category appears in the second. These items are searched after to finish the research in order to avoid wastage.

2.1. Requirement Specification and Analysis

2.1.1. The Way Specifications Helped. Specification for displaying a person's health status is based on the emphasized problem description; an IoT concept was created. Young agers' time limits and time have been identified as a problem statement since they are focused on their work and rarely care for their health. Young agers who want to keep track of their health should do so, even if it is just for a few minutes. It will force young agers to lose sight of their health, placing them at risk of getting ailments that are damaging to their bodies. In addition, rather of learning about their health first [5], young agers will seek therapy at a nearby clinic, despite the fact that there are other resources available.

Young agers can use the IoT-based showing health status system to help them solve problems. Because the technology can help young agers determine their heart rate and avoid trips to the clinic, it is a win-win situation. In addition, if you have a problem, this device can help you save money on pharmaceuticals.

The device was inspired by existing pulse-measuring technology. Users can purchase this instrument because it is made on a small scale. Young agers can afford to buy a pricey pulse-measurement device because they are not harmful. As a result, this tool was developed to aid young agers in addressing this issue without having to spend a lot of money on existing pulse devices.

2.1.2. Communication with Consumer. According to correspondence with young agers, the majority of the young agers in the sample are taken from freely available datasets especially deals with health status of teen ages as teen agers are highly affected with the vulnerable diseases [6]. In addition, academics are communicated with at a weekly meeting in the lecturer's room. As a result of their collaborative communication, the displaying health status using the Internet of Things concept is deemed appropriate and consistent with the stated objectives, functions, issue statements, scopes, and modules. The significant majority of them feel that the concept of displaying health status using the Internet of Things has the potential to grow and be explored further.

2.1.3. Constraint. Time restrictions and insufficient time due to their busy work schedules are some of the challenges that arise prior to the introduction of showing health status based on the IoT concept. As a result, showing health status using IoT was developed in order to display and record their heart rate using a better structured mobile phone.

Furthermore, if the purchased item does not arrive on time, this is one of the restrictions that may arise throughout the tool's implementation. Furthermore, the purchased item is defective or damaged. Furthermore, tool damage is a constraint that occurs after the deployment of Displaying Health Status Based on the Internet of Things Concept. Because this equipment does not display their pulse rate on their phone, they must purchase new equipment to continue their research.

2.1.4. Rational. It is hoped that this tool will be improved in the future, notably by offering tools for more aspects that young agers or other parties involved can use and accept. The tool's implementation will also be refined and improved in the future. The purpose of implementing the Displaying Health Status Based on the Internet of Things Concept is to help young agers maintain their health so that they can enjoy the daily lives of this globalized period in a healthy body.

2.1.5. Specification of Details. In your health situation, the notion of the Internet of Things (IoT) is based on the Internet of Things (IoT). The heart beat sensor calculates a person's BPM using a pulse device. The pulse sensor detects changes in blood volume caused by the heart's pumping of blood throughout the body. As blood volume changes, so does the intensity of light travelling through that organ. This modification will then be translated by the Arduino into BPM (beats per minute) [7, 8]. It can be taken on a regular basis by heart patients and health-conscious persons. The ESP8266 Wi-Fi module uploads the BPM data to the Thing Speak Internet server. A person can obtain this data by just logging into their IoT Analytics Cloud account. IoT Analytics Cloud is a web-based open API IoT source information platform that saves and visualizes sensor data from a variety of "IoT applications" [9]. The server will also keep track of previous information. As a result, people can maintain track of their heart rates on a regular basis.

2.1.6. Design. The process of design is the second stage. A number of diagrams have been generated and presented for this level of the tool's development. One of the diagrams created by researchers is the schematic diagram. The diagram was created to assist in the development and implementation of the Displaying Health Status Based on the IoT Concept by displaying the tool's concept and journey.

