IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Iot-Enabled Emergency Detection For Heart And Asthma Attacks With Automatic Ambulance Alerts

Dr SHAMALA N [1], SHARATH H R [2], SANJAY D [3], NISARGA M C [4], MAMATHA D[5].

[1] Head of Department, Department of EEE & Vidya Vikas Institute of Engineering & Technology, Mysuru.

[2] Student, Department of EEE & Vidya Vikas Institute of Engineering & Technology, Mysuru.

[3]Student, Department of EEE & Vidya Vikas Institute of Engineering & Technology, Mysuru.

[4]Student, Department of EEE & Vidya Vikas Institute of Engineering & Technology, Mysuru.

[5]Student, Department of EEE & Vidya Vikas Institute of Engineering & Technology, Mysuru.

Abstract: The advancement of Internet of Things (IoT) technology has significantly impacted healthcare by enabling continuous, real-time patient monitoring. This paper introduces an IoT-based system designed to detect heart attacks and asthma attacks. The system utilizes the MAX30100 sensor, a pulse oximeter and heart rate sensor module, to accurately monitor vital signs such as heart rate and blood oxygen levels.For heart attack detection, the system monitors heart activity and oxygen saturation, while for asthma attack detection, it tracks respiratory patterns alongside oxygen levels. The data collected by the MAX30100 sensor is transmitted to a central processing unit via IoT modules, where advanced machine learning algorithms analyze it to identify potential critical events.In the event of a heart or asthma attack, the system automatically sends an alert to the nearest ambulance service, complete with the patient's location via GPS. This automated alert system ensures timely medical intervention, reducing response time and potentially saving lives. The proposed solution aims to enhance patient safety by providing reliable and continuous health monitoring.

I.INTRODUCTION

Heart attracts is one of the widespread death causes. According to the World Health Organization heart attack is a serious public health problem with over 100 million sufferers worldwide. Outcomes for patients with heart diseases remain poor despite the development of novel therapies. In part, this reflects the fact that adherence to therapy is low and clinicians lack accurate methods to assess this issue. Digital technologies hold promises to overcome these barriers to care. Internet of Things (Iot) based wearable device integrated with low-cost sensors and consumer graded devices which continuous monitoring and management of heart patients.

Asthma is one of the widespread chronic diseases. According to the World Health Organization asthma isa serious public health problem with over 100 million sufferers worldwide. Outcomes for patients with chronic respiratory diseases remain poor despite the development of novel therapies. In part, this reflects the fact that adherence to therapy is low andcliniciansla ckaccuratemethodstoassessthisissue.Digitaltechnologiesholdpromisesto overcomethesebarrierstocare.InternetofThings(Iot)basedwearabledeviceintegratedwith low-costsensorsandconsumergradeddeviceswhichcontinuousmonitoringandmanagement of asthma patients.

