

A Health Monitoring and Security System for Home Isolated Patients Based on the IOT

^[1]Shamna P.A

^[1] Student, Electronics and communication engineering, KMCT College of Egg, Kozhikode, Kerala. India.

Abstract— The not unusual place healthcare advantages with crafty decisions, execute super communications technology that can produce creative communities. Health performs a prime role in our everyday routine. Real-time fitness tracking for initial detection of lifestyles alarming sicknesses via superior sensing and conversation era typically make contributions boost treatment to shop the lives of patients. The predominant goal of this task is to expand a machine with the intention to deliver frame temp, MAX 30100 oxygen sensor and pulse sensor as well. Plus the Controller ESP32 Dev board is interfaced with the sensors. For patients security system by using Python software and serially connected laptop to ESP 32. Wireless records transmission is processed the usage of Arduino via the Wi-Fi module. The controller ESP32 is applied for Wireless records transmission on IOT method the usage of an android app BLYNK. Visually digitalizing the records on a Blynk Android App. Patient's report of records might be saved over a duration of time. The records is saved the usage of an Android app with a view to control the tool the usage of the app.

I. INTRODUCTION

Health tracking is a prime trouble in today's world. As an end result of a scarcity of right fitness tracking, sufferers from one-of-a-kind illnesses be afflicted by critical fitness troubles. Because of growing paintings value, clinical establishments would compel to restriction nursing body of workers for sufferers. Patients affected through infectious illnesses like COVID-19 wishes to be monitored remotely because of its opportunity to unfold amongst nurses additionally. Before inventing IoT, it wishes 2-three days to deal with a difficulty in an ordinary deliver chain situation for a first-rate end result. However, in IoT, it wishes best minutes, seconds, or microseconds to take action. The excessive expectation and discharge of widespread information with inside the IoT surroundings indicate that the value of information will lessen very soon. According to the WHO, 4.9 million human beings died from lungs cancer, overweight 2.6 million, 4.4 million for accelerated cholesterol, and 7.1 million for excessive blood pressure [1]. Hypertension is a common sickness this is especially answerable for cardiac/stroke mortality of just about all continual illnesses. But at now, a restrained number of far off HRV evaluation structures is to be had for high blood pressure affected person that permits the medical doctors to music down the development of the affected person's fitness circumstance or crucial troubles with inside the rural area [1]. These clever gadgets are additionally high quality to a fitness expert to preserve a watch on personally their sufferers. With lots of latest healthcare generation start-ups, IoT is hastily revolutionizing the healthcare industry. Here, we introduce a primary IoT-primarily based totally healthcare tracking gadget. Implementation of the nursing gadget gets a brand new size and each affected person may be monitored remotely. By this, primarily based totally on procured information, instantaneously training may be given to the

only who's in price while the affected person is in a crucial situation. It may also play a crucial position to lessen exertions value, instead could be smooth to assess from anywhere, whenever and could be useful to take an instantaneously decision. Thus, the nursing gadget could be digitalized. In the proposed version, sufferers can measure heartbeat rate, saturated peripheral oxygen degree and body temperature through himself or herself and that file immediately despatched to the medical doctors. Later that, the ones reviews could be used to discuss with medical doctors inside a totally brief time. It additionally reduces the precious time for each sufferers and medical doctors. They don't want to anticipate the reviews due to the fact sensors are providing real-time information. The version could be very powerful for peoples in rural areas. IoT is served thru Wireless Fidelity (Wi-Fi) technology to ship information or affected person reviews to the medical doctors with time and date. This proposed version can use any kind of folks like she or he affected with a sickness or not. So, they can test it on a everyday foundation due to the fact human beings pay more interest in the direction of prevention and early popularity of sickness.

For home isolated patients need a security system to protect themselves from intruder. Technology has been evolving notably from early 90's and we're now on the level of changing human beings with generation. Nowadays human beings are greater targeted at the easiness of existence and really a good deal depending on the generation for accomplishing it. Some of instance for such regions is Robotics, Building management, Drone surveillance, computerized cars, etc. Now machines aren't simplest capable of examine the encompassing however also are capable of make calculative choice due to availability of facts and computational resource.

