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Cloud Based Smart Healthcare Management System Using Blue EyesTechnology

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Abstract: *In the modern world, the board framework for medical care is emerging as a study area. Nevertheless, manual labour gives medical professionals the chance to measure a patient's many boundaries. The demand for skilled workers in the medical area has also increased recently. A solution is put up to automate all patient observation activities using Blue Eyes Technology in order to reduce human labour. The main idea is to utilise BET for the board structure to improve medical treatment, as well as to screen patients using BET. It makes estimations for a variety of parameters, including emotions, different types of mindsets, circulatory strain, pulse, skin temperature, and ECG. The key developments are the interactions of empowering detecting to a device, so it can detect a few basic measurements of an individual, at that point, human feeling discovery includes the most common method of noticing various human emotions, including joy, trouble, dread, outrage, shock, and repugnance, finally, respond suitably and appropriately assuming any basic circumstance happen.*

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I. INTRODUCTION:

Majority of the time, a carer must physically monitor patients by continuously taking their temperature, blood pressure, heart rate, blood pressure, and ECG readings. Additionally, if done manually, this task is delayed. The healthcare system is struggling with a few problems, such as a lack of public understanding of health care, a staffing crisis in hospitals, skyrocketing expenditures for advanced degrees, etc. More individuals today require healthcare assistance. Health monitoring often necessitates extra specific healthcare software, and there is a questionable level of trustworthiness owing to variances in accuracy. Moreover, the implementation of Real-Time Health Monitoring Devices depends heavily on an extensive wireless communications infrastructure, which might not be accessible or practical in remote locations. An automated patient monitoring system is suggested to offer patients with superior treatment in order to address these problems. In most of the countries, the patient monitoring is done manually by a nurse or a caretaker who has to perform patient parameters including heart rate, blood pressure, temperature, ECG, etc. are continuously measured. Additionally, if this task is done manually, it is delayed. The healthcare systems are dealing with a number of problems, such as a lack of public healthcare education, a staffing crisis in hospitals, sky-high expenditures for advanced degrees, etc. Nowadays, more people need health care support. Health monitoring necessitates additional specific healthcare services in many facilities, and there is always a risk of responsibility because of inaccuracies. Moreover, the implementation of Real-Time Health Monitoring Devices depends heavily on an extensive wireless communications infrastructure, which might not be accessible or practical in remote locations. An automated patient monitoring system is suggested to address these problems and give patients superior treatment.

II. LITERATURE REVIEW:

There has been a noticeable rise in process automation with the improvements in various technologies. The following list includes some of the technologies that will be useful for adopting automation in the sector of health care:

a) BlueEyes Technology: Since 1997, International Business Machines has been doing research on the Blue Eyes Technology at the Almaden Research Centre (ARC) in California. The technology offers amenities that are user-friendly. It makes it possible for a machine to comprehend a person and respond appropriately. The expression glass and the emotion mouse are two key components of the system. MAGIC (Manual and Gaze Input Cascaded) to choose a target and decrease cursor movement; SUITOR (Simple User Interest Tracker) to track a user's behaviour; and an eye movement sensor to detect eye movement are also included. The basic function of BET is to give a computer human power.

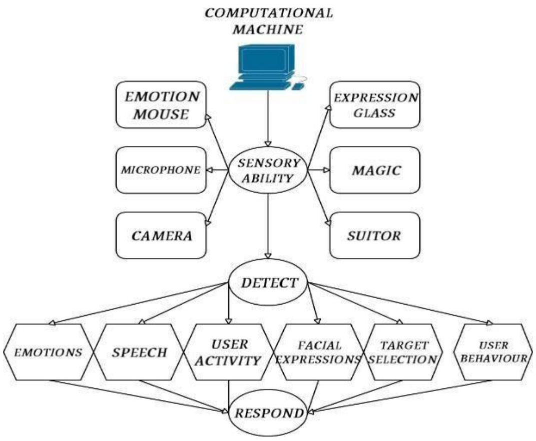

Fig1.*Basic architecture of Blue Eyes Technology*

b) Internet of Things: The IoT is a platform that makes data transport reliable. IoT devices have the capacityto produce enormous amounts of data that artificial intelligencecan utilise. Using IoT the following benefits are achieved:

- Easier data transmission
- Communication and control are simplified
- Cost-effective, saves time

