Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 13 Issue 4, April 2024

Pioneering Stroke Detection for Proactive Healthcare Interventions

Ms.S.Priya
Assistant Professor, Department of CSE
Nehru Institute of Engineering and Technology
Coimbatore,India

Mr. M. Madan Mohan
Assistant Professor, Department of CSE
Nehru Institute of Engineering and Technology
Coimbatore ,India

Sathiyapriya.A
Department of CSE
Nehru Institute of Engineering and Technology
Coimbatore,India

Harini.S
Department of CSE
Nehru Institute of Engineering and Technology Coimbatore,India

Shahin.S
Department of CSE
Nehru Institute of Engineering and Technology Coimbatore,India

Abstract — **In this Project, a tentative design of a cloud-based Stroke prediction system had been proposed to detect impending Stroke using Machine learning techniques. To achieve this, effective machine learning techniques must be used to detect hits. It is derived from a specific review of various machine learning algorithms. The proposed algorithm was validated using two widely used open study sites, where 10-fold cross-validation was used to verify the effectiveness of stroke diagnosis. An accuracy level of 97.53% accuracy was found from the ML algorithm along with sensitivity and specificity of 97.50% and 94.94%respectively. Moreover, to monitor the Stroke patient round-the-clock by his/her caretaker/doctor, a real-time patient monitoring system was developed and presented using Arduino, capable of sensing some real-time parameters such as Body temperature, blood pressure, blood flow, heart rate, oxygen content. With the help of different decision-making algorithms decisions can be made easily and fast and according to its people can have access to the database. The biggest advantage of our body is that it automatically produces the necessary medicine according to the importance of the human body.**

INTRODUCTION

Ischemic stroke is the most common cause for the loss of lives in the world. The symptoms of stroke in acute
phase are evaluated by diffused magnetic resonance imaging (MRI) data and using these data, the degree of changes in vascular territory of the occluded blood vessel in stroke can be measured accurately. MRI is sensitive for the early identification of little infracts in the brain stem, and deep structures inside the cerebral hemispheres and also these scanners are extremely valuable in demonstrating early stroke infarcts. The diffusion weighted imaging (DWI) modality of MRI is the commonly used modality as it detects even small changes in water diffusion in case of acute ischemic brain. The manual delineation of abnormal brain tissue is the standard method for lesion identification; however, this method is very time-consuming, and operator dependent. An exact delineation and time of process in lesions identification is extremely important in disease diagnosis and treatment processes. Therefore, it is recommended to use all automated methods to eliminate differences in identifying the affected brain tissue and analyzing large MRI data. Manual semi-automatic and automatic methods (WT) and graph cutting theory are recommended to diagnose stroke. These methods include contour preprocessing, segmentation, feature extraction, and classification.

A. Abbreviations and Acronyms

IoT: Internet of Things

OBJECTIVES:

The primary objective of this project is to create an efficient and reliable stroke detection system by leveraging IoT and ML technologies. By combining data from multiple sensors, the system aims to enhance the accuracy of stroke prediction, enabling early intervention and timely medical assistance. The project also focuses on establishing a seamless connection between the IoT devices and the cloud for continuous monitoring and data storage.

Collect Real-Time Data:

Utilize IoT devices to gather relevant physiological data (e.g., blood pressure, heart rate, glucose levels) from individuals at risk of stroke.

Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 13 Issue 4, April 2024

Data Preprocessing:
Clean and preprocess the collected data to ensure its quality and suitability for analysis.

Feature Extraction:
Extract relevant features from the preprocessed data that are indicative of an individual's stroke risk.

Machine Learning Model Selection:
Select appropriate machine learning algorithms (e.g., logistic regression, random forest) for building a predictive model based on the extracted features.

Model Training and Evaluation:
Train the selected machine learning model using the preprocessed data and evaluate its performance using appropriate metrics (e.g., accuracy, sensitivity, specificity).

