IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified ⁜ Impact Factor 8.066 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 10, Issue 5, May 2023

DOI: 10.17148/IARJSET.2023.10579

IOT BASED AUTOMATED INFANT MONITORING SYSTEM

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Abstract: The monitoring of children has had a significant impact on modern parenting in many ways. Our research focuses on the pertinent issues parents have when trying to watch over and care for their kids while working. By creating an IOT-based Smart Cradle monitoring System that will help Parents watch their children, this project intends to lessen the difficulties faced by parents. This cradle has a swinging mechanism that swings automatically in response to a baby's cries. An integrated camera is part of the proposed smart cradle, giving parents access to constant monitoring. For the purpose of modernizing an existing cradle, an Arduino, sound sensors, a wetness sensor, a swinging mechanism, and other electrical parts are employed. This project is much more dependable and efficient, and it can produce results that are superior to those of a traditional cradle.

Keywords: **:** Infant, Security Purpose, Smart Cradle system, Temperature, moisture sensor, cry Detection, node mcu, baby monitoring system, IOT

I. INTRODUCTION

In recent decades, a significant number of people have moved to major cities in quest of improved employment possibilities, particularly among women. Currently, it may be challenging for couples to provide their child the time and attention they need if they are both working. Many people worked from home during the Corona era, making it challenging for them to manage job and parenting. The situation becomes worse when the child is sick because it necessitates continual supervision and necessitates taking time from work. There is a need to lessen the responsibility of supervising and nurturing children on parents because it not only impacts their careers but also makes them stressed. Our proposal is an original idea to address this issue by creating an automated smart cradle system that uses IOT to efficiently monitor and care for children. An IOT-based smart cradle system should be developed to help parents keep an eye on their kids whether they are at home or at work. This cradle system contains an automated swing mechanism that will swing automatically when a baby cries. It also has a timer that will send a notification to the parent if the baby does not stop crying. Additionally, it has a wetness detector that will determine whether the mattress is wet and send an SMS to the parent's phone. A camera is fixed to the top of the cradle so that parents can keep an eye on their child while they are at work. Moreover, the baby's entertainment in this cradle is provided by an automatic toy, lowering the likelihood of crying.

II. PROPOSED SYSTEM

The parents will benefit from this suggested approach since it will help them to unwind and reduce their worry about the baby's welfare while they are away by providing them with updates on the child's condition within the cradle. The other benefit is that whenever anomalous behavior is observed and picked up bpy sensors, alert signals will be sent out.

III. LITERATURE SURVEY

[1] In this paper author enabled the swing mechanism which will make cradle swing and they have added sensors like wet detection, GSM module for sending messages with the use of sim card , Wi-Fi camera is used to monitor baby's activity live and with the help of microphone parents can also hear the sound of baby but that will be for a certain limit or range once you go out of range you will not be able to hear the sound. The only thing is by using Wi-Fi camera and microphone system become less useful as you go beyond the range parents will not be able to track their baby.

[2] The purpose of an intelligent baby incubator is to provide a system for regulating the temperature of the baby's immediate environment. Typically, incubators are used to increase a baby's chance of survival by providing a warm

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environment and reducing heat loss from the baby's body, but we can improve the system's functionality by using more than one temperature module to sense the environment.

[3] Without parental or guardian involvement or automated by sensors, the author made a support swing or oscillate automatically. Through a revolving drive bar, the Slider-wrench tool is used to convert rotational movement into transitional movement. The battery with corrosive lead, A device known as a "movement indicator" may identify moving objects, particularly people. The two decibels [dB] and the altered decibel [dBA] are recognized by sound sensors. A decibel is a measurement of sound pressure. This paper's obstacle is that it causes additional ruckus, which upsets the youngster. The suggested system is insufficiently skilled to handle sound.

[4] The author has designed a troubling framework structure that will alert the infants' keepers/guardians to certain workouts. The gear will be designed in such a way that it can fit the majority of typical supports or dens. The framework will have sensors that can recognise a child's exercise routine and notify the child's parents or guardians. This paper is constrained by the lack of a swing system and rock movement in the framework. They used a Wi-Fi module that had to be used in a certain area.

