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Monitoring and Filtering Patient Health Data with IOT Based Health Sensor Kit

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The main aim of our project is to perform event based triggering to process the patient's real-time data and compute the data in patient's mobile and then data got uploaded to cloud. When an event is triggered the cloud sends alert to doctor, ambulance and relatives based on the threshold of event occurred. All data transmission occurring in-between Cloud Server and Patient' Mobile is encrypted using One Time Pad security mechanism.

KEY WORDS: - Fog computing, event based triggering, security, alert message.

I.INTRODUCTION

Fog computing allows data to be processed on the network edge without reaching the cloud infrastructure to reduce latency and network bandwidth. However, it is not without its security challenges as existing security protocols, implemented in the fog, do not fully cater for the mobility and heterogeneity of the fog, especially on resource-constrained fog nodes. As such, this increases latency and overhead on those nodes which also affects the fog. This paper investigates the possibility of creating a One- Time Pad-based encryption protocol with no packet loss; lesser time and energy overheads as compared to protocols that have been proposed by existing research. The protocol will be tested on wireless sensor nodes, which are resource constrained, and the outcome monitored. The One-Time Pads will be generated using a Random Number Generator within the nodes. Outcomes are positive and can be implemented on resource-constrained fog nodes.

II.RELATED WORK

IOT based remote monitoring systems have been suggested by various researchers due to their high efficiency in delivering intensive time-sensitive information to the clients. In existing system the IOT devices will keep observe the data from various resources and send data to the respective fog node or edge node for computation of health data. Then the computed values will be transferred to the cloud Server. Based on the abnormal condition the Cloud will send intimation to the clients. Due to continuous monitoring of IOT devices even the Fog Servers got accumulated with bulk of junk files. Processing the data in Edge Servers or Fog Servers takes very long time which makes slow alerts.

- A. DivyaTomar and Sonali Agarwal published a paper titled "A survey on Data Mining approaches for Healthcare" explores the utility of various Data Mining techniques such as classification, clustering, association, regression in health domain.
- B. A. D. Wood and J. A. Stankovic published a paper titled "A taxonomy for denial-of-service attacks in wireless sensor networks," Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, pp.
- C. E. Shih, S.-H. Cho, N. Ickes, R. Min, A. Sinha, A. Wang, and A. Chandrakasan published a paper titled "Physical layer driven protocol and algorithm design for energy-efficient wireless sensor networks," in Proceedings of the 7th annual international conference on Mobile computing and networking.

III. PROPOSED METHODOLOGY

In this paper, we propose the Secured OTP IOT Environment in Medical Field. Here the patient’s android mobile device will be acting as the edge server for doing computing with the receiving data from health monitoring devices. The health related data get uploaded into Mobile node. In Mobile Edge Layer, edge level computing is performed based on the threshold values the health status of respective patient is analyzed. If the status is getting abnormal then the Mobile Edge layer sends the health data with One time pad security to the Cloud. Then the emergency message will be sent to Hospital Ambulance, Doctor and relatives based on the type of event triggered. Mobile computing promotes high efficient output because maximum computation is done at edge level which makes the cloud process as light weight. We are going to implement the computation in patient’s mobile device with one-time-pad security.

