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Parkinson's Disease Detection & Self Stabilising Spoon With Health Analysis Using Ml And Iot

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Abstract*—Parkinson's disease is the second most common neurodegenerative illness, primarily affecting the elderly. It is caused by extensive nerve cell degeneration, which makes mobility and daily activities difficult. Early symptoms may include unintentional shivering and hand tremors, making it impossible for the patient to perform daily tasks such as eating out of a bowl. Patient remote monitoring is particularly difficult for the attendant. The proposed system intends to produce a stabilising spoon for Parkinson's disease patients, as well as a health monitoring system based on IoT and sensor network principles, as well as ML prediction. By calibrating its head against these forces, the stabilising spoon compensates for unintentional tremors or shivers from the user, ensuring that the spoon bowl remains steady at all times.A prototype of the device was built to aid patients' eating processes, and it used a gyroscope to measure the angle of motions and an accelerometer to measure the speed of these motions. Another aspect of the project involves monitoring the patient's heartbeat, Spo2 levels, and temperature and transferring the data to a mobile application to track the patient's status.*

Keywords: *Parkinson's Disease, Gyroscope, Accelerometer, Calibration, Sensor Networks, Internet of Things, Stabilization,Biomedical Instruments, Android Application,Cloud Connectivity.*

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I. INTRODUCTION

In recent years, wireless technology has evolved to satisfy the demands of a variety of businesses. IoT has dominated the industrial sector in recent years, notably automation and control. Biomedical is one of the most current health care improvement trends. In addition to hospitals, IoT technology has made available personal health care facilities. As a result, a smart system monitors a variety of metrics that affect power consumption, cost, and efficiency. This clever system examines our records. Doctors play an essential role in conventional health examinations. This method requires some time for registration, appointment, and follow-up. Later, reports are also created. Due to the long procedure, working individuals prefer to disregard or delay their examinations. This contemporary strategy decreases time utilisation. In recent years, wireless technology has been widely used to help numerous industries.IoT has consumed the bulk of the industrial sector in recent years, notably automation and control. Body sensor network systems may assist individuals by offering Internet-based healthcare services such as medical monitoring, memory improvement, medical data access, and connection with a healthcare practitioner in an emergency. Continuous health monitoring via wearable or clothing-embedded transducers and implanted body sensor networks will enhance the identification of emergency situations in people at risk. These will assist not only the sick, but also their relatives. Additionally, these systems give valuable tools for improving life quality by remotely gathering and monitoring physiological signs without interfering with the patient's routine activities.Through innovation and research, medical experts have endeavoured for many decades to enhance health care and human satisfaction. Their contribution to medicine is vital and cannot be ignored.

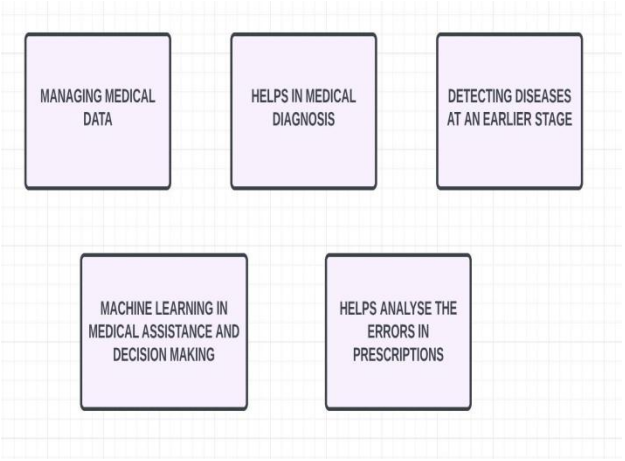

Fig. 1. Application of machine learning in Healthcare Sector

II. RESEARCH AND ELABORATION

RELATED WORK

[1] E-health monitoring system for the aged

The proper functioning of an individual's health is generally established by monitoring the individual's body temperature and heart rate. In the past, only hospitals used health monitors, which were enormous, stationary monitoring equipment used to assess the health state of bedridden patients. Continuously linked to the patient's body were these hospital-exclusive monitoring gadgets. It is crucial for the patient to have a portable equipment that can always be used to test these variables when no one is around, since many of them are difficult to use. The system monitors a patient's heart rate and temperature concurrently with the pulse and temperature sensors, filling a centralised database with values at specified intervals. When the readings are abnormal or above the predefined threshold, the gadget utilises the GSM/GPRS/GPS shield to broadcast the readings and position coordinates to the patient's doctor/guardian so that they may promptly monitor, examine/diagnose, and take life-saving measures for the patient. To lower the risk of illness and death in the elderly, these indicators must be assessed and monitored on a regular basis. The system is meant to continuously monitor these factors to lower the death rate of the elderly. [1]