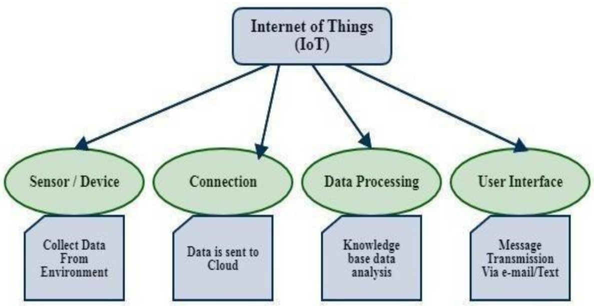

Fig2.IoT Platform

c) Cloud Computing: Simply described, cloud computing provides a range of computer services through the Internet, including servers, storage, databases, networking, software, analytics, and intelligence. The utilisation of big data to improve patient care, greater collaboration, more effective security, and many other related benefits are all made possible in the healthcare sector by the usage of cloud computing.

III. PROPOSED SYSTEM:

The following solution, which involves the integration of BET in patient monitoring system, is addressed after a thorough review of the current patient monitoring system. The suggested system tracks the heart rate, blood pressure, temperature, emotional state, and ECG of the patient. aiming for eliminate manual labour and provide patient monitoring around-the-clock. A specific automated care can be used in this system. The goal of Blue Eyes Technology is to endow a machine with human strength or talents. IoT is a developing interconnection technology that facilitates communication between devices. Here, the amalgamation of BlueEyes Is Technology with IOT Creates At Tremendous change by assuring best personalized care. The system comprises of three major units:

- The Data Acquiring Unit (DAU)
- Central System Unit (CSU)
- The Software Unit (SU)

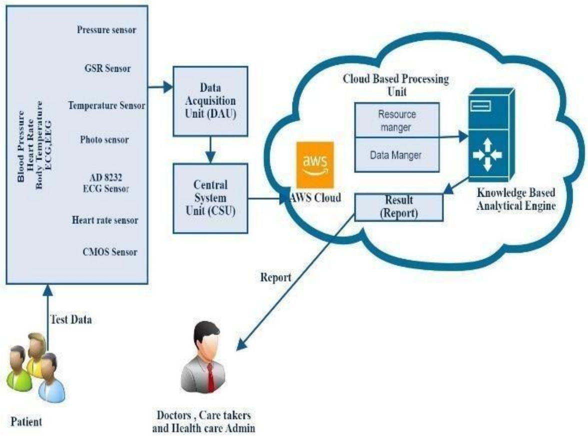

Fig3.*Overview of proposed system*

A) DAU-Used to collect physiologic data and send it to the Central System Unit for processing and verification of the data. PIN - Personal Identification Number codes are created for operator authentication purposes, together with identity cards. The DAU's Bluetooth module offers a wireless interface between the operator and the CSU.

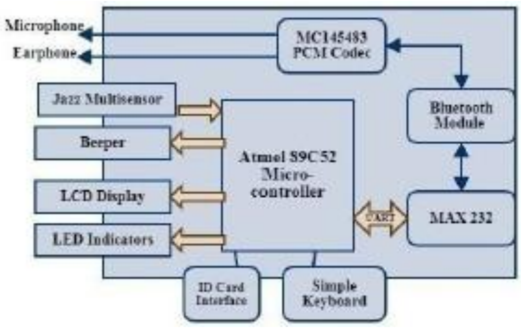

Fig4.*DAU Components*

B) CSU - CSU's primary responsibility is to process the data and respond appropriately. The CSU primarily consists of a codec and a Bluetooth wireless module.

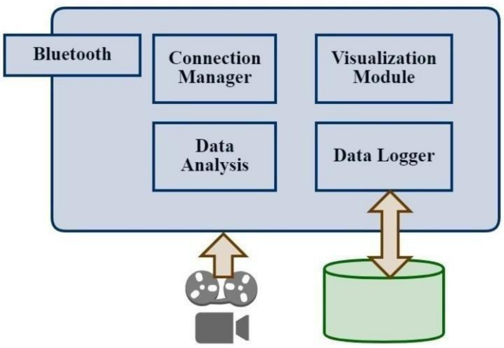

Fig5.*Central System Unit*

C) Software Unit - A software programme called BlueEye Technology continually monitors the operator. Transfer of messages between the manager and the data analyser is made possible by the programme. The programme will react in real- time based on physiologic changes made by the operator. Here, the programme serves as a supervisor.

