Smart Health Consultancy with Heart Rate Checking

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Abstract: Virtual health care management system plays a critical role in this era where people lead a busy life and does not have enough time to take good care of their health. Eventhough such systems already came into practice where people can monitor their health from home itself, there are many drawbacks to the existing system. A health care system without any basic checkups is of no use. So here we aims at implementing an efficient real time health monitoring system which includes pulse rate checking in addition to doctor appointment so that the user get access to their basic test results from anywhere. In remote areas, it is hard to find laboratories and pharmacies, so this system also provides accurate location of the nearest laboratories and pharmacies.

Keywords: AI, Health monitoring, Pulse rate, Smart phone

I. INTRODUCTION

In this modern generation, everything has changed into a digital mode where people receive every single services at their home itself. Here, we aim at providing an efficient health monitoring and appointment system to improve user's satisfaction by adding many value added services to the patients and doctors as well. Patient can communicate with the chat bot to know their current medical condition by simply entering the symptoms they have in case patient have no clue on their current medical condition. This feature also helps the user to take appropriate steps regarding their health condition and also suggest doctors for them to consult. In addition to it, the user could check their pulse at anytime, anywhere. Testing doesn't require any hardware devices except the smart phone which we are using. In case of any additional checkups, the system provides the location of the nearest test laboratories. It also provides the information and location of the nearest pharmacies to buy the prescribed medicines as per the doctor's suggestion. The user can attach their details and medical reports in an encrypted way. The patient have the access to the chatbot where they can receive details of their disease, doctor appointment, pulse rate checking and can view the location of their nearest test laboratories and pharmacies.

II. RELATED WORK

In [1] A smart medical prescription model is developed which benefits both doctors and patients. In this system, doctors can directly check in their patient's details, suggest medical tests and give medical prescriptions through this model. Similarly on the other side patient can access this model with their own access method and diagnostic centres can update and upload patient's test report on time.So all the information related to the patient's prescription and diagnostic services can be seen and served accordingly and smartly. The proposed system is established in a website based platform with MySQL database which contains information about doctors, patients, the registered diagnostic centres and registered nearest pharmacies. New patients are registered to the system by a unique identity number so that doctors can access patient's information through this ID.The procedure is initiated by the web browser by accepting requests from the client machines and sending HTTP requests to the server. Server in turn searches the database for the requested data and passes back the result to the requested client machine.Access is denied for unregistered users by performing authentication.

In [2] A patient portal is introduced which is a secure online application that permits patients to have access to the health information via Internet. Patients can access health information such as doctor visit information, list of medications, lab results, allergies, etc.using their username and password. When the user login for the first time he/she need to reset the password. Patient's Personal Health Information (PHI) data is encrypted and for this RSA and AES 256 algorithm is used.As the system is built with multiple level of encryption, to access simpleinformation like name of a patient, two-fold decryption is applied.

In [3] an interactive medical assistant is proposed in which user can enter his/her medical history and can ask questions related to health. User can communicate with the device by providing voice input. Then voice to text conversion is done by using "Julius" tool. This sentence is given as input to the system where the sentence is tokenized using POS trigger to

produce word-tag pair.In the next level medical term extraction is done after which it is normalized. All the terms related to medical are extracted and the rest are discarded. This extracted terms are much more legitimate and are stored in a new database.In the database, each of the entities will be marked as one and questions will be generated for each entity by QA matrix. When the user have completed inserting all the required information needed by the system, the medical term from the earlier stage of the processing is compared with the symptoms. If both of the medical term and the symptoms matches they are mapped on to the QA matrix and then the respective solution is identified from the matrix set. Before disclosing the result to the user, the result is checked with the user's previous medical history so that any side effects can be avoided. Later, the response of the system reaches the user in voice format. Natural Language Processing techniques are used in this system to provide accurate answer to the user.

