

PRIVACY PRESERVING DATA SHARING FRAMEWORK FOR HEALTHCARE IN IOT SYSTEMS

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ABSTRACT

A healthcare data is very important for the purpose of organizing the data, analyzing the data etc. It is also important for Scientific Research, sharing of healthcare data has rapidly growing in Society. The healthcare data brings more privacy to the patient's health data. Sharing that particular data without any permission can bring many threats to the patient's privacy. Data collection and Preserving of data is the most sensitive part in the medical sector. Now a day's many of the Organizations are focusing on the data privacy for healthcare. In this Research Paper we are going to introduce the framework for privacy preserving data sharing with developing more application and different ways to work on it. This research paper mainly focuses on the 3 main Points they are: (1) Privacy of Healthcare data and detection of it; (2) Focusing on the Policy Management; and (3) Preserving the data privately.

Many techniques and many Technologies have been developed and developing in the Medical field. Affordability of many of the devices is growing rapidly day-by-day. Devices play a very important role in the terms of Science, in the field of Medical. It also plays a main role in health monitoring, safety monitoring, early disease detection etc. Analyzing of data can be done with real time Entity. Even we need to set the proper timing or alarm timing whenever and wherever it is needed. To store large no. of data in hospitals, every hospital has its private cloud to store the private data of each and every patient. This private cloud helps us to store large amount of the data with different records. It also stores the particular data and all the history related to patients health and also the improvement records. This whole data has been privately stored with the help of IOT (Internet of Things). And we can also access it whenever needed.

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1. INTRODUCTION

Healthcare data is the data which is given in the form of regular checkup, any important update related to the health. All the hospitals have a proper data stored about

us which ever clinics or hospitals we go. Doctors checks our firstly reports and then they gives you the proper advice for next treatment. One of the best thing is that the hospitals are been developed according to new technologies so that it becomes more easy even for

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doctors to operate patients as fast as they can. It has been an extreme growth in the field of IoT. Vast use of IoT has been done in many different fields. Even healthcare sector is using IoT to grow more and more and make all the use of it by building different technologies (Bhuiyan et al., 2021). IoT is expected to connect 16 billion till 2022 and many more are expected to continue in future. Data allows us for the building different machines for the use of diagnosis, optimization of intervention, and to cure many other diseases.

Recently, the whole world went through COVID-19. The virus of COVID-19 was worldwide spreading rapidly. It probably started from March 2020. This was one of the situations where whole world was stuck. Everybody was in their houses. There was no any work to do, no any source of income etc. And while this entire situation we were even not able to get any of the vaccine to get out of this virus. But after a lot of search we got the vaccine. There was a lot of research on for this vaccine. Also many of the women have played an important role to find it out. Here, also IoT played an important role in the search of vaccine. Everything was done on the basis of Internet. Where whole world was stuck there only Internet was the thing which was unstoppable. Whole world was on the internet. And with the help of Internet of things we really found a best vaccine which can beat the huge virus like COVID-19.

Internet of things only does not plays a role in the field of Healthcare sector but it can be also used in many different things. In COVID-19 the education was totally stopped but with the help of Internet we can say that our education was still going on. We can easily find the way to connect with millions of students and get them all connected with Internet. Even if we want to connect with our family Doctor's Internet made it easy to get even connected with them without going out. There are even many of the applications made which are in the use to order our medicines online. The apps such as Wellness Forever Pharmacy App, Truemeds, Apollo Pharmacy, MedPlus Marts etc.

2. USE CASE OF IOT IN HEALTHCARE SECTOR

Recently, we heard about an Artificial Wombs in the Healthcare Sectors (De Bie et al., 2023). The proper meaning of artificial is it is not genuine or natural but it is totally made by humans. The main purpose to develop artificial wombs is just to make women's comfortable and make them relief from their pain (Landau, 2007). The pain which they bare for 9 months in the body so make this pain relief this Artificial Wombs are made now in the countries such as Japan, Russia, US etc.

The second reason of developing Artificial Wombs is to treat Pre-mature babies as a normal baby (Zimmer, 2021). The Pre-mature babies are kept at least for 14 days in that womb and the with the help of different sensors they are totally attached with their nerves, brain, heart and all the body organs. A mother can feel and sense all

the body parts of her baby and just by sitting at home she can also keep watch on her baby just by looking or tracking everything from her phone or Mobile. This is one of the best sources to feel her baby all the time. All the things proper food proper Milk, Vitamins, Proteins whatever is required for the body is properly provided to the baby. The waste material is also properly removed out and stored into a proper container. This everything is done very properly with step by step execution.

The concept of Artificial Wombs or Artificial uterus was mainly developed in the recent years (Bulletti et al., 2021). Actually this was firstly developed on one of the animal which was Goat. They have totally experimented on the Goat and it was properly developed. Actually the process has been started in foreign countries just because in other countries the babies are too matured or made too matured from their small age. And from the age of 14 to 15 the children's are getting independent. That is the main reason why the concept of Artificial Womb has been developed and has been used (Romanis, 2020). There is lots of difference between Natural birth and Artificial Birth. Innovative treatments help the people over the world to get the best and get the innovative treatments as per their choices. And the best part of the research is just to think and to research different things by using different tools, your communication skills by taking short interviews, by different platforms etc.