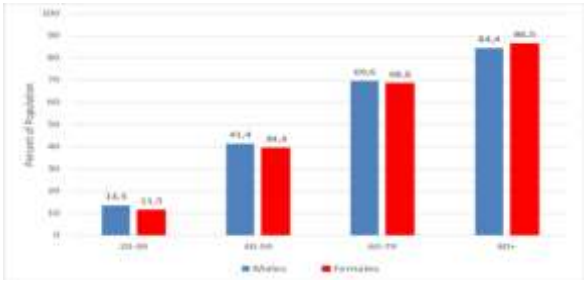


Fig1: Heartattackincidencebyageandsex

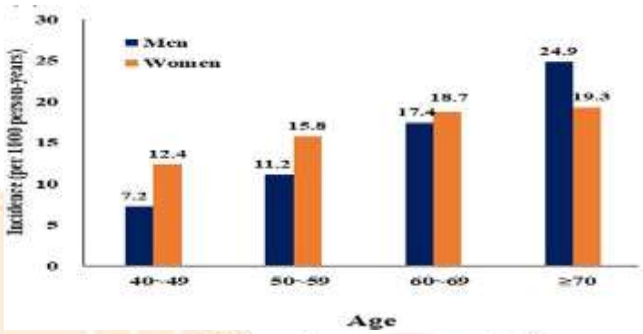


Fig 2: Asthma incidence by age and sex

The system uses the MAX30100 sensor, whichmeasures heart rate and oxygen saturation levels (SpO2). The sensor is connected to a microcontroller (Arduino) that continuously monitors these vital signs. If the heart rate or oxygen levels deviate from normal ranges, the system detects a potential heart attack. The microcontroller then sends an alert through the Internet of Things (IoT) network to notify medical professionals and trigger an automatic ambulance dispatchThe integration of IoT allows for real-time monitoring and immediate response. When the systemdetectsacriticalcondition(eitherheartattackorasthmaattack),itusesaGSMmodule to send alerts to emergency services. Thesystem can also providethe patient's GPS location, ensuring that the ambulance reaches the patient quickly.

PROBLEM STATEMENT

HEART ATTACKS, ALSO KNOWN AS MYOCARDIAL INFARCTIONS, POSE A SIGNIFICANT HEALTH CHALLENGE DUE TO THEIR SUDDEN AND UNPREDICTABLE ONSET. THE PRIMARY ISSUE IS THE ABRUPT BLOCKAGE OF BLOOD FLOW TO THE HEART MUSCLE, TYPICALLY CAUSED BY PLAQUE BUILD-UP IN THE CORONARY ARTERIES. THIS BLOCKAGE CAN RESULT IN SEVERE CHEST PAIN, SHORTNESS OF BREATH, AND RAPID DETERIORATION OF HEART FUNCTION. IF LEFT UNTREATED, THE AFFECTED HEART TISSUE CAN BEGIN TO DIE, LEADING TO PERMANENT DAMAGE OR EVEN DEATH. THE URGENCY OF TREATMENT IS PARAMOUNT, AS DELAYS CAN LEAD TO COMPLICATIONS SUCH AS HEART FAILURE, ARRHYTHMIAS, OR CARDIAC ARREST. COMPOUNDING THE ISSUE IS THE WIDE VARIABILITY OF SYMPTOMS, WHICH CAN RANGE FROM INTENSE CHEST PAIN TO MILD DISCOMFORT.

Asthma Attacks: Asthma attacks also present significant health challenges, severely impacting patients' well-being and quality of life. An asthma attack occurs when the airways become inflamed and constricted, causing difficulty breathing, wheezing, and a drop in blood oxygen levels. These attacks can be triggered by various factors, including allergens, pollution, respiratory infections, or stress, making them difficult to predict and manage. The sudden onset of symptoms can cause severe respiratory distress, and if not promptly treated, can lead to unconsciousness or even death.A critical problem lies in the lack of continuous monitoring. Without early detection, impending asthma attacks may go unnoticed, delaying the administration of necessary medications like bronchodilators or corticosteroids, which are essential for reopening airways and reducinginflammation. This problem is exacerbated in remote areas with limited access to healthcare services, increasing the risk for patients.

The Need for a Monitoring Device: Given the unpredictability and severity of heart attacks and asthma attacks, a continuous monitoring device that measures heart rate and blood oxygen levels (SpO2) is essential. By providing real-time data and automatic alerts, such a system can ensure timely medical intervention by notifying emergency services, especially in situations where immediate care is critical.

1.OBJECTIVESOFTHESYSTEM

The primary goal of the IoT-based heart attack and asthma attack detection system with automatic ambulance alert, utilizing the MAX30100 sensor, is to enhance patient safety and improve emergency response times through continuous monitoring and real-time alerts. The system focuses on the following key objectives:

Continuous Monitoring: Establish a reliable system for continuous monitoring of heart rate and blood oxygen saturation (SpO2) using the MAX30100 sensor. The system will promptly detect any deviations from normal levels.