In [4]When a patient is admitted in the hospital the patient is required to do the registration on paper which is difficult to maintain and update every time hence by using NFC tag this paper work will get reduced as all the data will be automated. Near Field Technology is used to store and retrieve patient information and health parameters. The main objective here is to completely avoid the use of medical report in the paper format even in the case of direct doctor consultancy. The system includes a doctor application along with the patient application, which will be able to view the patient's data with the help of NFC tags and takeadequate actions.When a patient is admitted to the hospital for the first time, he get registered to the system and will be provided with a unique id. In this manner each and every patient will be associated with an unique id. Patients need to be have an android smart phone and the doctors must have a NFC enabled phone to be a part of this system. Whenever the doctor wants to check patient's information, he can make use of the NFC issue app to read the content from the mobile to NFC tag. In the case of emergency automatic alerts will be generated.The doctor can view the patient data even in the form of graphs and logs at any time by just swapping the NFC tag.

In [5]The main intention of this system is to design a health monitoring system for the rural Indian population suffering from hypertension and Hypotension and it is also programmed to capture pre-cardiac arrest situation for remote people to take appropriate measures. This system helps to monitor the blood pressure and heart rate of the user with the help of an economical hardware kit consists of programmable microcontroller (MSP430) with an photonic sensor of radius 1.5cm to capture the blood flow rate and the variations in noise caused while cardiac cycle at the figure region (ROI). Android application in the user's device fetches unfurnished data from the microcontroller and the sensors. The data transmission from the hardware kit to the smartphone is done with the help of a Bluetooth module in the hardware kit. This fetched data is received at the smartphone application and is compared with the threshold value that is already fixed. Based on the comparison result the application takes appropriate decision. i.e. application decides whether to make an emergency call to the doctor/close ones or to update the doctor's application.

In [6] The proposed system is a web application for providing health care service mainly focused on the general republic of Bangladesh. Once the users, registered as patients, all their medical data can be stored in the database and can be used for future reference. In this application model both patient and doctor can communicate with each other via a message system. In the patient portal, the user can input and view medical information, take online appointment and seeking online medication. The system has been established using Code igniter, a PHP framework. The database has been established using MySQL and XAMPP/ WAMP as the server. The API of the application is used to build a separate android application which matches with the website.

In [7] Near Field Communication (NFC) technique and android based mobile application is used to develop an alternate patient appointment system. The model consists of three parts: medical consultation, medical check-up and early medical collection. Near Field Technology (NFC) device is used as a queuing system for getting patient's health records and for giving alerts to nurses, doctors and pharmacists. After registering to the system, patient's must be provided with NFC cards which must only be tapped once. The database was implemented using WAMP local host, MySQL version 5.5.24 and PHP version 5.4.3. The implementation covers NFC side towards only for patient appointment.

In [8] The system is implemented to make user's communication with doctors and the hospital more easier and effective. The Main objective of the system is that patient can make appointment with doctors according to the speciality area and can also take help from 24/7 online medical consultancy and emergency ambulance service. The system is also provided with the contact details of registered blood donors for all existing blood group. This is an android application which uses the Internet or the network of cellular phone operator where the user has to register with his phone number and email address. After user have gained access to the application, there will be four options from which user can select the preferred one. First option is followed by a layout in which user can select the doctor by checking the doctor's information provided. After choosing the doctor, user can make appointment online or directly by phone calls. The main attraction of this model is that all the previous appointments can be saved in an interface which can be used for future reference. And also emergency consultancy and ambulance services are saved based on the location. Finally, user gets to rate the doctor's service which will helps the doctor to maintain the standard and gives them an opportunity to improve.

In [9]A real-time patient monitoring system based on Internet of Things (IoT) is proposed. The main objective of the system is that it is able to assure the reliability of the real-time electrocardiogram (ECG). Message Queuing Telemetry Transport (MQTT) protocol is used for sending the real-time ECG to the web server. The doctor can access the webserver via a laptop or smartphone to display the recorded or real-time ECG data. The system mainly consists of four modules: a sensor, a microcontroller, a communication module and an ECG sensor. To gather the ECG data from the cardiac

patient, an ECG sensor is used. The sensor measures and amplifies the signal which is then processed by main controller and then transmitted to the MQT broker via WiFi module. The data is then transmitted to the web server through MQTT.