The implementation technique is designed to present health status and is based on the IoT concept. C++ was used to create this valuable tool. The Arduino IDE and Notepad + + were used to produce this code. The Arduino IDE is based on the processing [10] programming language and is built in Java. Several UPSI students are putting the Displaying Health Status Based on the Internet of Things Concept to

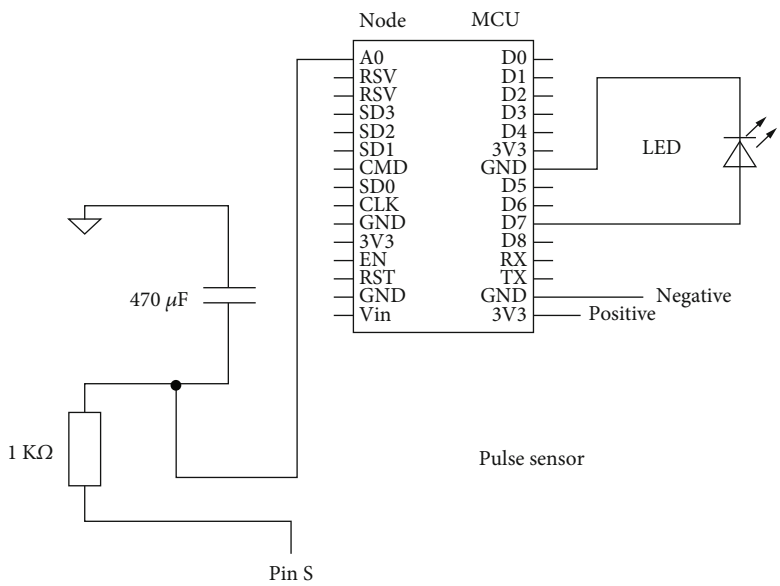

Figure 1: Analytics flow.

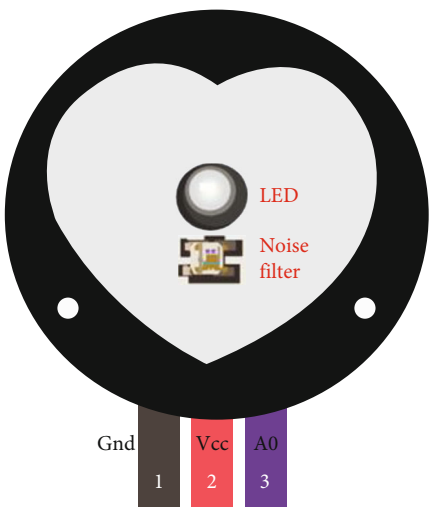

Figure 2: Heart rate sensor.

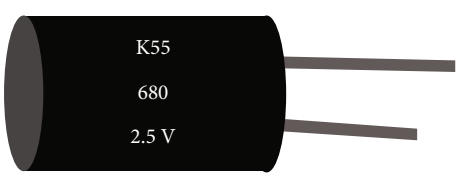

Figure 3: H-Chips.

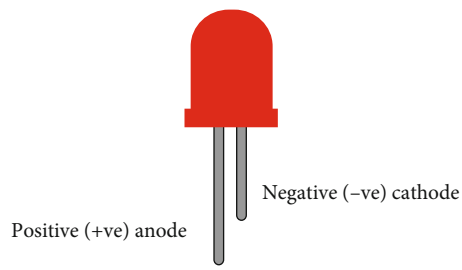

Figure 4: LED.

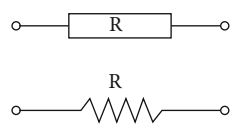

Figure 5: Resistor.

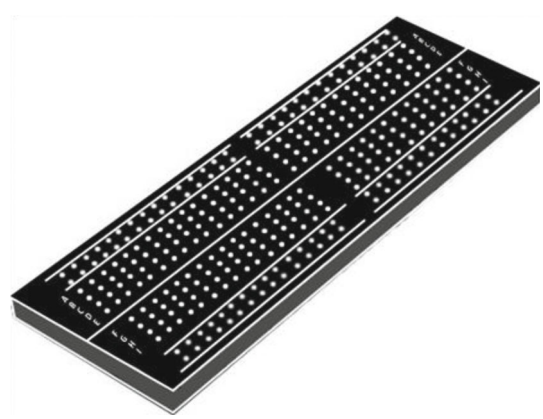

Figure 6: Breadboard.

the test and obtaining study findings using this tool's user-friendly ways. The following is a breakdown of the development process. Once the research results were repeated several times, and samples were gathered, this technique could be used to fix Displaying Health Status Based on the Internet of Things Concept.