Early Detection: Develop and implement algorithms to accurately detect early signs of heart attacks and asthma attacks by analyzing sensor data. This includes recognizing sudden drops in SpO2 levels and abnormal heart rates.

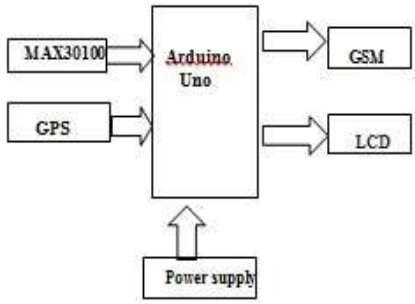
Real-Time Alerts: Leverage IoT technology to send real-time alerts to medical professionals and emergency services when critical conditions are detected. The system will include automatic notifications via SMS.

-
- **Automatic Ambulance Dispatch:** Integrate GPS technology to ensure automatic dispatch of an ambulance to the patient's location during a medical emergency, providing precise location data to emergency responders.

Improved Patient Outcomes: Reduce the time between the onset of symptoms and the delivery of medical care, thereby improving patient outcomes and lowering mortality rates associated with heart and asthma attacks.

1. METHODOLOGY

In this, the core component is the Arduino microcontroller, which acts as the brain of the system. Various sensors are connected to the Arduino to monitor the health parameters of the individual. The heart beat sensor is one such device, used to measure the heart rate of the person. Similarly, a SpO2 sensor is connected to the Arduino to measure the blood oxygen level. These sensors play a crucial role in detecting potential health emergencies such as heart attacks and asthma attacks by analysing the data they provide.



Block Diagram

HEART ATTACK DETECTION

Heart attacks can be detected by monitoring the heart rate. The heart beat sensor continuously measures the heart rate and sends this data to the Arduino microcontroller. If the heart rate suddenly increases and crosses a predefined threshold, it indicates a potential heart attack. The system then triggers an alert. An SMS is sent to the authorities, caregivers, and ambulance services, including the patient's live location, which is fetched using a GPS module. This ensures that medical help can be dispatched promptly to the exact location of the patient.

ASTHMA ATTACK DETECTION

Asthma attacks are often characterized by a drop in blood oxygen levels. The SpO2 sensor continuously measures the oxygen saturation in the blood and sends this data to the Arduino microcontroller. If the blood oxygen level falls below a certain threshold, it indicates a potential asthma attack. Similar to the heart attack detection, the system sends an alert message to the authorities, caregivers, and ambulance services. The message includes the patient's live location, ensuring that help can reach the patient quickly.

ALERTS

The integration of these sensors with the Arduino microcontroller allows for continuous monitoring of vital health parameters. The system is designed to automatically send SMS alerts in case of emergencies, providing real-time updates on the patient's

condition and location. This feature is particularly beneficial for elderly individuals and those with chronic health conditions, as it ensures that they receive timely medical assistance when needed.
By leveraging the capabilities of the Arduino microcontroller and the connected sensors, this project aims to create a reliable and efficient health monitoring system. It enhances the safety and well-being of individuals by providing continuous monitoring and prompt alerts in case of emergencies,making it easier and safer to care for elderly people and those with health conditions.

1. WORKING

PROCEDURETOINSTALLARDUINOSOFTWARE(IDE)

First we must have an Arduino board and a USB cable. In case we use Arduino UNO, Arduino Duemilanove, Nano, Arduino Mega 2560, or Diecimila, we will need a standard USB cable (A plug to B plug), the kind we would connect to a USB printer
One can get different versions of Arduino IDE from the Download page on the Arduino Official website. We must select our software, which is compatible with our operating system (Windows, IOS, or Linux). Unzip the file, after downloading it completely.
The Arduino Uno, Mega, Duemilanove and Arduino Nano automatically draw power from either, the USB connection to the computer or an external power supply. If you are using an Arduino Diecimila, you have to make sure that the board is configured to draw power from the USB connection. The power source is selected with a jumper, a small piece ofplastic that fits onto two of the three pins between the USB and power jacks. Check that it is on the two pins closest to the USB port.
Connect the Arduino board to computer using the USB cable. The green power LED (labeled PWR) should glow.
After your Arduino IDE software is downloaded, you need to unzip the folder. Inside the folder, you can find the application icon with an infinity label(application.exe). Double- click the icon to start the IDE