[5] The cradle, a part of the programmed swinging when a child cries, is mentioned by the author in this work. to take a child's temperature, videotape their movements, detect their looks, and automatically transmit an alert if they are being safeguarded or not. The drawbacks are that because it uses AI to identify emotions, the cost of the framework increases and development takes longer because the bunk is missing and the components are installed on the bed.

[6] The Author had Insisted and thought of having an android application for the child monitoring. The real swing behind the auto swing activity is distinguished as (sound degree of (X)=20log(Vin/V0)db). Calculation for the equivalent is contemplated. The disadvantages of this paper are children information cannot be put away and there is no data set to store the information of the child. This framework is programmed and parents/guardians cannot able to control the system by their smart phone, or they cannot operate physically by their devices.

[7] In next paper, A comprehensive baby care system that can track a baby's movement and body temperature was developed by the author. The researcher found that rocking a baby, singing a song, and sleeping a baby were all effective ways to relax and soothe a newborn. PIR module, Motor shield, Arduino microcontroller, temperature sensor, power source, and Geared motor were some of the hardware components included in the project. It is difficult to hear the baby cry or hear him or her engage in other activities because sound detectors are not being employed, which is a negative of the system. Also not used any kind of wet detection system.

[8] The author in the next paper proposed a design specification document that describes the smart infant prototype. This designed document will get followed to make the final smart baby cradle product, although all the electronic components may be replaced with more convenient devices. All designs in this document will take into consideration of customer and safety requirements. The constraint is Baby's inquisitiveness: In addition to the risk for an electric shock, the baby could bite at or consume the parts, cause them to slip off, or break them. Parents are more concerned with safety issues than with product features.

[9] In next paper author discusses about GSM - based Baby Monitoring System. In this system it has some important indicators such as movement tracking, body temperature and GSM module that will be put together and will send some basic temperature samples to mobile no. but the lack of cradle or crib, as well as the lack of rock motion are some drawbacks in the system, as a result baby is irritated.

[10] In the next paper, author made an monitoring system which is an wearable device that will detect the most important vital signal of baby and taking that data and transmits over wireless links but due to the size of that device it can cause irritation on body as the device made for babies and small infant do so much if movement so it will affect the sleep of baby. And the overall system is not designed for comfort.

[11] In next paper authors were more focused on the activities done by baby for that they have used Bluetooth sensor, Arduino and cloud short messaging service what they were doing is they were tracking unfavorable conditions happen to baby. And in order to differentiate unfavorable conditions and normal conditions they have set one threshold value if the value exceeds they alerts will be sent through cloud servers. But they using Bluetooth sensor only as it can give unnecessary values to. And lot more features were missing at least they can provide automatic swings.

[12] The author decided to create a Cradle that can be operated by a PDA and receive information from it, such as video and sound transfers. In the event that the parent is unable to reach the child right away, it should contain a pre-programmed

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mechanism for comforting the infant. after considering two or three components. They used a speaker, microphone, router, stepper engine, micro-regulator, and security for Wi-Fi modules. Baby's curiosity is one of this paper's drawbacks. In addition to the risk of electrical shock, the youngster could break or knock the parts off, or they could even try to bite or eat them.

[13] Parents believe that security offers considerably more than highlighting stuff, which is a problem for the guardians.

[14] The author has provided a framework for childcare that can monitor a child's bedwetting, development, and internal temperature. According to scientists, there are effective techniques for soothing and calming the youngster, such as rocking the infant or singing a song. PIR sensor, Motor safeguard, Arduino GPRS, UNO safeguard, Surface temperature sensor, Wet sensor (PCB designed), Power source (9 Volt battery powered battery), Geared engine are among the tools being used in the project. The drawback is that because sound locators are not used, loud discoveries—like crying and other child-related activities—are absurd. The video match is absurd because the Camera and Toy are absent.

[15] The author in paper [2] claims that the system is intended to track a baby's movement and body temperature. There were two modules provided by the system, which was obviously a good thing, but synchronization of both modules is not that much good. Also, one crucial module for the automatic swinging cradle was missing.

