Improvement and Enhancement in Emergency Medical Services using IOT

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Abstract - *In medical emergencies, the victims are not able to talk about anything regarding themselves. Medical information of patients is not available at that time for doctors. Along with this, victim's wallet, purses, mobile, cards are frequently separated by them because of theft, or accidents. In these situations, a dedicated device that can provide the ER doctors about the patient's medical information can be very useful. The device can be described as an IOT based 'virtual assistant' for providing proper identification and complete medical information of every emergency patient to the ER staff and thus ensure timely and appropriate treatment decisions. It provides personal identity to that victim and medical information such as history, current condition and ensuring that the information gets available to doctors in time of need to ensure safety of family and friends. Also, one can track individual with the help of device with its software application provided with it.*

Key Words: IOT, Medical history, Security, Safety, Tracking

1. INTRODUCTION

IOT which is called as Internet of things is a system which is connection of objects or physically present objects with network accessed by internet. Here the 'thing' in IoT could be the objects helping victims to interact with internal and external environment, which in turn helps us to achieve our problem statement. It is basically a concept of connection between anyone, anywhere, anything, any network [1]. IoT technology brings roles, challenges, chances, opportunities in network based medical services [3]. Increase in management of IOT in healthcare systems helps in ever growing information and communication solutions.

Medical emergencies can happen anytime, anywhere. Victims in accidents, medical needs are sometime not able to speak for themselves. Also for emergency identification and communication devices and things like mobile phones, wallet /purses are either stolen or separated from victim because of some reasons A system which can help victim display their identity to doctors when in need and helps an individual keep a track of their respective members, creates a high chance for victim to survive a situation of medical emergencies. Medical devices which are IOT based are of different size, shape which contains high electronic equipment that are linked with network devices.

Ensuring that it is connected with good cellular network connectivity so that data access can be done anywhere is one of key factor in it. Organizations try to focus on its data access and storage for further analytic.

2. Literature Survey

The IoT is an ongoing huge trend in upcoming growing technologies that can leave a huge impact on the very single business trending and can be defined as the inter and intra connection of different yet unique objects and devices present within day today environment with benefits increasing as needs increases. [1]. By using IOT, Medical health concept uses sensors, computing, communication for healthcare is attracting more researchers to use this in various services. [7][3]. Various techniques flourishing IOT for social causes have been developed or still in progress. In last few years, researchers have taken a keen interest in IOT in healthcare system. Minimizing human effort to a certain extent by keeping it safe as well has become new trend in research world. It is not new concept still overgrowing, empowering and gaining attention in increasing order day by day. In this usage of electronic devices using cloud computing; private or public. Many examples are their such as garage door openers which uses user identity as a main concept to send information to user mobile phones. All can see how healthcare using IOT is picking up speed in accelerating healthcare system network even though problems remain continuously.

In paper [1], IOT is used for pediatric and elderly care and for their private health management. Though it has few drawbacks as in this there is no future in E-health and it doesn't maintain standard network model which has less chances of data protection. In paper [2], patient monitoring can be by staff anywhere and everywhere. But it has complex infrastructure which in emergency can cause problems. In paper [3], various interfacing is done between devices so that ER- doctors can use it without any problems. But it requires wide range of data to be accessed through app as this requires heterogeneity of database. In paper [4], it put forth idea of smart hotel management for monitoring health care system. The only difficulty in this is maintaining current and past medical information of patient with a good track of them.

Fig -1: IOT in healthcare system

3. Proposed technology

A wearable identity (bracelet, eyelet for watches or pendant) with a unique identification number, basic medical data and emergency contact numbers will be provided to registered users. In the time of emergency, the person will get immediate medical help once a call to emergency number is made and detailed medical history will be provided to the hospital approached.

3.1 System Architecture

The system architecture focuses on two parts of system. Along with the wearable identity, a mobile application will be available to access the user account and manage the members under this account as well as updating the medical information of all. The mobile application also provides a way to track any member associated to the user account and gets historic route data as well. An emergency feature to send assigned contacts an alert is also provided in the application As an IOT extension, a GPS tracing device can be requested to track a person using the same mobile application. The GPS tracking device uses a GSM sim card and records the route taken in a tracking session.
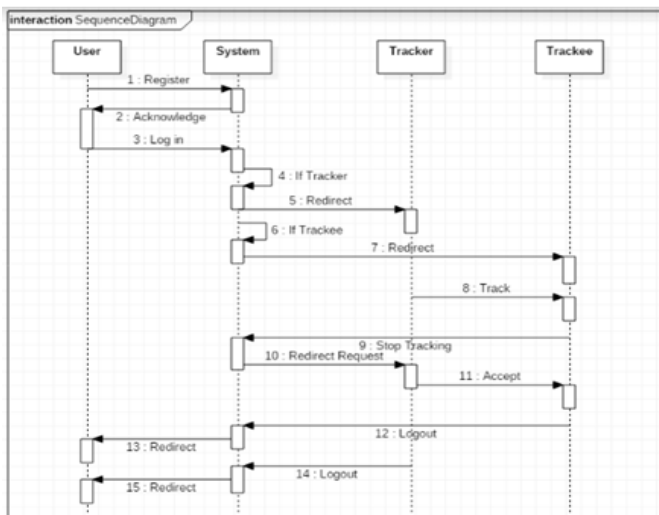