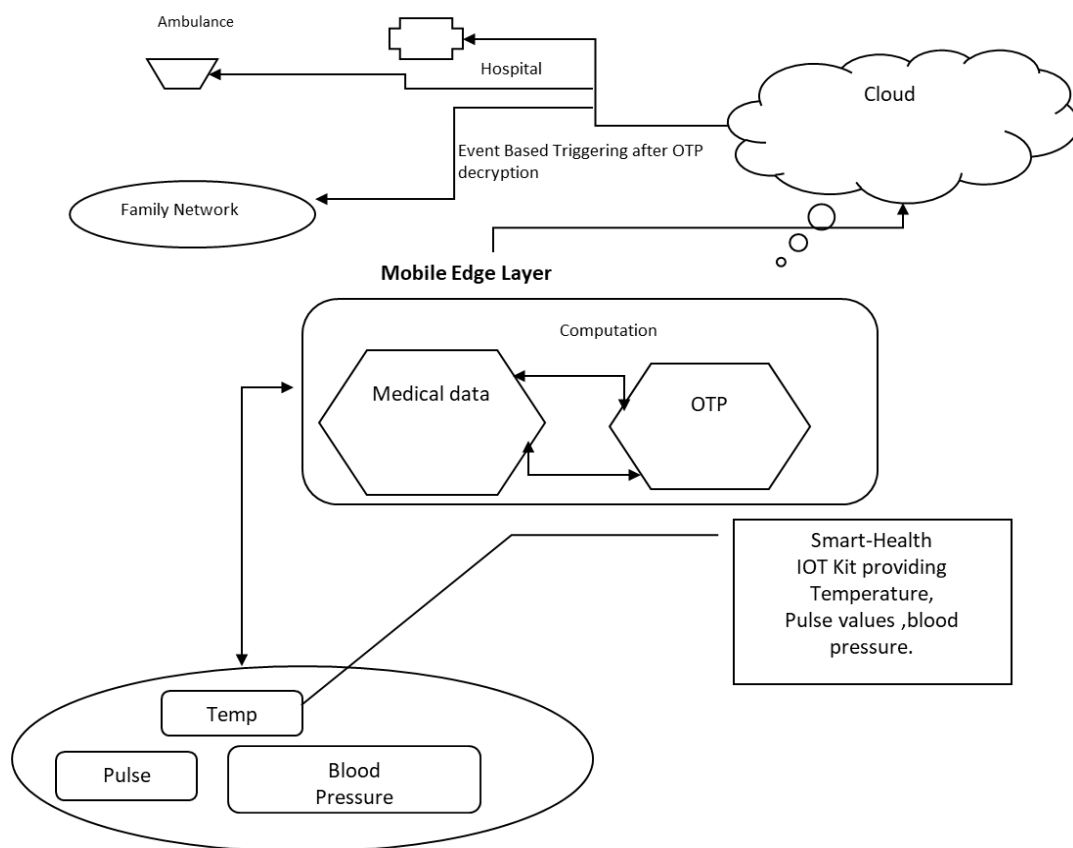


Fig 1. Architecture Diagram

User Authentication in Web-portal

We have developed a web portal – Hospital Web application. Using this application new patients has to register their details and the data will be stored in hospital Server. Likewise a hospital Admin sign-in will be there they can add new doctors and specific specialist to which the doctors belong to. All these information will be saved into hospital server’s database.

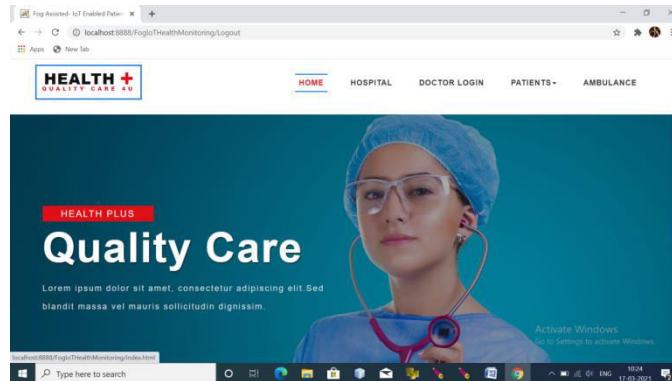


Fig 2.HOME PAGE

Patient’s Mobile Application and Appointment

The patient communicates with this system by registering his/her information at first instance by answering questions related to health history and personal details. After registration, a unique identification number is provided to the patient by the cloud server. To perform the classification, cloud layer provides the patient identification (PID) and attribute sets related to health history of the patients. The current application scenario works in event triggered mode. In this mode, the requisite real-time sampled data is stored at the mobile nodes. The mobile edge layer will conduct a data handling. Patients can request appointment to their respective Doctors from mobile application or web application.