Real-Time Monitoring and Alerting:
Implement a real-time monitoring system that continuously collects data from IoT devices, feeds it into the trained model, and generates alerts if a high stroke risk is detected.

User Interface Development:
Develop a user-friendly interface (e.g., web application, mobile app) to display the monitoring results and provide recommendations for preventive actions.

System Integration and Deployment:
Integrate all components of the system (data collection, preprocessing, model inference, and user interface) and deploy it in a real-world setting for testing and validation.

Performance Optimization:
Optimize the system's performance in terms of accuracy, speed, and resource efficiency through iterative refinement and tuning.
Ethical and Legal Considerations:
Ensure compliance with ethical guidelines and legal regulations related to data privacy, consent, and healthcare standards throughout the development and deployment process

EXISTING SYSTEM:

The main vision of the healthcare industry is to provide better healthcare to everyone, anytime, anywhere in the world. This should be done in many patient friendly and business establishments. Therefore, nursing equipment needs to be improved to improve the nursing profession. Technology has been shown to be effective in reducing patients' stress because it makes life easier.
Body Sensor Network (BSN) technology is one of the most important technologies in modern medicine based on the Internet of Things. It is a collection of low-power, lightweight wireless sensor nodes used to monitor human body activity and the surrounding environment. Since BSN nodes are used to collect important (life-critical) data and can operate in harsh environments, they require stringent security procedures to prevent malicious tampering with the system.

PROPOSED TECHNIQUE:

Pre-Stroke Detection System.

Expected Advantages:

- ❖ The main advantage of the system lies in its security and its ability to use the internet to send sensor data and perform machine learning.
- ❖ Doctors can access the database to compare the current patient with their medical history.
- ❖ The machine learning process continuously monitors the sensor data of patient simultaneously.
- ❖ Allows plug-and-play off-the-shelf hardware devices from a variety of vendors, thus eliminating the need for standard designs.

METHODOLOGY

A person’s health will be monitor by wearable device every day. Stroke beat, pressure, temperature all the data is sent to cloud and machine learning is performed with the uploaded data . The main role of machine learning is to classify the hardware sensor data is normal or not. The data set contains the medical characteristics is compared with real hardware data through ML which intern gives the accurate status which reduces the time complexity and can save many lives.We use this algorithm to predict stroke by taking different independent variables and we take pulse beat time to time as it varies from time to time. We use multiple regression to predict Stroke attack and we use IOT to communicate to the person and we use IOT devices and cloud platform in order to remind the person about his health condition of a stroke.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 13 Issue 4, April 2024

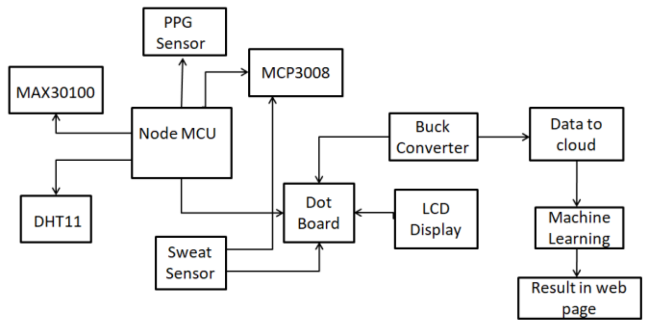


Figure: Block Diagram

COMPONENTS OF HARDWARE

1 .NODEMCU (ESP8266)

The Atmel AVR® core provides a rich instruction set with 32 function registers. All 32 scratchpads connect directly to the Arithmetic Logic Unit (ALU), allowing two independent scratchpads to input a single instruction in a cycle. The result is better code while being delivered up to ten times faster than traditional CISC microcontrollers. The ATmega328/P provides the following features: 32K bytes of in-system programmable flash memory with read-on-write capability, 1K bytes of EEPROM, 2K bytes of SRAM, 23 general-purpose I/O lines, 32 scratchpad functions, real-time clock (RTC), three including time switch/comparator and PWM, 1 serial programmable USART, 1 byte-oriented 2-wire serial interface (I2C), 6-channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a programmable observer timer with internal oscillator, an SPI serial Six power saving modes selectable by port and software.