The Arduino platform is employed in this investigation. The ESP8266 Wi-Fi module takes analogue values from the pulse sensor and uploads them to the IoT Analytics Cloud

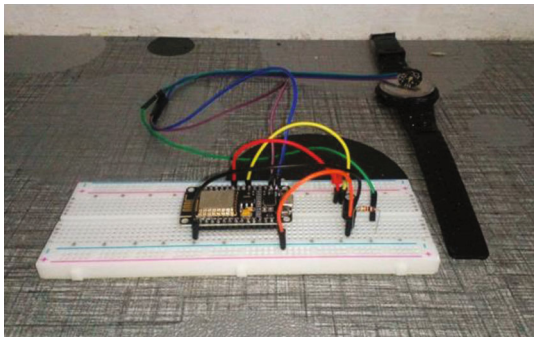

Figure 7: View 1.

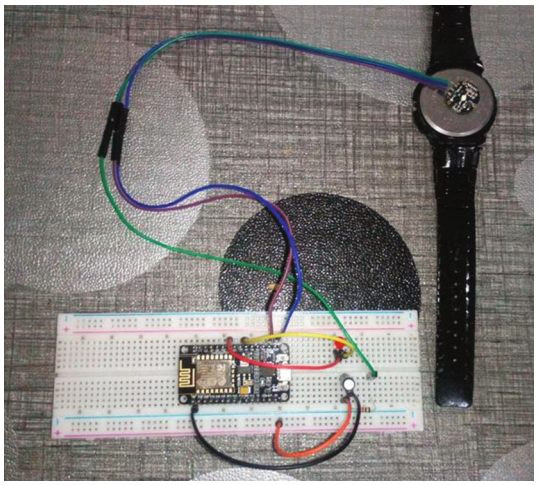

Figure 8: View 2.

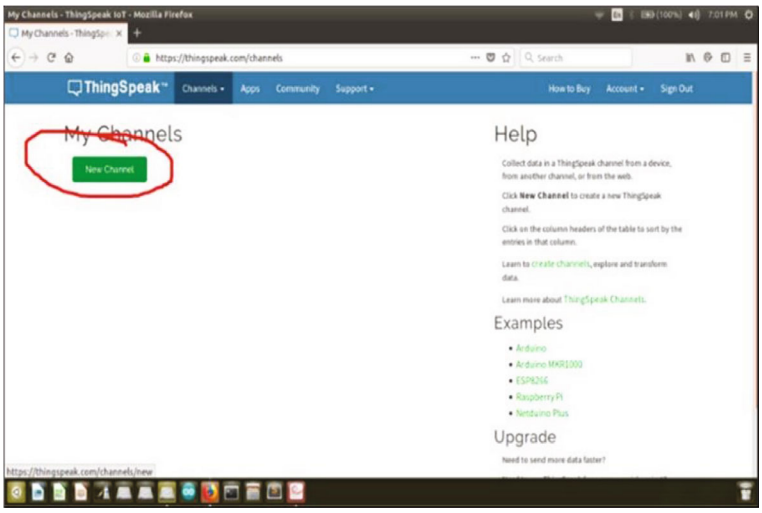

Figure 9: IoT Analytics Cloud create channel.

server over the Internet using a small battery as a power supply. A person's heart rate is measured in beats per minute by the pulse sensor (BPM). The circuit is linked together by a 10K-ohm resistor and a 10-microfarad capacitor. By utilizing resistors for voltage control and a capacitor to lower the voltage buffer, the noise from the pulse sensor can be reduced, while the ESP8266 collects analogue data.

2.2. Schematic Diagram. Figure 1 depicts a conceptual diagram for this study.

3. Work Architecture

The following components were used in this study.