[2] Fall Detection Sensor System for the Elderly

Numerous seniors live in their own houses alone. When the elderly fall, it may be difficult for them to ask for help. This project's primary objective is to develop a low- cost Android-based fall detection sensor system for elderly Malaysians. In this work, the design of an Android-basedfall detection sensor system is detailed. The system is capable of alerting the contact person of a fall so that the occurrence may be reported to the ambulance department as quickly as possible, as well as giving the wounded senior with the appropriate medical care. The design and implementation include both hardware and software for detecting and reporting falls in the house. The falling detection sensor monitors the user's body position and whether it is in a falling mode, whilst the software side consists of algorithms that identify falls and activate the alert. [2]

[3] Health Alert and Medicine Remainder using Internet ofThings

In modern society, it is difficult for people to remember which medications they must take. This study provides a paradigm for an automated medication reminder and pharmacy system. This system can reduce inconsistency in taking the recommended dosage of pills at the time prescribed by the doctor and switch from methods primarily reliant on human memory to insignificant regulation, freeingpeople from doing things incorrectly due to human error, such as taking pills at different times with the wrong dosage. There are various available medication boxes on the market. The suggested medicine box would aid patients, especially the elderly, in taking their pills on time and without forgetting to do so. Using tensors stored at home, it also continually checks people's health problems, such as blood pressure and ECG, and informs them when appropriate. This system has the capability to save a life. Additionally, this health warning and medication relaxation might lessen human effort. [3]

[4] Patient Health Monitoring System

They have created a method that can be used by everyone. The device constantly monitors the heart rate and temperature of the person. The suggested technology will beuseful if a person is strolling along the street and his heart rate or temperature record gets abnormal. Due to the factthat we are helping the individual by offering a list of local hospitals and a list of health recommendations, he may take some measures by reading the health tips and then promptly go to the hospital for treatment. Therefore, it is not necessary for the individual to be hospitalised in order to usethis system. [4]

[5] IOT based Patient Health Monitoring System

This study presents the development of a microcontroller-based system for wireless monitoring of heartbeat and temperature using a Wi-Fi module. This technology allows us to quickly give real-time information to a large number of people and send them notifications in emergency circumstances. Patients in India are not getting proper treatment during heart attacks, which contributes to the high mortality rate. We aim to continually monitor patient health so that we can give prompt and appropriate support. The fixed monitoring system can only be used while the patient is lying in bed, and these huge systems are only accessible in intensive care units. The system is designed for use at home by patients whose conditions are not life-threatening but who need prompt monitoring by a physician or family member. An SMS is sent to the doctor or a family member in the case of a life-threatening situation. As a consequence, by providing fast assistance, we may easily save a great number of lives. [5]

[6] Health Monitoring system using IoT

Our everyday lives are predicated on our health. To do everyday tasks effectively, one must be in excellent health. Using an LM35 and a pulse sensor, respectively, the objective of this project is to develop a system for measuring body temperature and heart rate. These sensors are connected to an Arduino uno board. The wifi module is used by Arduino to communicate data wirelessly. On theIoT platform, also known as thing speak, the ESP8266 is utilised for wireless data transfer. Thing talk is used to visualise data. Thus, this data record may be preserved throughout time. This information is stored on the web server so it can determine who logged in. [6]

III. SYSTEM DESIGN

The gadget, which is basically a spoon stabiliser, is used for eating and health monitoring by Parkinson's disease patients. The gadget, once worn by the patient, detects hand tremors and stabilises the spoon, enabling the patient toswallow meals without trouble. The gadget, which has an esp32 module, provides Wi-Fi and Bluetooth capability to the third-party application blynk. A spo2 sensor detects the patient's blood oxygen level. The heart rate and temperature sensors contribute to the device's health monitoring function by measuring the patient's heart rate and temperature. In order to characterise the deficiencies of Parkinson's disease, affordable accelerometers are connected to the upper and lower extremities of patients with Parkinson's disease and similar disorders to provide a continuous, three-dimensional recording of movements happening during task performance. The output of the apparatus may be communicated to specialists for diagnostic or therapeutic evaluation. The device's servo motors are electrical rotors that aid with spoonadjustment. They have enough torque to sustain the weight of the gadget. Lastly, the blynk gadget is used to monitor the patient and alert both the patient and the carers. It gives a comprehensive analysis of the tremor patterns and severity, as well as a medicine reminder.