IoTHeartAttackDetectionandAsthmaAttackDetectionwithAutomatic Ambulance Alert System Module

2. CONCLUSION

Upon successful implementation of our project, caring for elderly individuals will become significantly safer and more manageable. The system will continuously monitor vital signs, including heart rate and respiratory patterns, enabling the early detection of heart and asthma attacks. In the event of an emergency, the system automatically sends SMS alerts to ambulance services and authorized persons, such as family members or healthcare providers.

This immediate notification ensures that medical assistance is dispatched swiftly, potentially saving lives. Additionally, by offering real-time updates on the patient's location, the system provides reassurance to both the elderly and their caregivers, knowing that help is always a notification away. This innovative approach to health monitoring will greatly enhance the quality of care and safety for elderly individuals, making it a valuable tool for both home care and hospital environments.

REFERENCES

[1] Hamim, M., Paul, S., Hoque, S. I., Rahman, M. N., & Baqee, I.-A. (2019). IoT Based RemoteHealthMonitoringSystemforPatientsandElderlyPeople.Paperpresentedatthe2019 InternationalConferenceonRobotics,ElectricalandSignalProcessingTechniques(ICREST).

[2] Ananth, S., & Sathya, P. (2019). Smart Health Monitoring System through IOT. Paper presented at the 2019 International Conference on Communication and Signal Processing (ICCSP).

[3] Majumder, S., Rahman, M. A., Islam, M. S., & Ghosh, D. (2018). Design and ImplementationofaWirelessHealthMonitoringSystemforRemotelyLocatedPatients.Paper presentedatthe20184thInternationalConferenceonElectricalEngineeringandInformation & Communication Technology (iCEEiCT).

[4] Sahraoui, S., Sahraoui, S., Benbousa, O., Berkani, A.-S., & Bilami, A. (2018). Sensor-basedwearablesystemforthedetectionandautomatictreatmentofnocturnalhypoglycaemia. Healthcare technology letters, 5(6), 239-

241.
[5] Das,S.(2013).Thedevelopmentofamicrocontrollerbasedlowcostheartratecounterfor health care systems. International Journal of Engineering Trends and Technology, 4(2), 207- 211.
[6] Chung, W.-Y., Lee, Y.-D., & Jung, S.-J. (2008). A wireless sensor network compatible wearable u-healthcare monitoring system using integrated ECG, accelerometer and SpO 2. Paperpresentedatthe200830thAnnualInternationalConferenceoftheIEEEEngineeringin Medicine andBiology Society.
[7] Din,I.U.,Almogren,A.,Guizani,M.,&Zuair,M.(2019).ADecadeofInternetofThings: AnalysisintheLightofHealthcareApplications.IEEEAccess,7,89967-89979.Deshpande,S. G., Thakare, V. M., & Butey, P. K. (2017). Analysis of different Heart Rate Measuring Sensors with Arduino and Smartphone.
[8] Wang, H., Ren, W., Shi, Y., Zhou, T., & Qian, J. (2011). Design of Portable Heart Rate Acquisition Instrument Bases On Bluetooth Transmission. Paper presented at the 2011 7th InternationalConferenceonWirelessCommunications,NetworkingandMobileComputing.
[9] Deshmukh, D., Shinde, U. B., & Zanwar, S. R. (2017). Android Based Health Care Monitoring System. INTERNATIONAL JOURNAL, 2(7).
[10] Narayan, H., & Dey, R. A Heartbeat Detection Method Based On Iot And Monitoring System Using Arduino Uno And Thing-Speak. Methods, 9, 12