Fig -2: System architecture

I] Registration is done by user. Now here a user act as administrator filling all detailed information about user that is medical and personal details.

II] User sends referral code to members he/she wishes to add.

II] Member can only be part of system through referral code.

III] User divides members into tracker and trackee.

IV] Now trackee can be tracked by two modes:

1) With GPS device; for children and elderly

2) With mobile devices

IV] If a member wishes to update or change his/her information then it is done only by permission of user.

V] User can limit trackee location by using geofencing.

VI] If the trackee moves out of zone, sos alert is generated. Also, trackee can use sos alert manually providing location to emergency contacts.

4. Algorithm:

I. Download the application.

II. Login or Register (New user, same as online portal).

II. Sign in.

IV. Add members (multiple).

V Generate unique identification for each member (Default identification for trail user).

VI. Request a track session to a certain member (Entry with pending status will be created).

VII The member accepts the track session from their device (Entry status changes to passed).

VIII. Live tracking session with route record.

IX. Session information recorded as historic data.

X. SOS Alert feature to send notifications to other members with google location link.

XI. Logout

5. Performance and analysis parameter

1. **Tracking**

   The tracking of a member is done by two ways. First one being the mobile application using the phone's GPS to track a member and SOS Alert using the same. The tracking is route recording and live location tracing. While, the SOS Alert makes phone

call and SMS alerts to emergency contacts. Application notification is also generated. Second tracking is using a GPS tracking device with works with a GSM SIM card for connectivity. This device can be located from the mobile application.

2. **Security**

Medical history, trackee information as well as tracker information is safe as it need specific referral code to be a member provided by user as well as only user has authority to change or access anything.

3. **Medical history update**

The user account can update or add new medical information for any member associated to that user account. This change is reflected of the database, hence on the online web portal as well.

4. **Portability**

User can carry device anywhere and also can track respective member anywhere as long as data connection provided.

5. **Safety**

Whole system follows a single motto that is safety. It is ensured for both user and member.

6. Applications

1) Household

Parents can track and be updated of their respective kids about their whereabouts. It comes in handy as it device is small in size and be easily hidden from kids and parents can track their pupil. Also, it contains emergency medical history providing doctors plus point to continue with medical emergencies.

2) Elderly people

Since old people do not have a proper eyesight restrain by their age given, this system provides their respective guardians to keep a tab on them.

3) School system

School authorities can use geofencing in this system to restrict student's location and keep safe student from entering in danger zone and also to provide information to their respective guardian.

4) Medical centers

Centers build for medical emergencies can use this app to track people admitted in the hospital for span of time so as to get notification when patient is in distress.

7. Future Scope

1. Introduction to Big Data: -

With increase in user data and internationalization, with overhead of databases increasing big data should be handled with efficient algorithm as the access time to historic data must be as short as possible.

2. Online medical support: -

Service can be added to help medical emergency actions, user can get quick response from certified and authenticated doctors about first aid in any medical situation.

3. Bio-sensors in wearable IDs: -

Various sensors can be integrated into the wearable IDs to get a direct alert to the mobile application direct about any medical situation.

3. CONCLUSIONS

Internet of things is used for transforming the healthcare system completely by using and defining apps, devices, web, and how people interact and connect for solutions in healthcare. IOT is constantly offering help when needed in shape of apps, new tools using integrated devices for patients to be better in no time. Even though it is a revolution in health care network, it so has challenges as data accessed for it is sensitive, confidential which after being shared can cause reputations damage, destroy life and careers.

In this a work system is proposed helping needy people to use it without any disturbance, insecurity of losing something as in this system they are their owner. Security is a key factor which also being boon can be curse too. Increases in security also required increase in level of data sharing. Though IOT is revolutionized work it still need to improve efficiency which can be done through various technologies integration. Thus, helping user in achieving result of the given proposed system structure with a high possibility of user satisfaction.

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