

E-Hospital: A Single Window Hospital

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Abstract - Today in the modern world, technology has proven to be the most beneficial in doing any work more efficiently and quickly. IT has penetrated each and every aspect of human life in this present world and on the other hand healthcare facilities is that sector which has to be upgraded with the changing times to serve the mankind in an efficient way. For healthcare facilities to be upgraded it has to be in sync with the latest technology on which mankind depends and that technology is none other than IT. Moreover, if technology is the core of the modern human world, then the health care facilities are its soul. Against this backdrop, the concept of E-Hospital is a better alternative of a technology based modern hospital as compared to the traditional health care system. This paper proposes an overview about the E-Hospital structure and how the E-Hospital system can be set up. This paper further deal with the problems associated with the E-Hospital System and discusses how this problem can be solved to obtain an effective E-Hospital system.

Keywords: Digilocker, case based reasoning, agent technology, encryption, framework architecture.

1. INTRODUCTION

Ever since the breakthrough of the first antibiotic and the first vaccine, medical field has progressed to such a stage that it can offer the gift of living to even a severely sick person. Today the influence of medical subject is tremendous, and it owns the power to cure almost all the diseases from which humanity suffers. On the other hand, although medical science has almost been brought forward to its utmost conclusion, thousands of deaths occur every year due to some or the other disease. This casts a sudden halt to the aura of the achievements of the medical scientific discipline. Today's hospitals have undergone a

revolution, but they continue to demand to upgrade themselves with the shifting times. They strive to be in sync with available technologies so that each and every human organism on this earth achieves a state of sound health. The hospitals have to constantly come up with novel methods to handle their patients. IT has permeated every sector of our lives today and as such can play a significant role in medical science also. The outcome of the combination of information technology with medical sciences will be a miracle because the information technology sector helps us to get in touch with the masses and medical science helps to heal the masses. So when we merge the IT sector with the medical field sector, the product obtained is called an E - Hospital. According to the World Health Organization the concept of E-hospital in terms of health care can greatly contribute to the resolution of many medical problems not only from a patient point of persuasion but also from hospital point of view [1].



Fig 1: Diagrammatic Representation of the combination of It with Medical Science

2. E-HOSPITAL

In this highly progressive era we have to rely on some or the other machine to do our work faster and in a more accurate manner. If we consider any electronic gadget which serves this purpose most efficiently, we narrow down on computers. Computers play an active role in synchronizing various data or to make available the data to the macrocosm. Today computers have become an important tool or rather a central instrument for development [2]. So the most important requirement for the proper functioning of the E-hospital is the computer. E-Hospital particularly refers to a traditional hospital which can be operational electronically also. In a more common parlance it can be expressed as an infirmary which establishes a closer contact with its patients. E-Hospital basically provides all the data required by the patients to the patients by an electronic medium. This is the major benefit of an E-Hospital and this makes the E-Hospital a better alternative to the conventional hospitals. The operational features of an E-Hospital can be stated as follows:

- a) Taking Appointments online
- b) Taking in the Diagnostic Reports
- c) Determining the availability of stock
- d) Readjustment of the nativity and destruction
- e) Approval and payment of bills

The E - Hospital can be conceived as the next generation of hospitals, which, when implemented throughout can bring close to a revolution in the medical arena. An E-Hospital can be defined as the usage of communication and information engineering in their broad potential to ameliorate the wellness of individuals and make available the relevant and important information to the individuals as and when required [3].

3. IMPLEMENTATION OF E-HOSPITAL

A systematic plan is required for the implementation of E-Hospital or an E-Healthcare. It can be achieved in the following mentioned ways:

1. Hospital Information System
2. Framework Architecture uses Agent technology
3. Service Oriented Architecture
4. Wireless Machine to Machine Based Health Care System

