**IAES International Journal of Artificial Intelligence (IJ-AI)**
Vol. 14, No. 1, February 2025, pp. 166~171
ISSN: 2252-8938, DOI: 10.11591/ijai.v14.i1.pp166-171 

# High body temperature detection solution through touchless machine for health monitoring

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**Article Info**

***Article history:***

Received Mar 19, 2024
Revised Oct 18, 2024
Accepted Oct 23, 2024

***Keywords:***

Arduino
Body temperature
Buzzer
Health monitoring
Touchless machine

**ABSTRACT**

The demand for reliable health monitoring systems has surged in today's health-conscious society. Body temperature monitoring is crucial for preserving health and preventing infectious disease outbreaks. In this study an Arduino uno hardware board with a touchless temperature sensor is proposed to detect elevated body temperature, indicating fever and early signs of illness. The system prioritizes real-time health surveillance, accessibility, and usability, blending seamlessly with normal life. Arduino's versatility allows the system to function covertly, uphold privacy and autonomy, and foster wellbeing. The goal is to highlight the system's ability to function covertly, uphold privacy and autonomy, and foster wellbeing. This technology exemplifies the synergy between personal wellness and contemporary technologies, offering a useful and adaptable fever detection solution for various contexts, including homes and public areas.



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## 1. INTRODUCTION

The study evaluated the effectiveness of a new wearable temperature monitoring device in predicting body temperature and identifying fevers in high-risk outpatient situations. These patients were especially vulnerable to developing febrile neutropenia as a result of recent chemotherapy and autologous stem cell transplantation [1]. A study highlighted the important potential of continuous temperature monitoring in multiple contexts, such as immune-compromised patient monitoring, sepsis prevention, and at-home patient care following discharge [2]. By utilizing portable, non-contact temperature monitoring equipment that can measure temperature with an astounding 99% accuracy, our study takes a novel approach to temperature monitoring. We tested our method on inanimate hot objects and people with normal body temperatures to confirm its accuracy [3]. Unlike an inexpensive non-contact infrared thermometer, this precision was reliably preserved both indoors and within a 20 cm range outside [4]. We have created a useful technique for monitoring temperature remotely, and we have successfully confirmed its operation through experimentation with an astounding 98% accuracy. Considering the current coronavirus disease 2019 (COVID-19) pandemic, it is extremely important to include technology that is wearable into daily life [5]. Our real-time smartphone accessory, thermo trak, can be used for fever evaluation, including the identification of symptoms associated with infectious diseases like syndrome coronavirus 2 (SARS-CoV-2) [6]. It provides accurate temperature

readings. In this work, we provide a low-cost system that uses an RGB-thermal camera to concurrently detect and evaluate the temperature features of numerous faces. In order to reduce temperature measurement errors, this method develops temperature models for particular facial features [7].

According to preliminary data from the first 50 individuals who report COVID-19 infections, wearable technology can reliably identify temperature rises linked to illnesses [8]. The correlation between self-reported fever and these temperature rises suggests that wearable sensors can be used to continuously collect physiological data that could be used to anticipate the beginning of disease [9]. With an astounding 99% accuracy in temperature measurement, our study offers a novel solution in the shape of a portable, non-contact temperature sensor device [10]. When participants with normal body temperatures and hot objects are tested indoors and outdoors, this precision is constantly maintained [11].

## 2. LITERATURE REVIEW

Respiratory droplets from people with infection are the primary means of COVID-19 transmission, quarantine measures are necessary to successfully limit the virus's spread [12]. According to this study, a wearable device with internet of things (IoT) integration might monitor indoor conditions and body temperature in real time. Additionally, it contains an alert system that activates when a person under quarantine's body temperature increases above a level that has been set [13]. This supply is necessary to provide timely responses to any illnesses. This study provides a novel approach for identifying COVID-19 fever symptoms in an effort to address concerns with extended screening at public or private institutions, which may create situations that are favorable to the spread of the disease [14]. Using IoT cloud services, it can detect abnormal temperatures more accurately and quickly identify the people who have them [15]. The method is essential for limiting the possibility of virus transmission in crowded environments [16]. This has taken on the mission of creating fever detection tools in order to increase testing reach, accuracy, and safety in terms of exposure to viruses and diseases. Their work has resulted in a reliable medical temperature monitoring sensor that is based on a mobile application [17].