II. LITERATURE SURVEY

Naina Gupta et al. set ahead an association of IoT based fitness tracking structures that ambitions to settle the problem of time wastage during ambulatory offerings and in hospitals. They pressure to switch the records thru a GSM module join via Bluetooth technology. Methodical fitness test and tracking of the unique frame parameters with the assist of the unique sensors connected to the frame is the primary recognition of this paintings [1]. In [2], a low-fee IoT device for multi-affected person ECG's tracking is brought. The authors brought a prototype this is certain to paintings handiest at the transmission of Electrocardiographic alerts via ZigBee wirelessly. Human-face-detection and reputation concept is mentioned via way of means of Bhupendra Vishwakarma, Pooja in [4]. As all of us recognize face detection and reputation play critical roles in lots of packages like video surveillance and face picture management. Here they want labored on each face reputation and detection techniques. Fatih Cherfawi and Si Nabil Yassini proposed the machine for figuring out the facial area, in preference to figuring out vital factors in the facial area, they proposed a complete framework wherein the spatial transducer community might be applied. i.e. previous to the class community to analyze face alignment parameters in [5]. A spatial transformer community learns the spatial transformation of an picture or function map. Transformation right here consists of tactics including scaling, shearing, rotation, and non-inflexible deformation. In this system, facial recognition is executed via way of means of a famous set of rules referred to as Principal Component Analysis evolved via way of means of Turk and Pentland and called eigen faces, which substantially reduces the size of the unique picture and the face detection and identity is carried out withinside the miniaturized space. For the motive of characteristic extraction, Fisher's technique of linear discrimination is used here.

Marko Arsenovic, Srdjan Sladojevic on this paper named Face Time Deep Learning primarily based totally Face Recognition Attendance System had entire technique of constructing up a face acknowledgement element via way of means of becoming a member of kingdom of the craftsmanship strategies and advances in profound mastering is portrayed [6]. It is resolved that with the extra modest wide variety of face photographs along the proposed technique for boom excessive assignment may want to probably spark off undertaking better exactness on littler dataset. There are some other kind for object detection system, especially during Covid-19 pandemic. Mainly pathological detection system using AI like covid-19 detection using segmented chest x-ray by Shamna P.A and Nair A.T [7].

III. WORKING METHODOLOGY

The Working flow diagram of the actual time IoT primarily based totally health and security tracking machine is

proven in Fig. 1. The machine is composed of 3 main embedded electronics: Pulse Oximeter and Heart Rate Sensor, Temperature Sensor and NodeMCU. A 5V adapter is attached as supply provider and for transmission of coaching from PC to NodeMCU. Patient will contact the Pulse Oximeter and Heart Rate Sensor after which the sensor's ray will depend the beat from blood glide. Touching the temperature sensor will degree the body temperature. The consequences then might be uploaded thru ESP8266 that's included in NodeMCU module and we will access the facts from cellular primarily based totally net server which acts as IoT cloud. While web cam is in on condition the Real time Intruder face detection will detect the Known face and also display the name of the person in system display by using ML in Python openCV. And if the system detect the known face of person, that information send to the receiver side by using IoT cloud. Then automatically open the door by a door motor that connected with esp32.

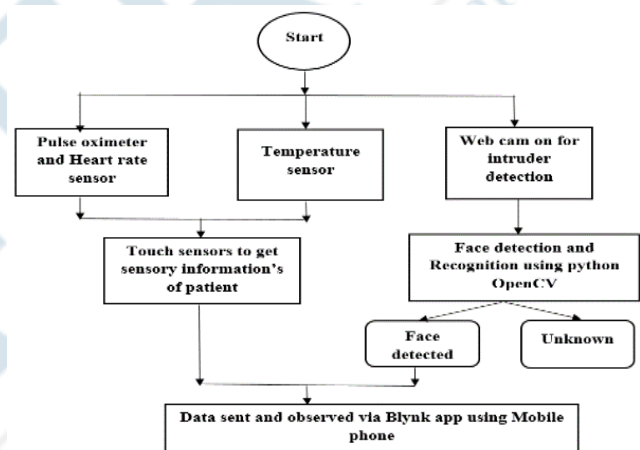


Fig.1 System workflow of the patient health monitoring and security system

A. SYSTEM MODEL

The proposed health tracking device version the use of IoT is proven in Fig. 2. Our paper is constructed from each hardware and software. In hardware part, heartbeat, SpO2 and Temperature sensors are used. When the heartbeat, SpO2 and temperature are measured. Software part include sensory program updating using Arduino IDE and real-time face recognition by python openCV. Wi-Fi module allows to send all data to Blynk app using Blynk server and can monitor all that information using mobile phone.