1DATAFLOW DIAGRAM

The data flow graphic illustrates the essential flow of information across the many phases of Parkinson's disease detection. In the first phase, we will gather patient data usinga variety of medical instruments.

Now that the data has been gathered, it is being used to train different machine learning algorithms that will categorise it.

- After categorising the data into Train and Test datasets,the datasets will be used to forecast whether the patient hasthe condition or not.

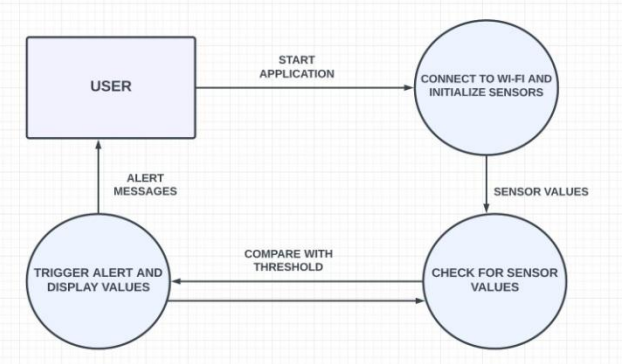

Fig. 2. Dataflow Diagram level 0

Fig.2. The above data flow diagram is a depiction of data flow associated with hardware connections. After the userlaunches the programme and connects to Wi-Fi, all sensordata are sent to the server and cloud. The data is then sent from the server to the mobile application, where the user may see all of the patient's information.

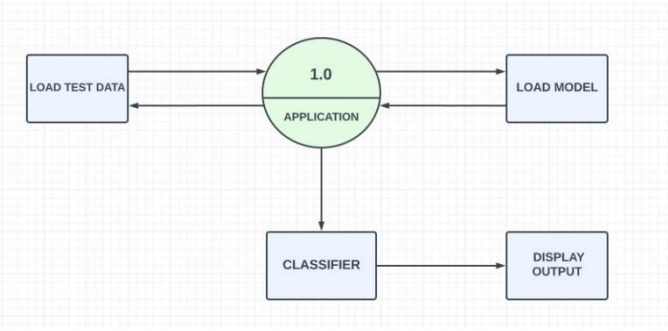

Fig. 3. Data flow diagram level 1

Fig.3. The figure shown above is a depiction of DFD1 The Level 0 DFD is split down into the Level 1 DFD, which is more precise. Level 1 DFD displays fundamental system modules and data flow between modules. Here, data is fed from a file into an application, which then sends the supplied data to a classification unit to forecast the outcome and labelsclasses accordingly.

CLASS DIAGRAM

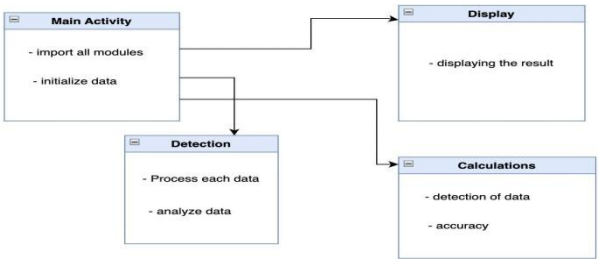

Fig. 4. Class diagram

Fig 4. Represents the primary activity as a class and includesdisplay detection and computation items.

IV. CONCLUSION

Modern technologies have evolved to create a more pleasant and better existence free of disease and health problems. Our project uses an ESP32 and a Wi-Fi modem togive a low-cost solution for improving the remote monitoring capability of an existing health care system. It makes use of a variety of sensors, including pulse rate, body temperature, and many others. The sensors are activated, and critical data is sent to the microcontroller. Using this prototype circuit, the hardware's circuit, messages can be delivered to theassociated medical expert if the value of any parameter falls below a predetermined value, allowing the patient to receive the necessary prescriptions.

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