To meet the need for precise and accessible temperature monitoring in healthcare settings, this equipment has a mobile application that provides real-time temperature data [18]. Added to that, an innovative vision-based real-time newborn temperature monitoring system has been created, and its amazing to achieve 83.33% accuracy rate as a proof. This gadget can greatly improve early fever detection and child care since it can distinguish between a parent's and a newborn's faces [19]. When a baby's temperature rises over average, it might also alert the parent. One important innovation in the ongoing search for a trustworthy fever screening method is a smart mask with long-range (LoRa) backscattering capabilities. This mask has a tremendous deal of potential to improve safety in a variety of situations, especially during public health emergencies, because it can assess both body temperature and breathing rate while consuming a substantially smaller amount of power overall [20]. In order to satisfy the demand for precise automated fever screening, it is critical to consider several temperature measurement methods. Large-scale screening is not a good fit for the labor-intensive, traditional procedures that use direct touch thermometers, notwithstanding their accuracy. On the other hand, thermography can take several people's temperatures without having to touch them, therefore it meets screening standards. The ambient temperature can, however, cause changes in it. To design effective screening systems, it is essential to weigh the advantages and disadvantages of different approaches [21].

## 3. REAL-TIME AIR QUALITY MONITORING

The main elements of our fever monitoring project are represented by the block diagram for our atmosphere monitoring system, which is shown in Figure 1. The purpose of this system's design is to make it easier to measure body temperature accurately and in real time, as well as to identify fever early on. Let's examine the essential components in this diagram in more detail and see how they work together to produce a seamless and successful health monitoring system.

The technological brain, the temperature sensor, has been carefully constructed to produce extremely precise body temperature readings. This sensor is able to be set as an ir temperature gauge or a type of thermoelectric. Getting the critical temperature information necessary for health surveillance is its main objective. The sensor itself serves as a system's brain, providing the very first input and initiates the entire process. It guarantees sure the user's temperature readings are constantly gathered and is a foundation for measurement of temperatures undertaken in real time [22].

The cerebral centers of the entire thing are the microcontroller known as Arduino, which operates as the system's central processing unit. Following receiving temperature data form, the instrument and interpreting it, it executes preprogrammed logic. To respond swiftly to temperature data that arrives at this flexible element is required. It can be set up to do a variety other function, like matching the recorded temperature and setting

fever threshold. Once the Arduino microprocessor notices an elevated or high temperature, it advances to the notifications step.

The output of the system is represented via a noise or buzzer. This part is critical to the procedure for collecting input from users. When the microcontroller of the Arduino judges whether an individual has a fever or elevated temperature based on the body's temperature data, a beeper or speaker emits a warning. A notification in real time informing the user to their higher temperature is sent. Users take this message as an alert to get medical attention promptly or to take the necessary safety precautions [23].

As a result, this section of the diagram highlights the major elements of our fever tracking system and shows how well they work together to provide an exhaustive and distinctive health monitoring solution. Reliable data on temperature is provided by the temperature sensor, which is complied with by the Arduino microcontroller's analysis and ringing of the alerts as necessary [24]. Via the sound of a buzzer or speaker, the user receives an instant audible a reaction that provides them with crucial details concerning their present-day health. In addition to imparting deep insight, the following description gives a distinctive example of how our state-of-the-art technology works for offering users discrete and seamless access to medical information.

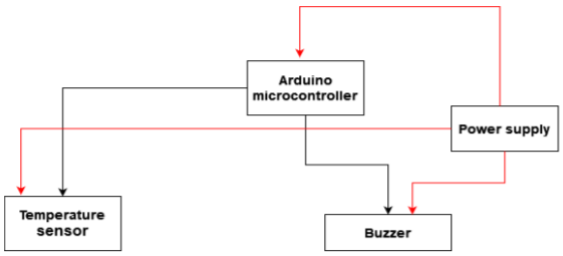


Figure 1. Block diagram for air quality monitoring

## 4. HARDWARE DEVELOPMENT

The hardware of fever alarm system are as follows (Figure 2):

- The Arduino board is the brain of the complete system where external power supply has been attached with it from 12v adapter.
- The ground pin of the mlx temperature sensor has been connected to the common ground and voltage pin to the external power. The analog pin of the motion sensor has been attached with the A1 and A2 pin of Arduino board.
- The buzzer ground pin is connected with ground and the output pin is connected with pin number.