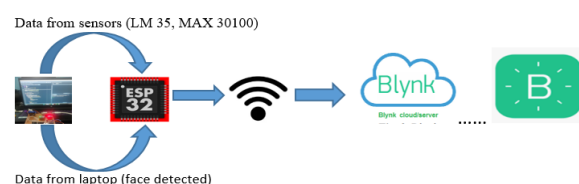


Fig.2 IoT based health and security system monitoring model

B. HARDWARE IMPLEMENTATION

To run the system first we want to attach NodeMCU module with the energy deliver as it's miles the principle manipulate unit. In enter side, we've got Pulse Oximeter and heartbeat sensor (Max30100) and temperature sensor. Moreover, WiFi module incorporated in NodeMCU Module facilitates to ship facts with inside the cloud and while the facts receives uploaded, we will check the output with inside the cloud utility in smartphone. First of all, a finger is located with inside the Pulse Oximeter and heartbeat sensor and with inside the temperature sensor. After that, if connection is constructed up, it suggests bring about the serial screen. And then it sends facts with inside the Blynk cloud to screen from far. This is all approximately the block diagram in Fig. 3 which suggests the entire method of hardware. Also Laptop connected with hardware for software applications.

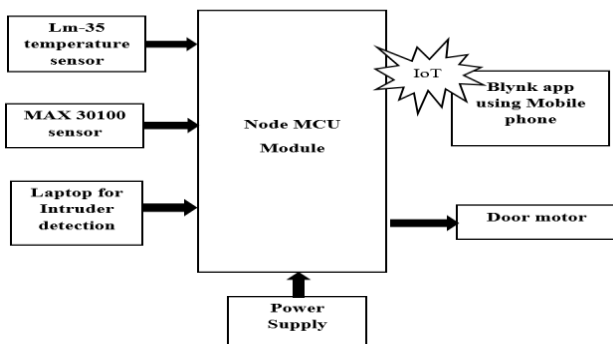


Fig.3 Block diagram for hardware implementation for IoT based health and security monitoring system

C. SOFTWARE IMPLEMENTATION

Software section mainly include python OpenCV machine learning algorithm. In this project, face detection algorithms are advanced primarily based totally on Local Binary Patterns Histogram (LBPH). The LBPH-primarily based totally algorithm, step one is to extract the photo sample with the LBPH algorithm. Then, thresholds are set to calculate the opportunity of face with inside the photo sample. After that, the sliding window implemented to become aware of the faces in given photographs and apprehend the ones faces.the basic LBPH based face detection using python openCV shown in Fig.4

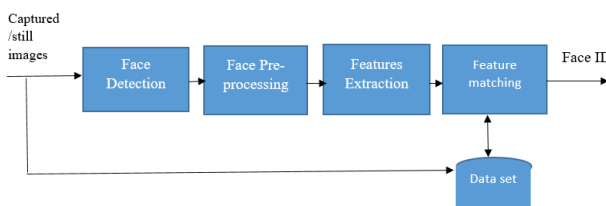


Fig.4 Basic phases in intruder Face detection system for patient's security monitoring

IV. PRACTICAL CIRCUIT CONNECTION

Figure 5 indicates the sensible circuit of the proposed IoT primarily based totally heath tracking system. The precision of the system relies upon at the sound layout of the circuit and proper association of the circuit elements. Performance of each circuit degree relies upon at the overall performance of preceding degree. So, each and every degree designing have to be meaningful.



Fig.5 Circuit diagram for IoT based health monitoring and security system

V. RESULTS AND DISCUSSION

The proposed IoT based patient health monitoring system worked successfully when deployed in a real circuit. Heart rate, peripheral oxygen saturation \ (SpO2 \) and body temperature were sent to the web server from the circuit. This section is shown below in Fig. 6 of patient's health under normal condition as a result of hardware section.