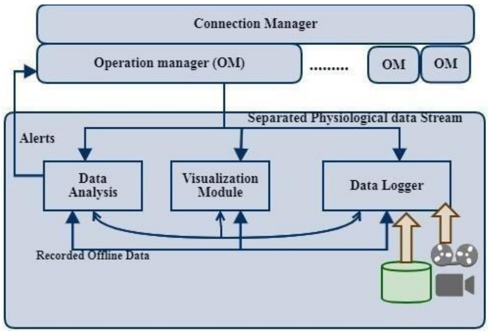

Fig6. *Software Analysis Diagram*

IV. STEPS INVOLVED IN MONITORING A PATIENT

- Procedure of granting and perceiving capability.
- Human emotion detection
- React wisely and appropriately.

The system starts out by observing the patient utilising voice recognition software, high-resolution cameras, and biometric sensors like the AD8232 ECG SENSOR and heart rate sensor. High-resolution cameras take photos, and the incoming "picture" hits the image sensor chip, which divides it up into millions of pixels, in speech recognition software. An ADC converts the analogue waves of the patient's voice into digital data by sampling the sound. The AD8232ECG Sensor measures the electrical movement of the heart using electrodes placed on the skin, and the heart rate sensor measures a patient's heart rate in beats per minute using an optical LED light source and an LED light sensor. The CMOS image sensor evaluates the brightness and colour of each pixel and records it as a unique number. The next step of humane motion level detection is done using the following device:

- Emotion mouse is an input device that may be used to capture a patient's or a user's emotions with just a touch. As a person interacts with a computer, the Emotion Mouse is intended to assess and recognise their emotions, including surprise, fear, rage, happiness, sorrow, and disgust. The primary goal the Emotion Mouse is to gather information about the a simple touch can reveal a user's physiological and physical state. With the right built-in sensors, this device can also determine a person's body temperature and blood pressure.

- A new sensing methodology: Our system attempts to build machines with perception and sensing skills. To detect user behaviours, the item employs a covert sensing technique that monitors physiological quantities. Software for speech and facial recognition makes it possible to continuously monitor patient activity. The genetic, medical, and behavioural problems of a patient are tracked and diagnosed using facial recognition software. A wide variety of facial recognition services powered by AI are available from Deep vision AI. One of the better options for facial recognition software for patient monitoring is Visual Face, provided by Deep vision. The biometric programme takes information from the collected digital photos and quantifies distinctive face characteristics.

- Response generation: The supervisor determines if the measured parameters fall within an acceptable range after detecting the heart rate, blood pressure, and other similar factors. The system continues to monitor if the measured values fall within a defined range; otherwise, it creates a response message, also known as an alert message. These alarm messages are provided to the carer as well as the doctor via text notification sent via email or SMS.

V. PROTOCOLS BLUETOOTH

· Bluetooth is a widely used IoT technology that provides short-range wireless data transmission. Bluetooth in our system allows for wireless connection between BET units. Advanced Message Queueing Protocol (AMQP): AMQPoffers point-to-point connectivity and enables secure, seamless communication between connected devices and the cloud. It aids in the quick and effective handling of urgent requests by the servers. Message Queue Telemetry Transport (MQTT): MQTT allows for remote device monitoring and data collection from a variety of electrical devices. This approach facilitates information sharing between the doctor, the caretaker, and the supervisor. It lessens data sluggishness.

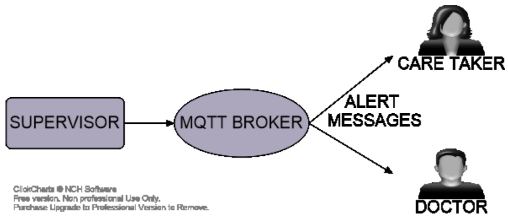

Fig7.*Working of MQTT Protocol*

The a fore mentioned protocols ensure that information is distributed effectively throughout the system. AMQP Protocol makes it simple for the supervisor to receive patient data from the system's remote devices, such as the high-resolution camera, emotion mouse, heart rate sensor, and ECG Senso pandemic phone. At the next stage, the supervisor\analyses the data and sends alert messages to the care taker and the doctor during critical conditions. The MQTT Protocol is used to send these alertmessages.

VI. APIs USED

- EmoVu created the EmoVu API. Machine learning and micro expression detection are combined in the EmoVu facial detection API. EmoVu uses webcams to observe a patient's micro expressions in order to determine their emotional state. It provides extensive platform assistance and several tracking functions, including head position, tilt, eyetracking, eye open/close, and others.
- Nviso The Nviso API uses emotion detection technologies to record and examine the user's emotional reaction and visual focus. Nviso is a leader in emotion video analytics, employing 3D face imaging technology to monitor many facial data points and generate probabilities for the seven most common emotions.