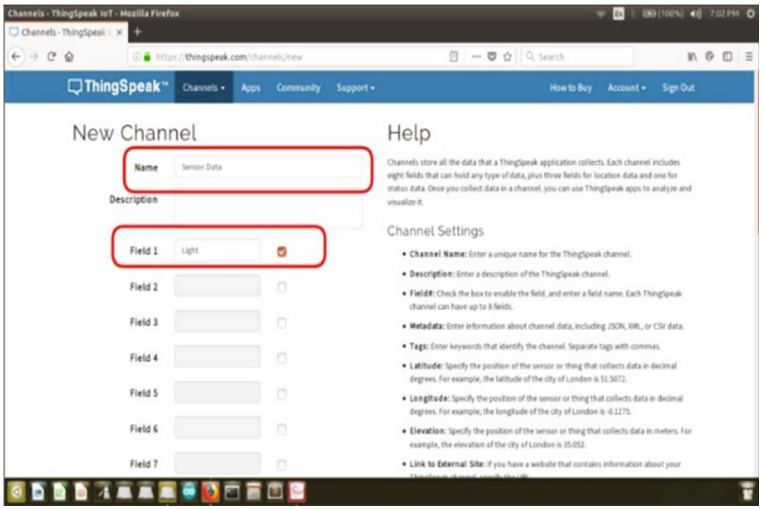

Figure 10: Creating new channel heart rate field.

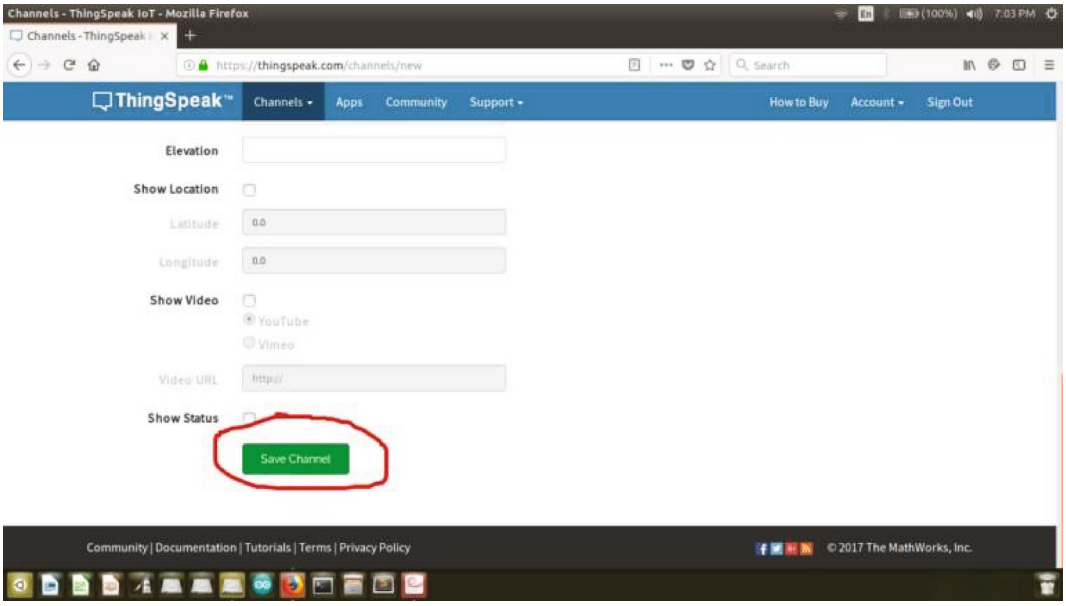

Figure 11: Save channel.

3.1. Heart Rate Sensor. The heart rate sensor is easy to operate, but it must be correctly mounted. The flat side of the sensor should be positioned on top of the vein with a small presser, which is generally done using clips or Velcro tapes. Figure 2 illustrates a pulse sensor.