In [10] This paper proposes a system of chatbot as customer care service for a company. Till now, the users have to call and go through IVR process to catch up with company's customer care representatives. In this busy world, people have no much time to spare on this, which leads to many unsatisfied customers over the past years. The emerging trend of online platforms especially chatbot is gaining immense use in the recent technologies where the user can clarify their queries anytime, anywhere. In this paper, the ejabbered server handles the chatting part, AWS web services will access the messaging part and chatbot perform the customer representative part to solve the issues pf customers.

In [11] The aim of this paper is to provide a speech intelligence conversation bot for universities. A chatbot is not only needed in companies but also in universities. It usually have a phone number to contact but it might be difficult for users sometimes. Therefore it provides a speech intelligence conversation bot where the users can provide queries in voice format and receive in the same format. Speech recognition is implemented by Sphinx-4 and modified Megahal style is used to find necessary information and data for the user. The chatbot has the ability to listen to the user's input voice, convert into text format and to transfer output text into voice as well. Text To Speech(TTS) is implemented to achieve it.

In [12] Users can attach a set of knowledge in the form of PDF (Portable Document Format) and digital photos in this model. The chatbot is responsible to answer the queries provided by the user from the file uploaded. From the attached file, texts are extracted by using Optical Character Recognition and then perform question generation using overgenerating transformation and ranking algorithm and finally chatbot responds to the queries provided by the user when it is matched with input string. It avoids retyping of text since the PDF can be attached easily. When the user ask queries related to the content of pdf, the chatbot searches for its matching string in the file and extract related information and responds to the user.

In [13] Most applications are built for normal peoples rather than considering others. In this paper, an android based chatbot is developed for visually impaired people for answering their educational queries. It provides output in voice and text format as well so that normal people can also use it. Input is also received in voice format with the help of mobile mic. The application can be opened by using google search followed by proper voice instructions. It uses predefined data storage and Wikipedia service for answering queries. User can use this application in any android application.

In [14] This paper proposes an interactive chatbot with voice interface and three dimensional avatar. A chatbot without voice interaction will be less interesting to the users. Here the user can provide voice command the application gives a voice reply with a 3D avatar whose lips and gestures sync with the voice reply. It consist of various API s where it converts voice command to text and back to voice. With the help of facial expressions and gestures, communication becomes more evident and interactive.

In [15] In this paper, a real time patient's health status monitoring using intelligent agents and fuzzy logic is proposed. The system silently monitors the user's health condition and detect irregularities in health and in any emergency situation arises, the system alerts the medical personnel. Fuzzy Inference System (FIS) is used by the fuzzy decision agent to classify the patient's health status based on the psychological parameters collected. The result is then compared and verified by the experts.

In [16] Most people are suffering from heart rate disease and the death rate due to heart-related disease is also increasing. In this paper, the user has an ECG sensor module through which user can see heart rate by just connecting it with a laptop. It converts the heart rate in form of a pulse and can measure heart rate with these converted pulses by using a timer and counter of wemos controller. By that user can continuously measure heart rate. It also includes a feature by which we can upload the heart rate data to the cloud server with the help of a wifi module.

In [17] Heart rate may vary from person to person depends on age, heart condition even the change in mood can also vary the heart rate. With the help of an IR sensor, it detects the density of blood and there is a photodiode that sends cascaded signals. These signals will be amplified and pass to LED. The heart can be recorded with the help of a microcontroller and it can be displayed. Arduino is used for reading sensors. It consists of IR and photodiode which is placed sideways. The user will place the finger above the sensor. Then the IR LED transmits the light into the finger and the photodiode senses the light which is reflected. The amount of light reflected depends on the blood volume in the fingertip. By that photodiode will detect the light and then we can convert it into the pulse.