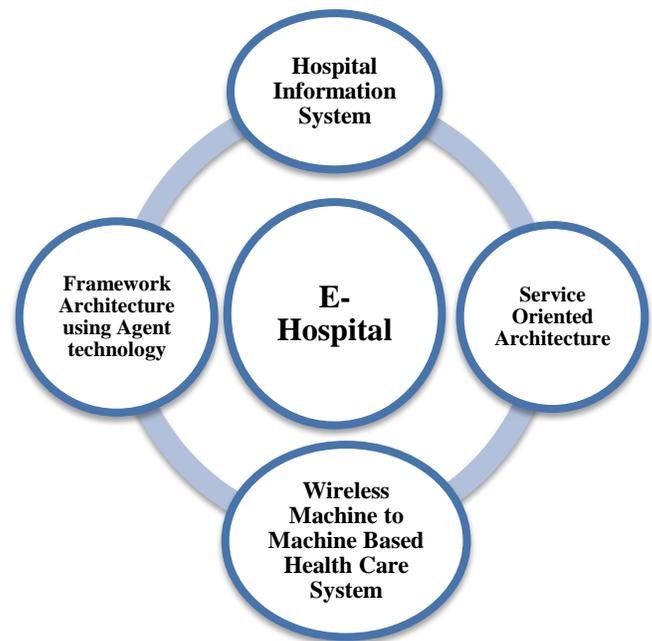


Fig 2: Ways of Implementing E-Hospital

3.1 Hospital Information System:

In this system all the data related to the hospital, whether it is the financial records or the therapeutic or management related data are made accessible to the individuals through software. The Hospital Information System can be fixed as the comprehensive software which can be employed to integrate the information of the individuals and also aids in exchange of this information between different medical centers. Thus Hospital Information System helps in improving the health care status of individuals and also facilitates in fixing the various hospital tasks more accurately and faster by using the techniques of data mining ...etc. [4]. The first Hospital information data system was keyed out as a Technician.

The welfares of the Hospital Information System can be clearly presented in the following diagram:

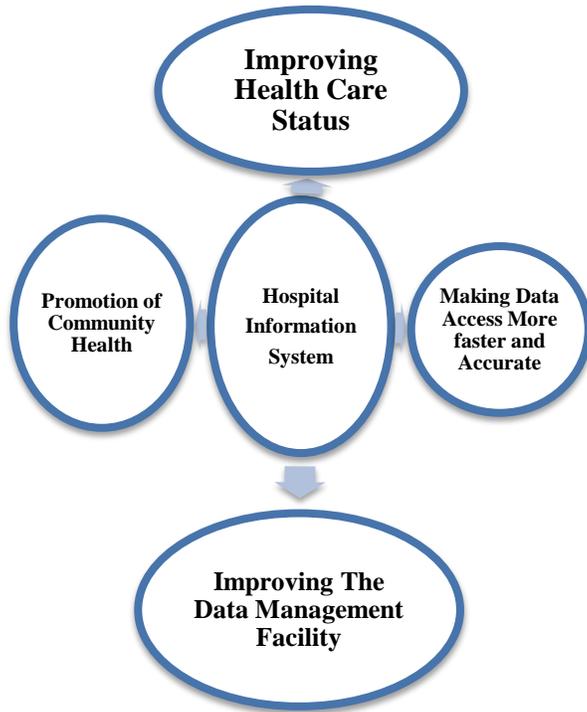


Fig 3: Benefits of Hospital Information System

3.2 Service Oriented Architecture:

Most of the software developed for the functioning of E-Hospital are complex and are difficult to control due to their decentralized nature. Service Oriented Architecture for hospital management is an efficient one as it underwrites the full facilities of the hospital and also helps with interoperability of the services provided at different programs. Thus, it works like a bridge which helps in connecting the various parts of a system to its spine and therefore the Service Oriented Architecture makes the functioning of E-Hospital smoothes. The service oriented architecture also uses web services which makes it to work faster. Service Oriented Architecture (SOA) is a business-centric IT architectural approach that supports integrating your business as linked, repeatable business tasks, or services. It is important to note that SOA is not a product but is an architectural style.

The comparison between the service oriented architecture and the other healthcare systems is depicted in the

following diagram:

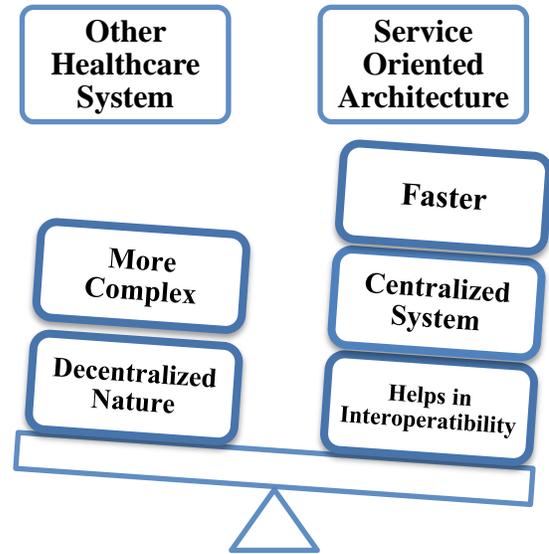


Fig 4: Comparison between Other Healthcare System and

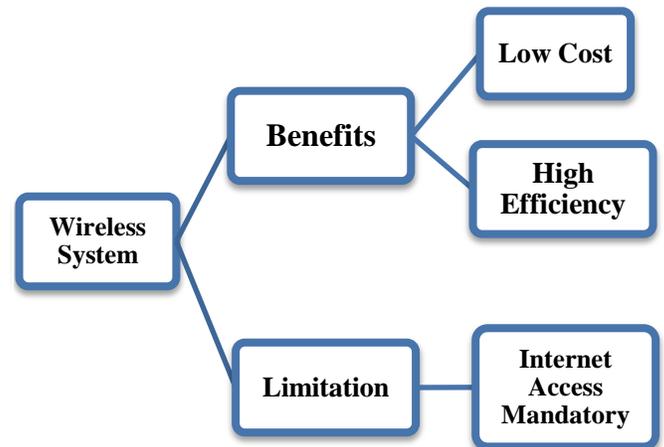


Fig 5: Brief outline of the wireless system

Service oriented Approach

3.3 Wireless Machine To Machine Based Healthcare System:

This system of healthcare management is by far more modern as compared to other available health care systems. In this kind of healthcare system a sensor will be tied to the patient’s body which will automatically transmit the data to the application server. In case the condition of the patient becomes acute, then this information will be quickly transmitted via machine to machine network so the concerned doctor can initiate a quick and an appropriate action. This health care system can be made more efficient by utilizing an application in android smartphones, which records the information and helps in its wireless transmission to the application server. This kind of organization packs in high efficiency and low cost. But this constitution is a big failure if there is no proper internet access [5]. The brief outline of the wireless system is described in following diagram:

3.4 Framework Architecture using Agent Technology:

Framework Architecture for healthcare systems is another efficient way to manage the functioning of the E-Hospital effectively. The commercially available systems are complicated technologies and are highly decentralized. Framework architecture using agent Technology helps in the interoperability among the substantive components of an E-Hospital. This system uses two major ideas which allow in the intelligent agent technology and case based reasoning approach which helps in widely distributed operation of the system. The brokers run in lieu of (instead) of human agents which aid in increasing the efficiency and accuracy of the scheme. Case Based Reasoning helps in providing advice to solve the problem by citing the results of the previously solved problems by analyzing the present situation the right room. The agent technology seems an attractive methodology for integrating and developing distributed e-healthcare information systems because it solves the problem of heterogeneity, supports intelligent and distributed storage, allows an optimal personalized e-health environment, and enhances modularity, reusability, flexibility and reliability. Agent may operate as a part of a community of cooperatively distributed system environments and ensure interoperability between different systems that are to be integrated into an operational heterogeneous

e-health system. Besides that, it solves the problem of low-bandwidth, reduces network traffic and process data locally instead of transmitting the data over a network. It could accelerate system development by using agent components; and enhance modularity, reusability, flexibility and reliability. Other Agent’s features to include are cooperation, coordination and interaction as well as intelligence. Multi-agent systems can become a key part of the e-health applications such as: quality aging e- services helping elderly people, diagnostic, telemonitoring, smart hospital and smart emergency applications. These e-health applications can surely benefit from deployment of agent technology. The advantages of using agent solution in healthcare information system:

- No changes to the features and functionalities of current health information systems are necessary.
- Routine and many non-routine tasks will be completed by software agents;
- Actors may receive and transfer data anywhere and anytime through their mobile devices;
- All transactions are systematically saved to maintain audibility of the system [9, 10].