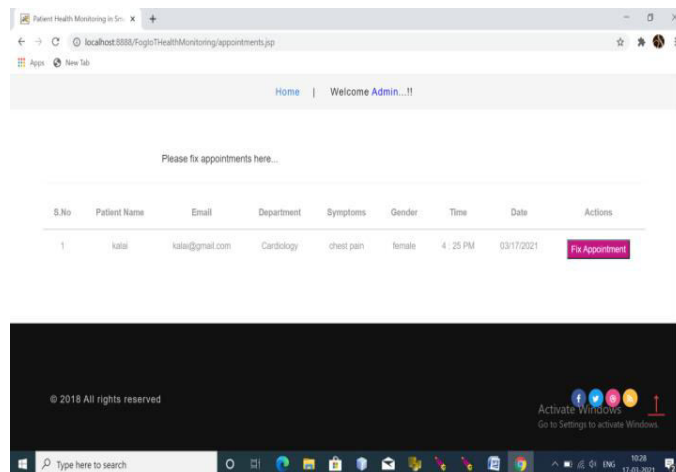
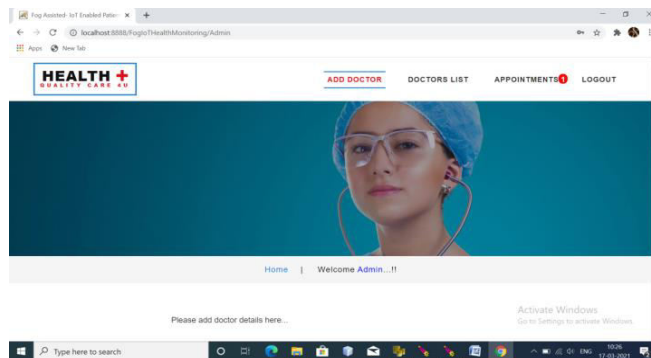


Fig 3.PATIENT’S APPOINTMENT FIXING

Mobile Computing

The health data from various fog-nodes from respective areas will be processed in Mobile layer. Based on the previous health dataset the computation will be processed. Data from different categories will be analyzed here. Health related data from previous history got collected from the Health dataset, Environment related data like air quality, noise level around the place where patient is, Behavior related data like whether the patient is having fits, vomiting, hyper tension, fainting etc. These kinds of data get analyzed in this layer. After computing, the end result will be sent to the one-time-pad security mechanism.

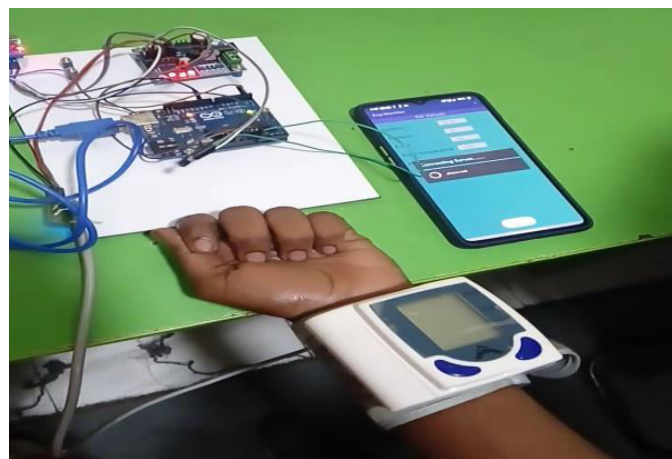
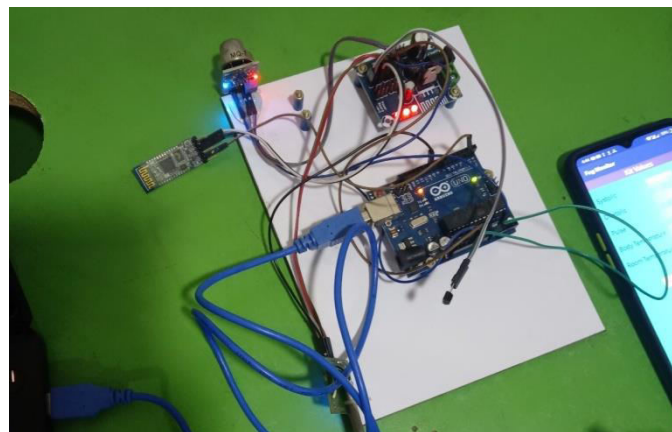