One of the most important which we have to know about limiting factors for survival in extremely premature babies is lung development (Jain, Feldman & Sangam 2020). Babies in an artificial womb would have their lungs filled with lab-made amniotic fluid. That amniotic fluid they would have had just like they would in utero. Into blood vessels Neonatologists tubes would be insert. In the umbilical cord so that the infant's blood could cycle through an artificial lung to pick up oxygen. The device is very closest to being ready and it is to be tested in humans. This is called the EXTrauterine Environment for Newborn Development (Baumgarten et al., 2020). Encases the babies are filled in the in container with lab-made amniotic fluid. This amniotic fluid was invented by Marcus and Alan at the Children's Hospital of Philadelphia and is being developed by vitara Biomedical.

Other researchers are also working on the same project called as Artificial Wombs too, though they're a bit farther behind. Scientists in Japan are developing a system which is called as EXTEND. In Europe, they are supporting their own technology called as "Perinatal Life Support" In Canada, researchers have been testing their version of an artificial womb on piglets. University of Michigan is working on same research and similar technologies. They are intended to be used within preemies. Here, conventional therapies whom conventional aren't likely to work. The lungs of babies are totally filled with floating fluid. It's a system that could be used in existing ICU with relatively few modifications, so "we believe that that has more clinical applicability".

3. FRAMEWORK OF ARTIFICIAL WOMB

In this, Research Paper we have actually shown the framework of Artificial Womb works with the use of Internet of Things (IoT) (Figure 1).



Figure 1. Framework of Artificial Womb in (IoT)

This is how the scenario is in real life. It really contains the womb like shape and many of the wired connections are done to it. This Wired connections helps babies to get developed as early as possible. There are even some Pipes contain which helps baby to provide the proper nutritional food and with that it helps to gain the proper weight of baby. As Nutritional food is very necessary for everyone's body so with this pipes it passes the nutrition. Generally, in structure of Artificial Wombs it contains two big containers in the middle by which every womb is connected to this containers. One container helps to get the good things inside the body and the second container helps to let the waste things go out to it. There are also some of the acid fluids which help to go with this pipes. The natural baby get all the things by the mother's womb whereas, here connections helps to get good nutrition food. This wires are somehow connected to our phone, laptops etc too. If the mother wants to see her babies' development she can just visit particular application and keep watch on it. Even its great that she will be able to know that are all body parts working properly, babies' heartbeats, how the brain is getting active on daily basis. This has made very easy for a mother to grow her baby and make him more mature in a very small age.

The concept of Artificial Womb is really very vast in whole life but Internet of Things (IoT) has made it really very easy and sorted our life. Specially, the mother's now don't have to suffer more for delivering a child. It is very necessary to learn such things, such concepts and make use of it and also get more advanced versions of it. In the field, of (IoT) Updation is very necessary. We always have to do the Research on various Things various Systems. We should always be aware of such Systems

because it helps us a lot. Artificial Womb is one of the latest and greatest example of all in the field of Internet of Things.

4. THE PROCEPTS OF ARTIFICIAL WOMB TECHNOLOGY

In Partridge et al. (2017) gave us the output of artificial womb-like device (the biobag) and it was totally designed to continue gestation ex utero. Oxygenator gives or supplies the oxygen to whole body. Utero allows to the flow of Circulation and Controls wherever needed. 100% of the biobag survived and that were successfully delivered and also it was properly developed and healthy too.

In Usuda et al. (2020) published the second trial of EVE platform. EVE therapy is designed to prevent the server morbidity suffered by extremely premature babies by potentially offering a medical technology. These studies are encouraging but have limitations. This device has been tested on small sample size for short period of time. It has only 87.5% of survival rate (Figure 2).

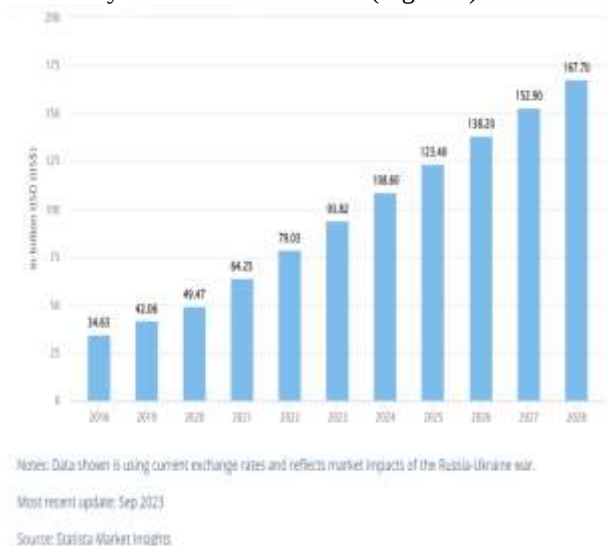


Figure 2. How Healthcare is transforming through the IOT Technologies.

This overall data has been studied and they are still working on it.