This allows for very fast startup and low power consumption. In continuous standby mode, the master oscillator and asynchronous timer are still active. Atmel provides the QTouch® library for embedding capacitive touch button, slider and wheel functionality into AVR microcontrollers. Patented offload signal capture provides advanced sensing capabilities, including full disclosure of keystrokes, and Adjacent Key Pressing® (AKS™) technology for subtle detection of key layer events.

Figure.1:NODEMCU (ESP8266)

2 .LCD Display:

A liquid crystal display (LCD) is a thin electronic device that uses light from a liquid crystal display (LC). LC does not emit light directly.

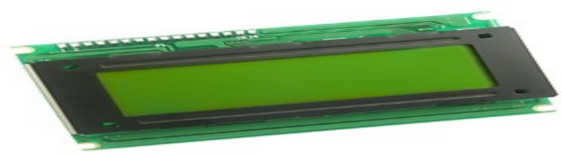


Fig.2:LCD Display

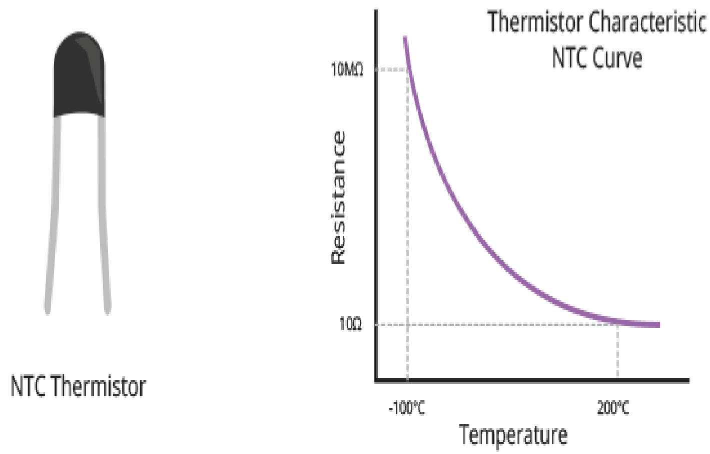
Computer monitors, TVs, instrument panels, aircraft cockpit displays, signs, etc. For example, they are used in many applications. LCDs have replaced cathode ray tube (CRT) displays in many applications. They are generally compact, lighter, more portable, cheaper, more reliable and more eye-friendly. They have much larger screens than CRT and plasma screens, and since they do not use phosphors, they do not experience image burn-in. Low power consumption allows it to be used in battery-powered devices. It is an electronic optical device containing pixels containing a liquid crystal that is placed in front of a light (backlight) or reflector to create a color or monochrome image. The first discovery that led to the development of LCD technology was the discovery of liquid crystal in 1888.

3. TEMPERATURE SENSOR:

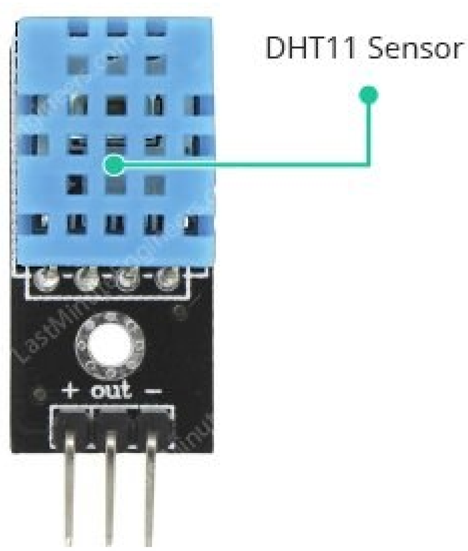
Thermistor is a type of resistor that does not change with temperature. This word is a combination of thermistor and resistor. Thermistors are widely used as in rush current limiters, temperature sensors, self-resetting overcurrent protectors, and self-regulating heating elements. The thermistor differs from temperature detectors (RTDs) in that the materials used in the thermistor are usually ceramics or polymers, while RTDs use pure metal. The temperature response is also different; RTDs are more efficient at higher temperatures, while the thermistor generally achieves higher accuracy at lower temperatures (typically 90°C to 130°C).