In [18] There is a certain situation while we are searching video on the web that gives us the result of some existing search interfaces. In this paper, they suggests content based video retrieval techniques. They are using key frame extraction techniques with the help of image processing algorithms. It converts video into particular temporal units. The most popular technique used for this is histogram difference. Once the segmentation is done the first shot is taken as a reference frame and others will get compared with this frame. Shot boundary detection is a method to detect changes in the video content. The accuracy lies between 95% to 98%.

In [19] In this paper, they are using a build acceleration sensor to measure heart rate. Here smartphone with a build-in accelerometer is used as a motion detector. The phone should be placed in the user's chest. Then by measuring acceleration we can get various pieces of information. From that heartbeat pulse and applying peak analysis to identify

high value from that set. After that, by distinguishing R-wave data the heart rate value can be measured. They compared values with the ECG device and there is low fluctuation in values.

In [20] Health related data are stored into cloud. This practise helps the user to retrieve data at any time and from any device. Here the sensors are connected to the patient body and the data retrieved and then these data will get transmitted to cloud services. Storing and processing of data will be executed in the cloud itself. Here they used Raspberry pi for collecting data and transmitting it to the cloud. Its main advantage is that anyone can use this application with any device that connected to the internet and also user can analyse patient data with various data mining techniques.

III. PROPOSED SYSTEM

In this fast moving world of automation, "Real time health monitoring and heart rate checking using smart phone" is an application that is a perfect health-care companion for any individual and for the doctors to know their patents better. It automates many of the processes in health care like suggesting doctors, alerting patients in critical conditions and checking pulse rate. It also predicts user's diseases and suggests them necessary actions to be taken. With this paper and application, the goal is to make the healthcare mobile and accessible to more and more people, and the more people use it the more robust it becomes. With the widely accessible mobile platform, this application can help people monitor their health even in remote areas. A healthcare system won't be efficient enough without basic medical checkup. This system provides the facility to check the pulse rate by using smart phone. It doesn't require any additional hardware. It also provides the information and the exact location of the nearest test laboratories and pharmacies so that people in small villages can view the location of nearest medical services. The patient can attach their existing medical records in the application in an encrypted way so that they can let the doctor view the records with their permission. This system also alerts the user in case of critical condition. The only cost it requires is the payment done to the respective doctors.

IV. CONCLUSION

In this world where everyone lives a busy life, digital health monitoring can be an immediate source of health care to access the patients themselves. Digital health care is done to make health care system mobile and accessible to everyone, even in remote areas. There is a lot of difficulties to receive proper health care in remote areas as they lack hospital and medical facilities. This system makes it available to everyone at free cost. The main purpose of this system to provide a medical support and health updation along with pulse rate checking. By providing doctor appointment system, users can consult the doctor from anywhere, anytime. Thus it provides a simple and efficient system to take care of our health effectively.

REFERENCES

[1]. Bijoya Lala, Sabikun Naher, Mohammed Arif Mahmood Md. Murshadul Hoque."Development of a smart medical prescription service model " on 4th International Conference on Electrical Engineering and Information & Communication Technology.

[2]. Subrata Acharya, Gabriel Susai and Manoj Pillai "Patient Portal: Anytime, Anywhere" 2015 IEEE International Conference on Bioinformatics and Biomedicine (BIBM).

[3]. Shamli Deshmukh, Ritika Bulani, Vijayalaxmi Rohane and Asmita Singh "Sia; An interactive medical assistant using Natural language processing" 2016 International Conference on Global Trends in Signal Processing, Information Computing and Communication.

[4]. Ms. Hoda Ramin Hossein and Prof. S.S.Shaikh "SPHPMS: Smart Personnel m-Healthcare Patient Monitoring System" International Conference on Electrical, Electronics and Optimization Techniques (ICEEOT), 2016.