5. APPLICATIONS OF IOT IN HEALTHCARE SECTOR

IoT for Patients: Internet of things has changed lives of many of the patients, many of the peoples by changing the Systems and by innovating different types of technologies. It has been helped many of the people to recover very fast and get the proper and needed treatments done within few minutes, few hours etc. This really has huge impact on families to families, person to

person. One small sensor or one small ringtone of phone can give the alarm and give the call for your medicine time or for any other reason. This changed was really very necessary for all of us to get develop.

IoT for Medical: Medical can keep better track of their patient's Health. It can also help Doctor's to keep track on their Patients from anywhere they are. Even by sitting at home they can have a look on health of Patient. If even they are busy in other work then too they can have a track on their patients.

IoT for Hospitals: The Internet of Things can be used in a wide variety of medical instruments, including wheelchair users, heart monitors, oxygen supplies, and other power storage devices. To store the data nominators are used. There are even big screens to monitor the heart rates.

Hygiene management devices with IoT capabilities help in the prevention of infection in patients. Asset management, such as medication inventory tracking, and environmental control, such as measuring refrigerator temperatures and controlling humidity and temperature, is also made simpler with IoT devices.

IoT for health insurance companie: With IoT-connected intelligent systems, health insurers have a variety of options. Data obtained by health tracking systems may be used by insurance providers for underwriting and claims management. They will be able to diagnose fraud allegations and classify underwriting opportunities using this information.

6. DATA STORING IN IOT

Imagine tiny, sensors are really helping us in our day to day life and also giving us many updates of our life. This is how these tiny sensors are used in Internet of things. And it is also used in healthcare (Figure 3).

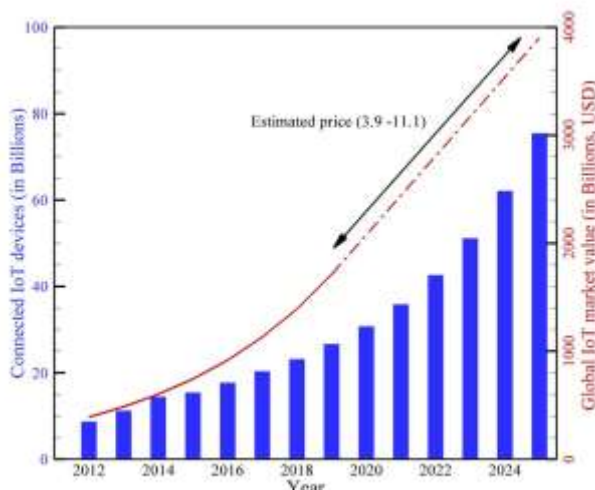


Figure 3. How IoT helps in Healthcare Sector

Gathering Information: Now a day there are some of the small devices such as smart watches which help us to track our pulses within a second. This helps us to reduce our work and track the data easily. The smart watches

really acts as smart and one of the innovative technologies. Even if we have any of the despise we can even consult with the doctor and even can tell him easily that your daily routing and how much do you walk daily. Even we can easily count your daily steps by using this gadgets.

Doctor's Notes: Sometimes, doctors and nurses also have to maintain their own notes for the purpose of daily research. They also have to maintain the notes of patient's medicines or routing of patients and that is the main reason they even have to study and maintain their notes. Even their Smartphones can help them to maintain such notes by using different applications. So IoT is very much important in every field.

The Smart Assistant: As we say all the information is collected by devices, or by storing the data into various forms. There are many of the sensors many of the devices used to collect the information. But where and how this data is stored? So this data is stored in big Clouds. Clouds are one of the Systems in IoT which helps us to store the collected data. Every company or every healthcare sector have their own cloud to store or to collect data. We can access all the data from this cloud anytime and from anywhere. All different types of data get stored into it into different forms. It helps us even to access our old data.

Informed Decisions: All the information is collected by using various sources such as analysis of data, different sensors, gadgets, various appliances etc. So now the doctor has collected proper information and according to it he has to give you the treatment and medicines. This all is the informed decisions of the Doctor's by using various Technologies. And especially the use of IoT has been done more everywhere. This is the reason why IoT has been an inspiration to all of us. It has changed lots of things in life. It has increased lots of functions in the Healthcare Sector. Different types if Machines are used to operate a patient. Within seconds you come to know about the problem what the particular patient is facing.

7. CONCLUSION

This research paper represented and shown that how in day to day life the use of Internet of things (IoT) is very much important in healthcare field. IoT has reduced our time, reduced our efforts and made the things easy and faster. It has also proved us that why use of machines are very much important in our life. And in recent time as per new generations or the changing of generations IoT plays a very important role. We can definitely say that IoT has totally changed the working process in the field of Healthcare. It even helps us to collect more data and used to store all the data of Patient's in different formats. We presented that, artificially developing the thing is not easy at all for the humans but Internet of Things has really made it very much easy to use. We can treat the patients very faster and very easier. Hence, The Internet of Things is changing us and our minds and also changing Healthcare sectors. Likewise is also changing the development of our country with the positive way. More

innovative things are to be done and to be researched more and more. These innovations enhance the product by combining small improvements to have a greater result.

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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