Fig.6 Health Parameters shown in Gauge form under normal condition

Under normal conditions, all health parameters were within normal limits: normal pulse 84 beats per minute (bpm), normal SpO2 94% and normal body temperature 33.55°C for a healthy adult. So in Mobile app we can see parameters in normal range in 3 different gauges.The

proposed main facial recognition application was implemented using Python, the Open CV image processing library, and the LBPH algorithm on the web camera. In this application, the algorithm applied to face recognition is divided into three different and independent parts. After preprocessing, all 50 snapshots of objects will be stored in the same folder. Each image will be assigned a subject ID and sample number. Sample count is the number of images per face image. Therefore, the sample number will be different, while the subject ID will be the same for a face image. If the person in front of the camera is known then name of the person indicate on the live camera image (Fig: 7(a)) and send a message to patient relatives through IoT Mobile app shown in Fig.7(b).

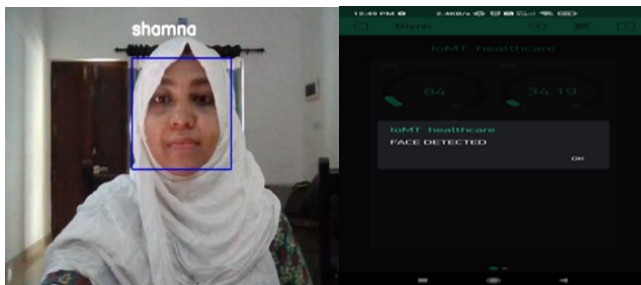


Fig.7 result of face recognition system using ML in Python openCV(7(a)left) Face recognition result send to Mobile app(7(b)right)

VI. CONCLUSIONS AND FUTURE WORK

In this article, we have successfully developed a real-time health monitoring and security system based on IoT using locally available sensors which provides continuous monitoring of patient using use web services and applications. Using the system powered by the, the patient's heart rate, peripheral oxygen saturation (SpO₂) and body temperature can be monitored remotely, 2 hours a day. Data were presented and discussed under normal. This IoT-based telemetry data visualization allows doctors or guardians to monitor the health status of patients. Stay away from hospitals and reduce healthcare costs, especially for people in rural areas. In the present study, we included only the two necessary sensors providing three health measurements.

The proposed system detects unknown and known faces people from the camera and automatically open the door using door motor. It uses Viola Jones face recognition technique to detect faces. Faces from frames for people. For face recognition, the system uses a model trained on the LBPH algorithm. The confidence of the LBPH prediction was set to 100 where the system obtained the maximum correct result. In the future can add more developed sensors which will represent a complete system for health monitoring in any unusual health conditions, the system can be integrated with CCTV for real-time detection and an alarm or door lock can be programmed to if the system detects an intruder.

REFERENCES

- [1] N Gupta, H Saeed, S Jha, M Chahande, S Pandey. IOT based health monitoring systems, 2017 International Conference on Innovations in Information, Embedded and Communication Systems (IEEEICIECS), Coimbatore, India
- [2] MRF Nurdin, S Hadiyoso, A Rizal. A Low-Cost Internet of Things (IoT) System for Multi-Patient ECG's Monitoring, 2016 International Conference on Control, Electronics, Renewable Energy and Communications (IEEE- ICCEREC), Bandung, Indonesia, 2016, DOI:10.1109/ICCEREC.2016.7814958, (16 January 2017).
- [3] Bhupendra Vishwakarma, Pooja Dange, Abhijeet Chavan, "Face and facial expression recognition for blind people", International Research Journal of Engineering and Technology (IRJET), 2017.
- [4] Fateh Cherfaoui and Si Nabil Yacini and Amine Nait-Ali, "Fusion of face recognition methods at score level", International Conference on Bioengineering for Smart Technologies (BioSMART), 2016.
- [5] Priya Pasumarti, P. Purna Sekhar, "Classroom Attendance Using Face Detection and Raspberry-Pi", International Research Journal of Engineering and Technology (IRJET) 2018
- [6] Shamna, P. A., & Nair, A. T. (2022). Detection of COVID-19 Using Segmented Chest X-ray. In Intelligent Data Communication Technologies and Internet of Things (pp. 585-598). Springer, Singapore.