The basic dependence of framework architecture is presented in following diagram:

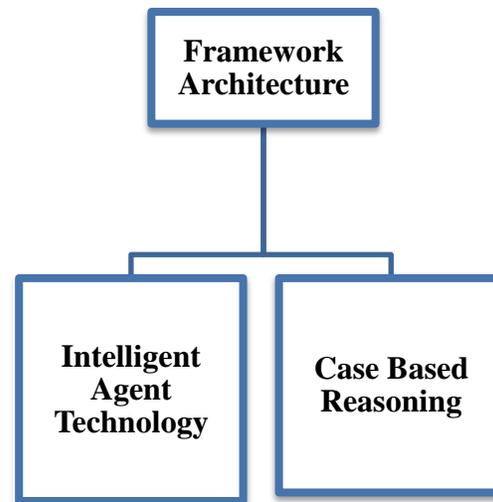


Fig 6: Dependence of Framework Architecture

4. PROBLEMS ASSOCIATED WITH E-HOSPITAL:

The major problem associated with the E-Hospitals is the proper management of patient's data. Since the E-Hospitals use a wide variety of components to function smoothly, the data available with them are at high risk of getting hacked or changed or used by any outsider who can use that data in unethical ways. The security of the patient's data on the healthcare systems and the protection of this information from being hacked or altered are great challenges. Most of the healthcare systems use the ideology of cloud computing, which is a developing technology, but this throws the greatest risk of the information being stolen or changed [6]. The leak of data from the healthcare systems is another large issue which needs to be solved to make the working of E-Hospital more efficient.

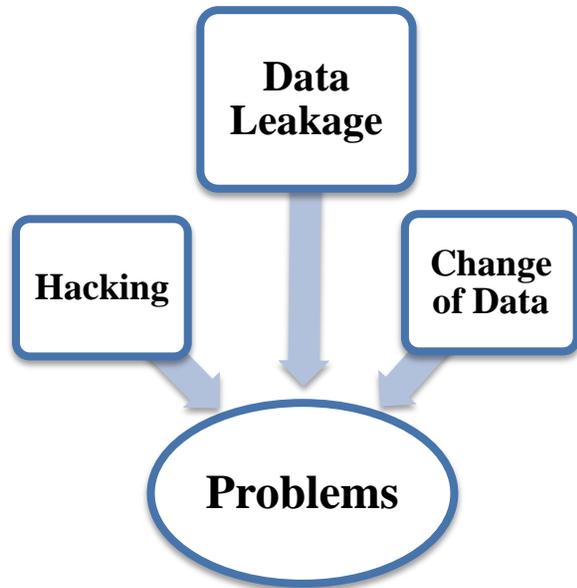


Fig 7: Problems Associated with E-Hospital

5. SOLUTIONS TO THE PROBLEMS:

The solutions to problems affiliated with E-Hospital include encryption of data and/or using the Digi Locker. Encryption is converting the data into a coded form and then uncoding the same data when the user wants to view it. Encryption is a potent method to protect the online stored databases and it is very effective in protecting the data of the E-Hospitals [7]. Another possibility for the security of data is using Digi locker. Digi Locker is a new initiative of the Government of India to retain all the documents safely in an electronic locker. Under this concept 10mb of an electronic space is offered to all resident citizens to store their personal documents. This Digital locker can be further widened to the E - Hospital where it can be applied to preserve the records of the patients more safely [8].

6. CONCLUSION:

E-Hospital basically aims to modernize conventional hospitals to provide perfect healthcare facilities to its patients. It also makes the data management in hospitals more efficient and precise. E-Hospitals are a comparatively novel concept in this globe and hence it will require time to become assimilated in the present world. Once the concept of E-hospital gets incorporated in all the traditional hospitals then it will significantly convert the scenario of medical science and assist in achieving the best standards of living with better health care facilities. If the E-Hospital becomes successful in managing and protecting its data efficiently, it can be the best alternative for the existing hospitals.

7. FUTUROSCOPE

The main hurdle lying in the progress of E-Hospital is the safety of the patient's data. If the data linked to the patient are effectively protected then E-Hospital is surely the next generation hospital, which has the capability to totally revolutionize the medical world. Digilocker is an upcoming idea related to the secure storage of the patient's data. Though a Digilocker is

used to save the citizen's details, its flexibility permits it to be used as a real electronic locker as well. If this e-locker is provided with suitable security, then the hurdles lying in the development of E-Hospital will be totally overcome. Every hospital then gets easily upgraded to E-hospital and hence satisfies the needs of its patients more efficiently and effectively.

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