[16] In this paper the Author propose a planned determination record depicts the plan subtleties of the brilliant child support model. The last smart child system item will likewise follow this plan archive, yet the electronic parts will be changed to more compelling and incorporated gadgets. In this archive, every one of the plans will consider the client and wellbeing necessities that were referenced in the utilitarian detail. The prerequisite marks in this report compare to the useful particular necessity names. The restriction is due to Baby's curiosity: in addition to the risk of electrical shock, the youngster may try to nibble or chew the parts, or they may fall off or break. Fears of the guardians: Parents give health concerns a lot more thought than material things.

IV. METHODOLOGY

Temperature sensor DHT11 Module is used to detect the baby temperature and gives a signal to the Raspberry Pi. Then motor starts it working through motor driver and fan will be turn on. The LM393 module that is sound sensor will be detect the baby crying and give signal to Raspberry pi then motor will be start and swings the cradles and music will be on.

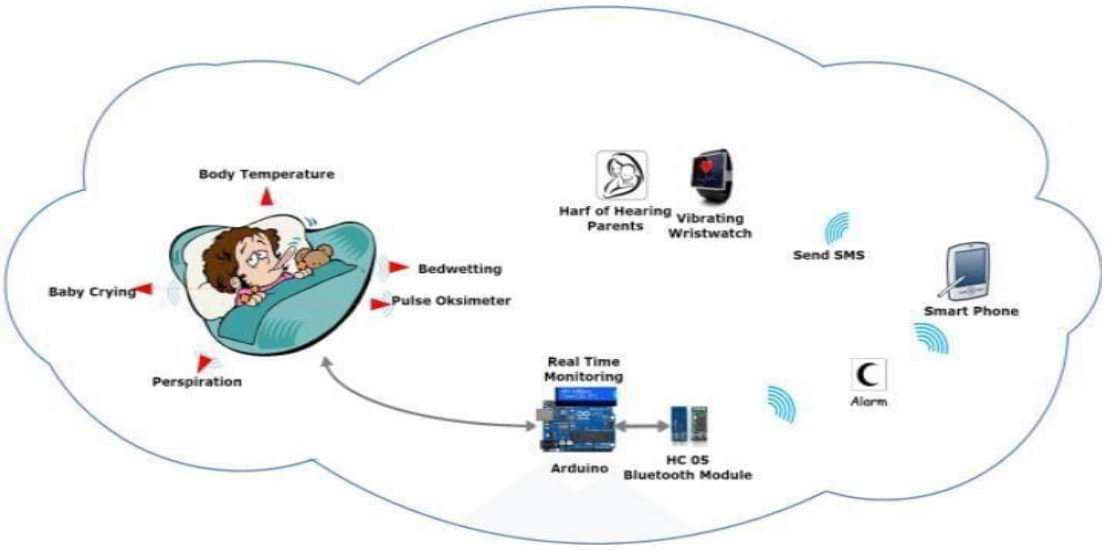

Figure 1. Smart Cradle and modules connected to it.

The Blynk app will be designed to access the video. The product uses camera for surveillance of the baby and sends a real time video to the app using local host so that they can monitor their infants and alerts provided by the system to present situation of the infants.

The components used here are connected to each other with the help of Arduino .

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Cradle Swinging Principle

The Cradle Swing will be triggered as soon as the Sound sensor crosses the threshold level. The Servo Motor will help in swinging the Cradle. Start the System. Check if the infant is making any noise or cry. If yes, it triggers Servo Motor

Figure 2. Servo Motor connected to the cradle.

which leads to swinging of the cradle. It also sends the alert message for the same. You can Turn On/ Off the Cradle Swing by the Android Application.

Wetness Condition

This Sensor helps in detecting whether the infant's diaper is wet or dry. If it is detected Wet, it will be intimated to the parent via an Alert Message. This will help to keep the infant in a healthy and hygienic Environment.