3.2. Realtek RTL8710. On the control module's side of things, the Realtek RTL8710 is an open-source Internet of Things (IoT) platform designed to make electronic human-device connections more convenient [11]. Software for the Espressif Systems Realtek RTL8710 Wi-Fi SoC as well as hardware for the RTL8710 module are included in this package. As a result, the Realtek RTL8710's primary role is to connect to personal Wi-Fi networks in a way similar to that of a Broadband modem or router and parallel operated with SIM technology [12]. You can send data once you have established a Wi-Fi connection and store in datasheet [13] and are further accesses through health database [14] using Realtek microcontroller chip. The concept of NODE RED [15] is used to tracking the health behavior of the employee within the industry.

3.3. H-Chips. Farads are the units of measurement for electric capacitance, which is defined as the capacity of a body to store electrical charge in the absence of external stimulation. The ability to charge and discharge electricity is one of the two fundamental functions of capacitors [16]. Figure 3 depicts a microfarad capacitor in action.

3.4. LED. A light source that is small in size is called an LED. Low-energy light-emitting diode is what it stands for. The earliest known research of a light-emitting solid-state diode was published in 1907 by British scientist H. J. Round. Figure 4 shows how to make an LED.

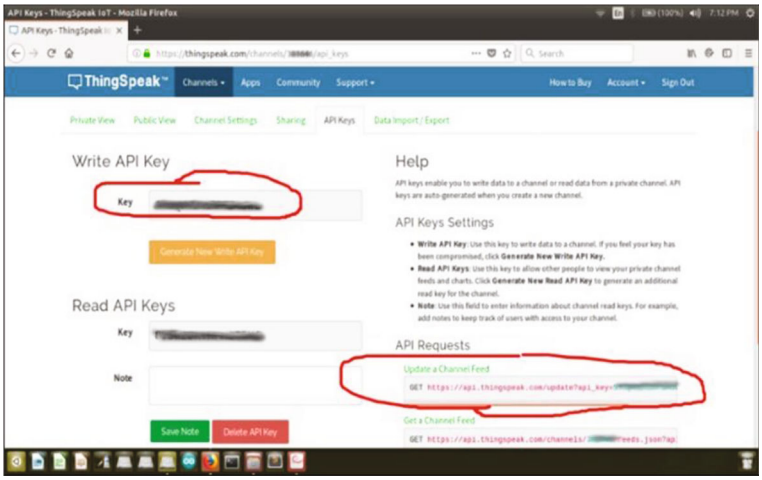

Figure 12: Copy the API key channel and paste it in the coding section.

3.5. Resistance. Resistors are used to, among other things, reduce current flow, change signal levels, divide voltages, bias active devices, and terminate transmission lines. The quantity of forward current is limited by a series resistor [17]. Figure 5 depicts a 1k resistor.

3.6. Breadboard. The breadboard serves as a circuit and can be used to connect all of the components. A breadboard is a device for testing and experimenting with different ideas by making temporary circuits. Because no soldering is required, modifying connections and replacing components are easy [3, 18]. Figure 6 shows how to make a breadboard.

3.6.1. Design of Tools. Figure 7 shows the tool's appearance from the front.

The tool's display is seen in Figure 8.

3.6.2. Setup IoT Analytics Cloud Server. Figure 9 shows the process of creating a channel with IoT Analytics Cloud.

Figure 10 shows the method for establishing a new channel heart rate field.

Figure 11 shows the save channel step.

The API key channel is copied and pasted into the code; Figure 12 shows this.

3.6.3. Implementation. The third stage involved writing C++ code to create and implement showing health status based [19] on the IoT concept. The Arduino IDE and Notepad + + were used to produce this code.

(1) Test. In order to resolve concerns, data has been acquired through participation in a number of forums. The problem of using the IoT to indicate health status has been researched extensively [18]. Data is also gathered through speaking with senior UPSI or contacting young agers from other institutions who have completed similar research.

(2) Renewal. The concept of showing health status via the Internet of Things has been resurrected at this time based on multiple observations and experiments made to better this research.