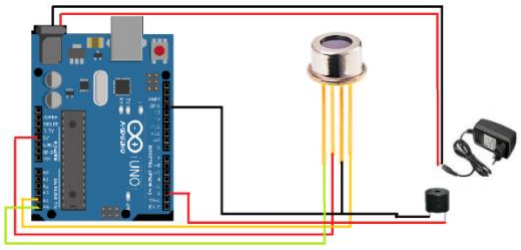

Figure 2. Connection diagram for fever alarm system

## 5. IMPLEMENTATION OF THE SYSTEM

The Arduino microcontroller's setup phase is a crucial first stage that creates a basis for every functional function. This is a critical stage since it set up critical hardware components, such as the temperature sensor and buzzer. This methodology will decide how to work. It is necessary to set a limit on the temperature of fever, only through this we will determine the health condition. It is a system working in a loop to continuously detect fever and body temperature [25]. This ongoing cycle ensures that the device takes the user's temperature quickly and accurately while monitoring. To get more information about the system's hardware configuration and connections as shown in Figure 3.

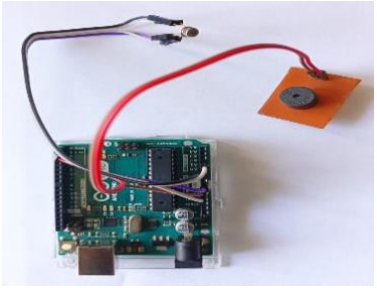

Figure 3. Hardware setup for the proposed system

This can be done by receiving analog or digital signals depending on the specific sensor being used. After the system receives the temperature data, it converts the temperature into a measurement and returns the temperature in degrees Celsius and Fahrenheit. This is an important step in the field of health because it helps in providing information related to health. The method of transformation may need calculation based on the sensor's properties or it may rely on calibration data specific to the sensor [26]. The temperature is adjusted by the system before it checks for fever. This is done by comparing the temperature measured to the set fever threshold. Then temperature of the user exceeds the limit indicating fever, the system will give a fever alarm. And whenever the temperature normal, the system starts giving its regular observations. The device instantly sounds a warning via the speaker or buzzer when it senses a body temperature that is elevated and may indicate a fever. The user receives an instantaneous, visually arresting indication when their health state changes thanks to this auditory notification [27]. Extra details on the fever episode might also be shown on a screen that is attached, if they are accessible, to help the user become even more aware of their health. At this point, a short delay time is added to stop uninterrupted alarm activation and lower the number of false alarms. It is customary for continuous monitoring systems to reset and prepare the system for the next temperature reading during this interval. The alert is reset and the system keeps checking the temperature after the time period. Monitoring the fever alert and receiving deeper health-related information are made possible by the mentioned capabilities. Power-saving sleep modes that conserve energy while the system is inactive. At the end of each cycle, the device moves simply to its primary functions of temperature monitoring and fever identification. Because of this never-ending cycle, the system is always on guard, being of real-time health monitoring and issuing alarms when necessary [28].

## 6. CONCLUSION

In the present study, a fresh perspective on the increasing importance of health and happiness in modern society is showcased. It uses an innovative fever monitoring device that combines discrete temperature sensors with Arduino microcontroller technology to give customers access to real-time health information. We have carefully considered the notion of "stealth" throughout the development of our solution in order to preserve user privacy and meet the pressing need for efficient health monitoring. Our Arduino system is a good example of how low cost home medical devices can be used to monitor one's health. It indicates the user's temperature regularly as part of its guardian function, and it swiftly alerts them if an elevated temperature is found—an early indicator of fever. Visual or auditory notifications can be used to receive information on changes in the condition of a person's health so that the necessary actions would be taken or medical help could be sought by them quickly. And with technological progress we can improve human welfare. It reminds us of our duties to prioritize health and well-being always that also helps us achieve our objectives. This temperature monitoring system is an important step in the field of security of homes and public places. It serves as an important tool for early disease detection. We strongly believe that technology acts as a dependable sentinel and that information is our most effective weapon. The purpose of this article is to explore the correlation between technology and health and provide a case that exemplifies how technological advancement could lead to better health results. It is very important for the society to pay attention to its health. And with the help of this project, we can significantly improve both individual and societal health to a great extent.

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