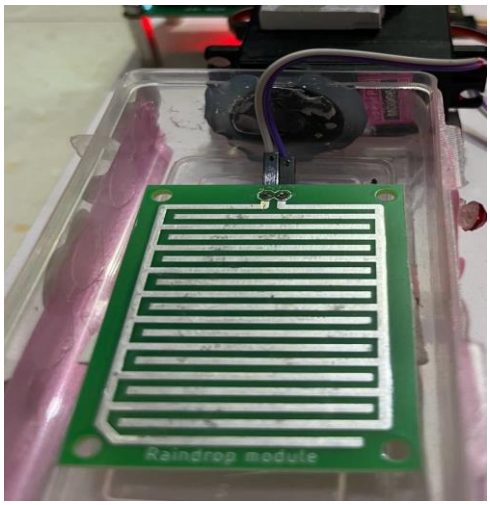

Figure 3. Moisture/Wet condition sensor

Temperature/ Humidity Check

This Sensor helps in detecting continuous change in temperature. It sends a message regarding the temperature change to parents.

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Figure 4. LCD monitor displaying the temperature and humidity.

Sound Detection

The sound sensor and Arduino are connected to each other where the sound signals receive the sound signals which are received during the crying of the infant or any uncomfortable conditions .The cradle starts to swing if the infant crying is heard by sound sensor.

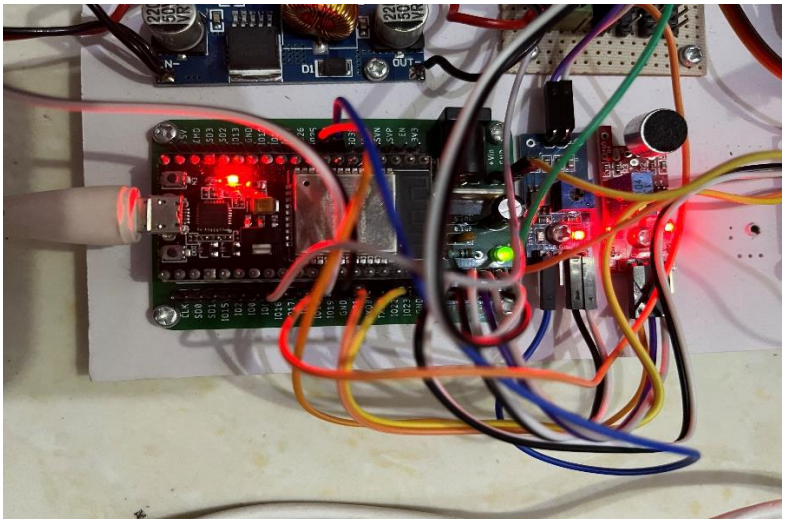

Figure 5. The sound sensor and Arduino connected to each other

Automation of Fan

The Auto fan mode during infant's discomfort. The fan automatically on when the infant is in discomfort, when the infant starts to cry and when temperature is more than the usual room temperature.