[5]. Syed Thouheed Ahmed S, K. Thanuja, Nirmala S Guptha and Sai Narasimha "Telemedicine approach for remote patient monitoring system using smart phones with an economical hardware kit" IEEE 2016.

[6]. Fayezah Anjum, Abu Saleh Mohammed Shoaib, Abdullah Ibne Hossain, Mohammed Monirujjaman Khan "Online Health Care" 8th 2018 IEEE Annual Computing and Communication Workshop and Conference (CCWC)

[7]. Yeo Sy Mey, Suresh Sankaranarayanan "Near Field Communication based Patient Appointment" 2013 International Conference on Cloud and Ubiquitous Computing and Emerging Technologies.

[8]. Md. Nasfikur R. Khan, A K E H Mashuk, Whomaira F Durdana, Mehdi Alam, Robin Roy and M Abdur Razzak"Doctor Who?- A Customizable Android Application for Integrated Health Care", 2019 10th International Conference On Computing, Communication and Network Technologies (ICCNT)

[9]. Hoe Tung Yew, Ming Fung Ng, Soh Zhi Ping, Seng Kheau Chung, Ali Chekima and Jamal A. Dargham"IoT Based Real-Time Remote Patient Monitoring System", 2020 16th IEEE International Colloquium on Signal Processing & Its Applications (CSPA).

[10]. Godson Michael D'silva, Sanket Thakare, Sharddha More and Jeril Kuriakose "Real World Smart Chatbot for Customer Care using a Software as a Service (SaaS) Architecture", 2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC).

[11]. Jefri Yushendri, Alvian Rahman Hanif, Anneke Annassia Putri Siswadi, Purnawarman Musa, Tubagus Maulana Kusuma and Eri Prasetyo Wibowo "A Speech Intelligence Conversation Bot for Interactive Media Information"2017 Second International Conference on Informatics and Computing (ICIC).

[12]. Ly Pichponreay, Jin-Hyuk Kim, Chi-Hwan Choi,Kyung-Hee Lee and Wan-Sup Cho "Smart Answering Chatbot based on OCR and Overgenerating Transformation and Ranking" 2016 Eighth International Conference on Ubiquitous and Future Networks (ICUFN).

[13]. Naveen Kumar M, Linga Chandar P C, Venkatesh Prasad A and Sumangali K "Android Based Educational Chatbot for Visually Impaired People"

[14]. Antonius Angga P, Edwin Fachri W, Elevanita A, Suryadi, Dewi Agushinta R "Design of Chatbot with 3D Avatar, Voice Interface, and Facial Expression" 2015 International Conference on Science in Information Technology (ICSITech)

[15]. Todor Ivascu and Ovidiu Aritoni "Real-time health monitoring system based on a fuzzy agent model" 2015 E-Health and Bioengineering Conference(EHB).

[16]. Minal Patil, Abhishek Madankar and P.D. Khandait "Heart rate monitoring system" 2019 5th International Conference on Advanced Computing & Communication Systems(ICACCS).

[17]. Arulananth T.S, B. Shilpa "Fingertip based heart beat monitoring system using embedded systems" International Conference on Electronics, Communication and Aerospace Technology ICECA 2017.

[18]. Ijya Chygh, Ridhima Gupta, Rishi Kumar and Prashast Sahay "Techniques for key frame extraction: Shot segmentation and feature trajectory computation" 2016 6th International Conference-Cloud System and Big Data Engineering.

[19]. Muhammad Khairul Nizar Bin Khairuddin, Kazuhiro Nakamoto, Hiroshi Nakamura, Kanye Tanaka and Shota Nakasimha "Heart Rate and Heart Rate Variability Measuring System by using Smartphone" 2017 5th International Conference one Applied Computing and Information Technology.

[20]. Mohammad S. Jassas, Abdulla A. Qasem and Qusay H. Mahmoud "A smart system connecting e-health sensors and cloud" 2015 IEEE 28th Canadian Conference on Electrical and Computer Engineering (CCECE)