Figure.3:Temperature Sensor(DHT11)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 13 Issue 4, April 2024



The DHT11 also has an NTC/thermistor to measure temperature. A thermistor is a thermal resistor whose resistance changes with temperature. The word "NTC" means "negative temperature coefficient", which means that the resistance does not decrease when the temperature increases. If k is a positive value, the resistance increases with temperature and the element is called a positive temperature coefficient (PTC) thermistor or thermistor. If k is negative, the resistance will decrease as the temperature increases and the element is called a negative temperature coefficient (NTC) thermistor. Non-thermistor resistors are designed with k as close to zero as possible so that their resistance remains nearly constant over a wide temperature range.



4. MAX30100:

MAX30100 is an integrated pulse oximeter and heart rate monitoring solution. The MAX30100 works with 1.8V and 3.3V power supplies and can be driven by non-current sensitive software, allowing the power supply to be connected.

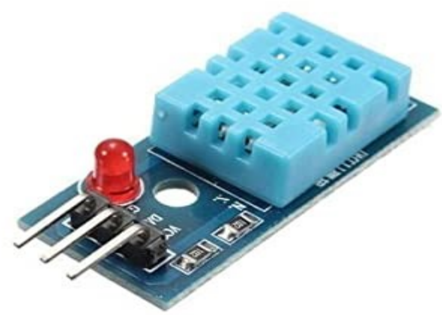


Figure.4:MAX30100

5. SWEAT SENSOR:

In the context of pre-stroke detection, these sensors could potentially detect changes in sweat composition that are indicative of conditions like dehydration, stress, or electrolyte imbalance, which are factors that can increase the risk of stroke.By integrating these sensors into an IoT system, you can collect real-time data from multiple users, which can then be analyzed using machine learning algorithms to identify patterns or anomalies that might signal an increased risk of stroke. This information could be used to alert individuals or healthcare providers, allowing for early intervention and prevention strategies.

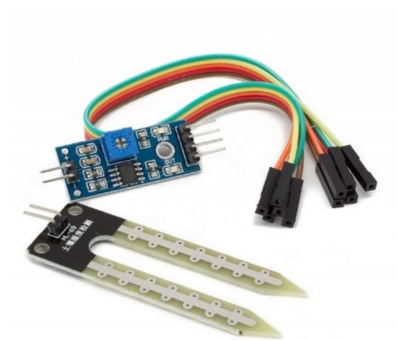
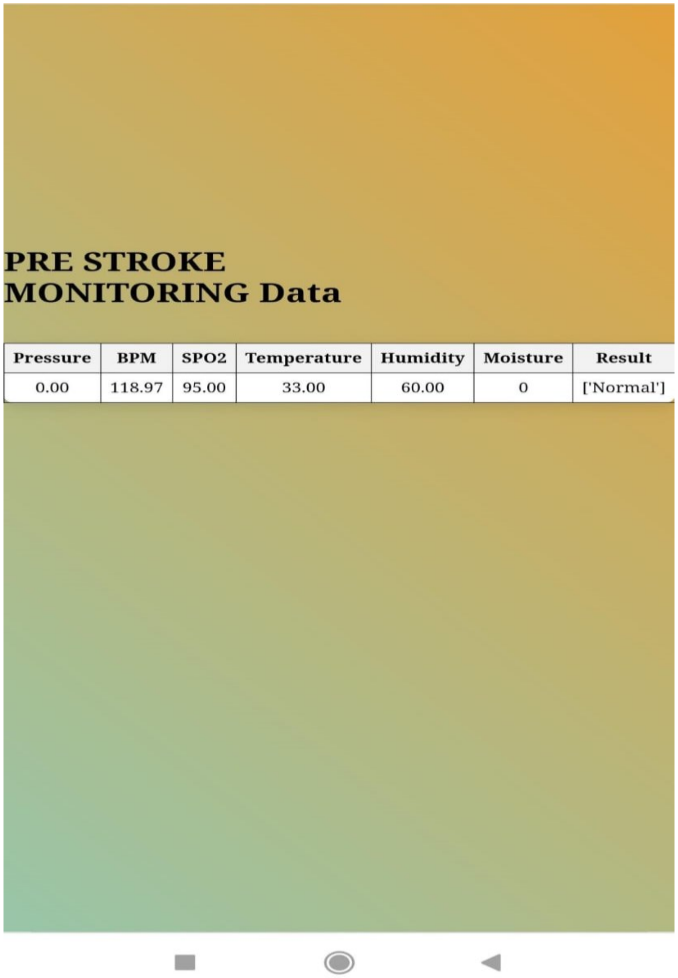