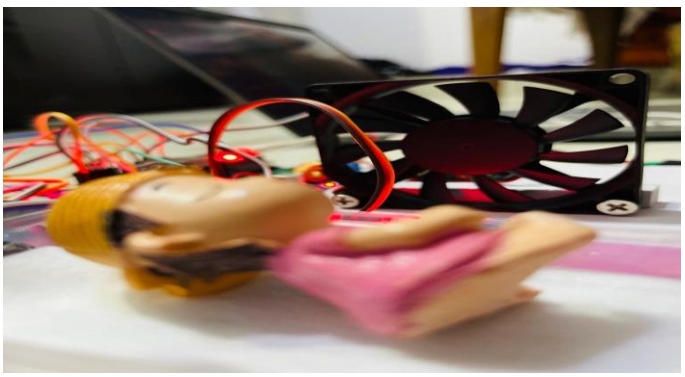

Figure 6. Automation of fan with the help of a Step-Down Transformer

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SYSTEM ARCHITECTURE

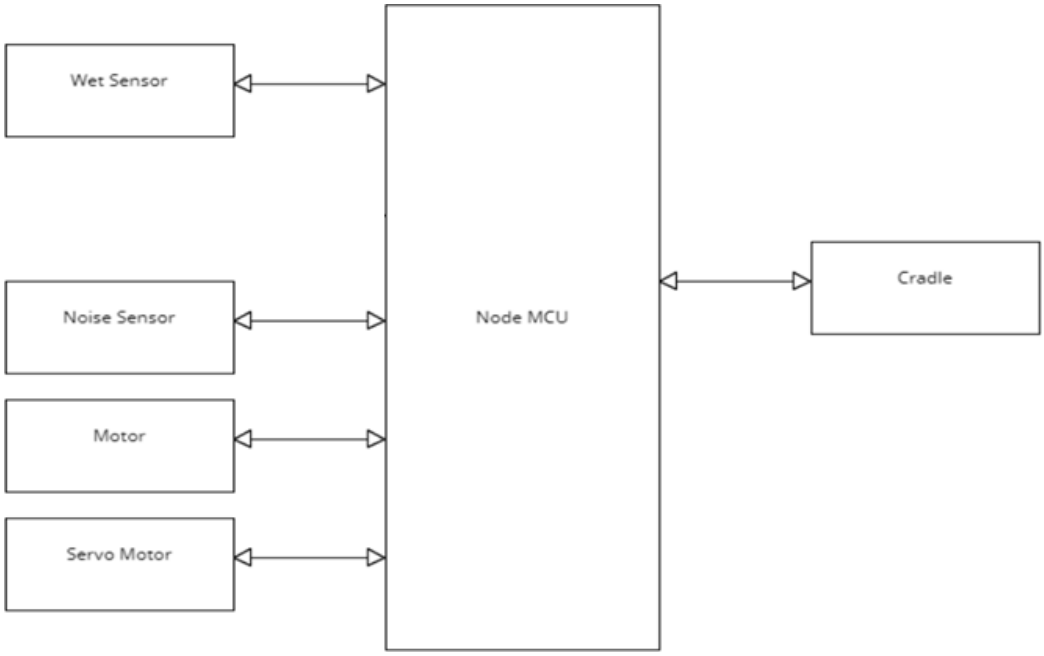

Figure 7. System Architecture

V. RESULTS AND DISCUSSIONS

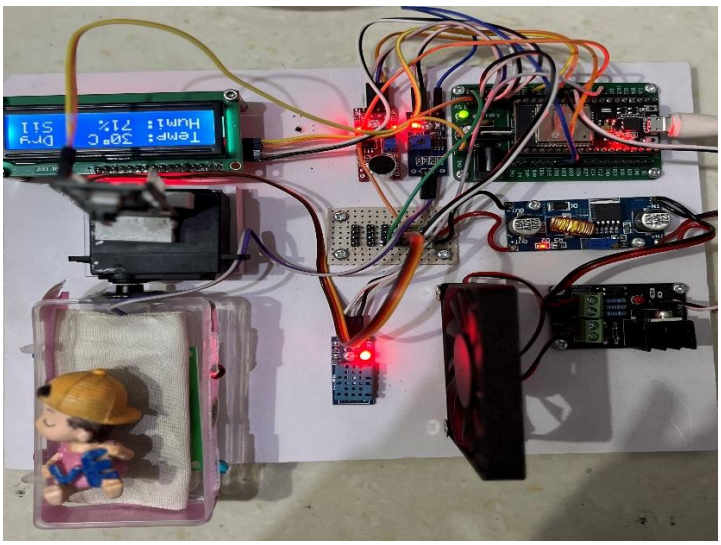

Figure 8. A complete View of Live Monitoring of Infant in the Cradle.

The above Figure(3), illustrates a view of smart cradle monitoring system. It consists of the Arduino, sound sensor, servo motor, LCD screen and camera connected to each other.