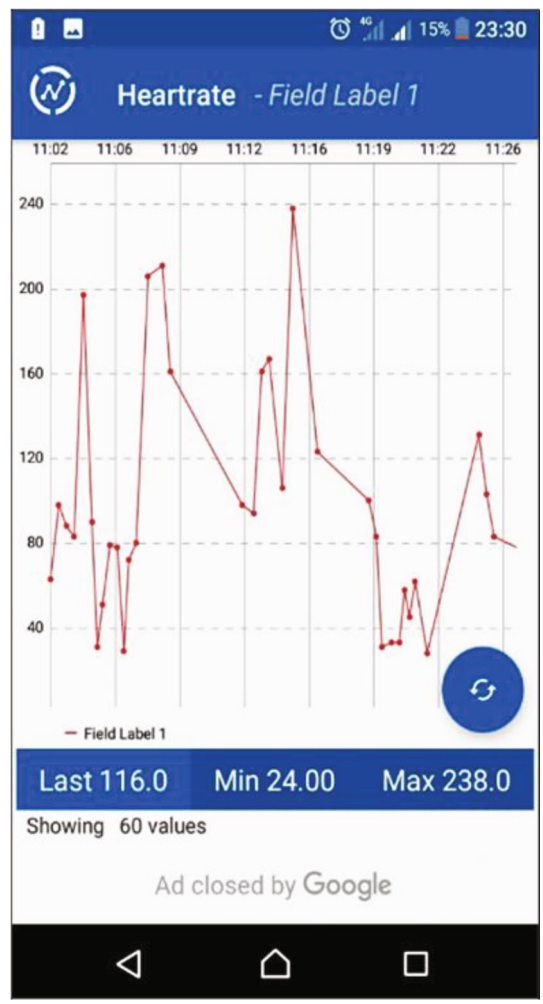

Figure 13: Heart rate with graph.

4. Result

In the medical situation, the IoT concept helped the researchers achieve their goals. This can be used by heart

patients and health-conscious people to monitor their heart rate on a regular basis. Young agers can monitor their pulse rates on their phones. In this test, the pulse rate is transmitted to a smartphone through Wi-Fi. This is the situation because the Realtek RTL8710 component connects personal Wi-Fi or Wi-Fi environments.

This test must be repeated many times in order to connect to Wi-Fi. Pulse sensors also conducted a series of experiments in order to discover which component had the correct pulse values. Throughout the testing, pulse sensors were put to the test on a few tiny circuits. When data is sent to the server, the outcome is shown in a graph [20, 21]. How to display your heart rate is shown in Figure 13. Similar results have been published in [22, 23].

In your health situation, the purpose of this project, which is based on the IoT concept, is to make it easier for young agers to check their pulse rate without having to buy one of the several pulse-measuring instruments available along with load cell [24] to manage their health status accurately. Additionally, in this age of globalization, cell phones have become indispensable in everyday life, allowing young agers to keep track of their pulse rates. Only authorized users, such as a remote specialist doctor, can access data that is made available for remote usage through the Internet.

In your health situation, the Internet of Things concept allows young agers to check their pulse rate and look at their phone. This tool is also portable because it may be held in one's hand. This tool can aid young agers in maintaining their health while also allowing them to stay up with their self-reading.

This tool can be used to check your pulse rate when exercising. The user merely needs to attach it to his or her wrist to improve the accuracy of the readings. There is no need to wait for test results to ensure your long-term health.

The inability of this gadget to display pulse readings on hand when no Internet is accessible, leaving people uninformed of their pulse rate, is one of the downsides of presenting health status based on the IoT concept. Furthermore, the tool is particularly prone to injury if a short circuit happens. This is because when there is a lot of electrical current in the circuit, short-circuiting might be dangerous.

The overall result outcome deals with the pulse diagnosis of the employee based on the behavior aspects that directly respond to the system for timely aid with response. The system is monitored throughout the session, and it keeps a live session during the presence of employee in the campus.

5. Conclusion

This application can assist pupils in maintaining their health and self-reading. The tool's shortcoming is that it lacks the attraction of other tools. This tool will need to be developed with a variety of other features in order to entice people to utilize it. As a result, the Internet is used to display health status, and it still has to be improved.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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