Figure.5:Sweat Sensor

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 13 Issue 4, April 2024

RESULT



Pressure	BPM	SPO2	Temperature	Humidity	Moisture	Result
0.00	118.97	95.00	33.00	60.00	0	['Normal']

CONCLUSION

In other words, send all the parameters of the patient, do the machine learning process and see his condition and medication on his mobile phone. The need to go to the doctor/physician is now pushed to the point of necessity. Therefore, it is very important to encourage collaboration with patients. In addition to the interaction between doctors and patients, communication between patients with chronic diseases is also important.

REFERENCES

[1] V Mozaffarian, D.B. (2015). 2015 Heart Disease and Stroke Statistics Update: A report from the American Heart Association. American Heart Association, Circulation 131, e29–322.one

[2] Amelia K. Boehme, C.E. (2017). Stroke risk factors, genetics and prevention. Phau ntawv American Heart Association Journal of Circulatory Research.

[3] M. Edip Gürol, J.S. (2018). 2018 Advances in Stroke Prevention.

[4] World Health Organization. (2018). World Health Statistics 2018: Monitoring health to achieve the Development Goals, Sustainable Development Goals. World Health Organization, Geneva.

[5] PSAs. (February 12, 2018). Deaths in the Philippines 2016.

[6] Merbakhsh Nirashi, H. Answer: (September 2017). Information detection and disease prediction: Comparison of machine learning. Journal of Software Informatics and Decision Support Systems, 4(No, 5), 8-16.

[7] Nilash, M. B. (2017). Analysis methods for disease prediction using machine learning techniques. Computer and chemical engineering. 106, 212-223, i

[8] Nilash, M.E. (2016). Multi-criteria collaborative filtering recommendation system using clustering and regression techniques. Journal of Software Computing and Decision Support Systems, 5, 24-30.

[9] Haqi Muhammad Azamatullah, A.H. (2017). Application of data mining methods in predicting diabetes. 2017 2nd International Conference on Image, Vision and Computing (IEEE), 106-110.

[10] Jeena R.S., D.S. (2016). Kev kwv yes mafia hit siv SVM. International Conference on Control, Instrumentation, Communications and Computing Technology (ICCICCT) (IEEE).

[11] Subha P.P., P.G. (2015). Incidence and risk of adolescent stroke among parents of stroke survivors at College Hospital. Thiruvananthapuram.

[12] National Stroke Association. (2019). (American Heart Association, Inc.) Retrieved May 28, 2019, from https://www.stroke.org/understand-stroke/what-is-stroke/.

[13] Dr. S.Vijayarani, M.A. (2015). Data mining classification algorithm for kidney disease prediction. International Journal of Cybernetics and Informatics, 4(4), 13-25.

[14] Jean-Emmanuel Bibault, P.G. (2016). Big data and machine learning in electronic oncology: state of the art and future prospects. Elsevier, vol., 110-117.

[15] Cemil Çolak, E.K. (2015). Application of knowledge discovery techniques to strike prediction. Elsevier, 181-185.