Fig 4.HEALTH SENSOR KIT

Event Based Triggering

When the mobile device performs computation periodically when the values got reached above the threshold value then it will detect that patient is in emergency state and has abnormal condition. So spontaneously the mobile node will send the abnormal data to the Cloud in encrypted format and here the Event is triggered by the cloud server. The Emergency alert to the Doctors, medical team, ambulance, relatives, etc.. Thus the alert will be sent to respective mobile users.

IV. RESULT

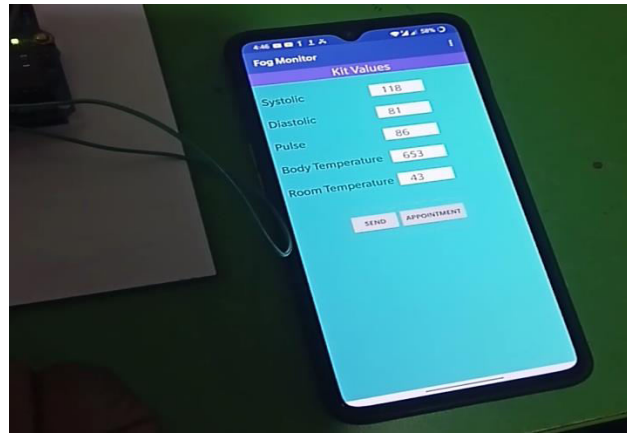


Fig 5.PATIENT'S FOG MONITORING SYSTEM

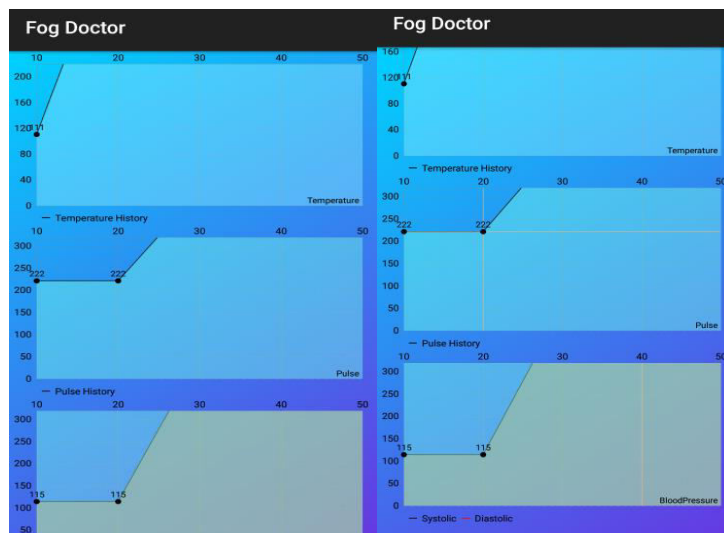


Fig 6.EMERGENCY ALERT TO DOCTOR

V. CONCLUSION

A secure and lightweight system for remote monitoring of patient's health conditions and used to provide immediate treatment. The medical data transmission is done in a secure manner using one time pad security mechanism. Event based triggering was achieved using mobile edge level computation that is only for abnormal cases the event is triggered and data got uploaded to the cloud server, then cloud will send alert message to Hospital ambulance, Doctor and relatives.

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