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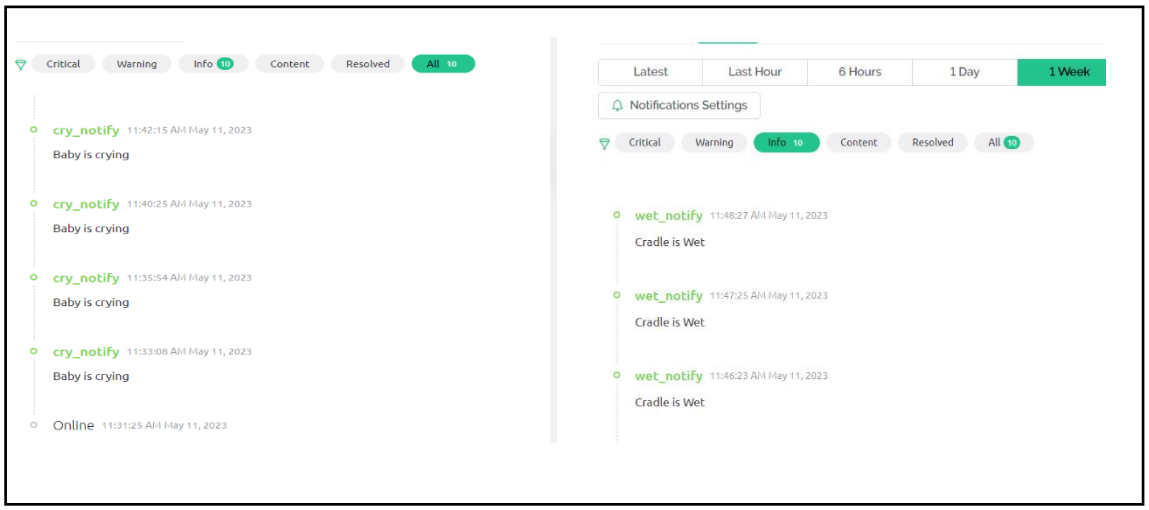

Figure 9. Blynk app Notifications

In the above figure(4), the Blynk app which represents the infant crying notifications. These notifications can be received through the mail as well as in the app. User can access the system in both mobile phones and laptop.

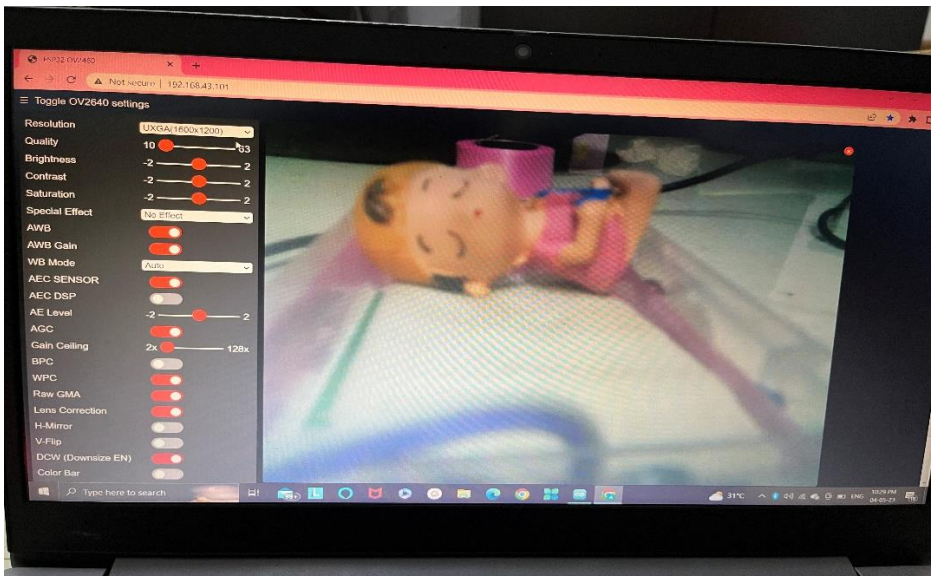

Figure 10. The camera module used for detection of all the live movements.

The above figure(5) illustrates the live monitoring of the infant from the camera module. The live monitoring can be viewed on IP address generated from the program when connected to wi-fi and can be accessed anywhere by the parents.

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CONCLUSION AND FUTURE SCOPE

IOT based smart cradle system give convenience and surveillance to parent in real time as compared to conventional cradle. We have proposed a smart cradle system using IOT. For an infant, this support will go about as a sitter for around 2 years. Innovation has been created in an extraordinary manner that it makes human work more straight forward. It is helpful for working guardians and medical clinics to take care of infants. It also ensures infant safety while they are not physically present near cradle, so it is efficient to use IOT based smart cradle system to take care of infant in proficient manner. Overall, the future ofsmart cradle monitoring systems lies in further improving accuracy, integrating with health care systems, leveraging data analytics, enhancing user interfaces, and prioritizing safety and security measures.

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