VII. IMPLEMENTATION

Each patient who is hospitalised and requests extensive observation is placed in a separate ward as part of the hospital's system architecture. A 24/7 monitoring unit surrounds the patient and includes a high-resolution camera, a CMOS sensor with high quantum efficiency—certainly important for constant observation of a patient—and an emotion mouse that must be kept in close physical contact with the patient's hand in order to measure the patient's emotional state. The emotion mouse is equipped with a number of sensors, including a built-in pressure pressure sensor for measuring blood pressure, a GSR sensor for monitoring sweat gland activity, a temperature sensor for measuring body temperature, and a picture sensor for confirming the presence or absence of an item.

For a regular measurement of heart rhythm, an AD 8232 ECG Sensor is positioned on the patient's body surface closer to the heart. Moreover, a heartrate sensor is worn around the patient's chest to continuously monitor the patient's heart rate.

Configuration of the sensors used:

Pressure sensor - Sensor Type: Load Cell, Accuracy: ±1%,Voltage–Supply:5V,GSRSensor–Sensor type:Temperature ,pressure. Voltage - supply:2.5V~5V,TemperatureSensorVoltagesupply:4to 30V,Typicaloperating voltage: 5V, Current drain: 60 µA, Accuracy: ±05˚C,Rangingtemperature:−55˚to +150˚C,Photosensor– Wavelength:1080nm, OutputType :Voltage ,Working voltage :12-24VDC24-240VAC (AC-DC power are applicable), AD8232ECG Sensor - Operating Voltage - 3.3V, AnalogOutput,Leads- OffDetection,3.5mmJackforBiomedicalPadConnection, Heart rate sensor - Operating Voltage:+5Vor +3.3V,Current Consumption: 4Ma,CMOS Sensor -output8/10-bit image data of various resolutions such asfull frame, sub-sampling, zooming and windowing, 15frames per second(up to 30 frames for 1080Pimages ,60 frames for 720P images ,and 120 framesfor QVGA resolution). PC Configuration: Intel core i7processor, 16GB Ram, 240Gb SSD and Windows 10 Professional. For activating the CMOS sensor presentin the high-resolution camera, FPGAs are used. All the above-mentioned sensors are programmed using JAVA,a programming language best-suited for healthcare applications. Speech recognition is done on a computerwith the aid of ASR (automatic speech recognition) software programs. Many ASR programs request theuser to "train" the ASR program to identify their voice so that it can more exactly convert the speech to text.

The APIs involved with this system are EmoVu and Nviso. EmoVu and Nviso APIs uses GPU capability for increased processing strength, returning nearly 20 unique metrics per user. In order to activate these APIs Node.js is installed on our machine and an account is created. Table1 holds patient ID, gender, age, date and time of measurement of the parameters and a list of values including temperature, blood pressure, ECG, heart rate and emotion. Table 1 consists of three different set of readings per patient record date and time interval of 4hours.

VIII. CONCLUSION

The proposed technique, according to the report, improves healthcare services while lowering the need for human intervention in patient monitoring. The ideal solution for automated patient monitoring in the healthcare sector is the implementation of blue eyes technology. The suggested system will be able to take care of and pamper a patient on its own and would give the patients excellent treatment. Very soon, this Blue Eyes technology will pave the pathfor improvements in healthcare.

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Table1.PatientAnalysisTable

ID	Gender	Age	Date	Time	Temperature	Blood Pressure	ECG	Heart Rate	Emotion
1	Male	23	12/01/2020	9.00 AM	97°F	117/77mmHg	Normal	72bpm	Sadness
				1.00 PM	97°F	120/79mmHg	Normal	78bpm	Sadness
				5.00 PM	99°F	120/81mmHg	Normal	81bpm	Happiness
2	Female	63	12/01/2020	9.00 AM	101°F	137/87mmHg	Normal	89bpm	Fear
				1.00 PM	99.5°F	139/88mmHg	Normal	92bpm	Fear
				5.00 PM	104°F	142/92mmHg	Abnormal	102bpm	Fear
3	Male	65	12/01/2020	9.00 AM	99.5°F	82/77mmHg	Normal	80bpm	Disgust
				1.00 PM	99°F	89/70mmHg	Normal	78bpm	Disgust
				5.00 PM	97°F	90/60mmHg	Normal	75bpm	Anger