

Biomedical Department Management System

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Abstract

The main goal of Biomedical Department Management System is to acquire technology and ensure its safe, continued efficient use through a schematic program of user training, restoration, and quality assurance, playing a vital role in the safe and effective implementation of health care technology. Depending on the organization, they may have direct or indirect functions. Roles of Biomedical Engineer include writing specifications for all the new equipment & machinery, solving issues related to the equipment in the hospital and maintaining records like preventive maintenance, calibration, asset files, equipment history cards. They are also responsible for maintaining the equipment to the best of its performance by organizing a planned maintenance program for all equipment and attending to emergency breakdowns and repairs. This project aims at providing a complete automatic system for the Biomedical department through an application based on Visual Studio to create websites and database management via MySQL and Bootstrap for styling webpages.

Keywords: health care technology, Visual Studio, MySQL; Bootstrap, Equipment history card.

1. Introduction

Clinical or Biomedical engineering is one of the latest & most dynamic programmes in hospitals. In today's advanced technological environment with a proliferation of complex medical equipment, clinical engineering has assumed great significance. The aim of the biomedical engineering program is to provide technical expertise & management support to hospital administration & the medical staff. We have designed a system which can manage the workflow of biomedical department in hospitals. It is very important to maintain efficient software to handle information about all the equipment in the hospital. This program allows you to record this information and easily access it afterwards. The existing systems provide the basic functionalities needed to be handled in a hospital management environment through Biomedical. There is no intelligence from the software in such cases. In the existing system, all the equipment details, company availability details and on the information regarding the run check done on the equipment or machine requested by the doctor is maintained manually by the Biomedical Engineers. If we need to find a machine, we need to check all departments of the hospital, which takes lots of time if done manually. Also, there is no proper search technique to check the equipment information. Using the existing system, it is extremely difficult to keep all of the hospital's finance management system and records that contain equipment details. When we examine the system's security, we find numerous flaws. These are the key drawbacks of existing systems that are addressed in the proposed model. In our proposed system, we are going to provide solutions to all the above-mentioned problems by automating the whole

biomedical department management system by using integrated software that handles the whole system. The proposed system provides an Effective Search facility to search for any type of information related to equipment history from the day of installation handover to the department service till the time of construction. It will help the engineers to rectify the equipment data sitting on the pc and the main advantage is that they can use the system logged any pc after just login to the website given with the id and password. Certain activities are automated; for example, the user does not need to enter the date directly; instead, the system inserts it automatically while storing the data. One more advantage of this newly proposed system is that the data is processed before storage, i.e. checked for correctness.

2. Related work

In this paper [1], Particular region and paves a way for the creation of software that helps with an easy transition from paperwork to e-papers. The paper describes an idea of such a web-based platform that eliminates the need for paper prescriptions in hospitals and proposes E-Medical Management, which will increase the efficiency of patient management, schedule management of doctors and give universal access to patient data anywhere in the hospital.

In this paper [2], E-Hospital Management Systems provide the benefits of streamlined operations, enhanced administration & control, superior patient care, strict cost control and improved profitability. Globally accepted health care systems need to comply with Healthcare Insurance Portability and Accountability Act (HIPAA) standards of the US and that has become the norm of the Healthcare industry when it comes to medical records management and patient information privacy.

In this paper [3], emphasize a broadly accepted mission; measured performance; continuous quality improvement; and responsiveness to the needs of patients, physicians, employees, and community stakeholders. This approach produces results that are substantially and uniformly better than average, across a wide variety of acute care settings. As customers, courts, and accrediting and payment agencies recognize this management approach, we argue that it will become the standard for all hospitals to achieve.

In this paper [4], This paper reports on research investigating the health management information system (HMIS) implementation process in Uganda, utilizing the diffusion of innovation and dynamic equilibrium organizational change models. The diffusion model does not predict what needs to change within the organization when a particular innovation is introduced, or how much. The addition of the organizational model has helped.

In this paper [5], A tool to gauge patient satisfaction and quality of care. In this paper, the objective of the HMIS would be to record information on health events and check the quality of services at different levels of health care. The importance of patient assessment is a part of the concept of giving importance to patient's views on improving the quality of health services. Expected benefits include enhanced patient satisfaction through improved communication; greater provider sensitivity towards patients; enhanced community awareness about the quality of services; and overall better use of services in the health system.

In this paper [6], Power and resistance in the implementation of a medical management information system. In this paper, the interrelatedness of the information system with the organizational forms and

practices within which it was used and which it helped shape reinforced the concepts, norms and values associated with the new management and economic discourse prevalent in the hospital, and helped to produce more defined accountabilities for doctors.

In this paper [7]. In this paper, we discuss the temporal evolution of health data management systems and capture the requirements that led to the development of a given system over a certain period of time. Consequently, we provide insights into those systems and give suggestions and research directions on how they can be improved for a better health care system.

In this paper [8], A Research Information Management System, in this paper, four major problems identified with existing biomedical scientific information management methods were related to data organization, data sharing, collaboration, and publications. Therefore, there is a compelling need to develop an efficient and user-friendly information management system.

In this paper [9], A Multilayer Secure Biomedical Data Management System for Remotely Managing a Very Large Number of Diverse Personal Healthcare Devices. In this paper, a multilayer secure biomedical data management system for managing a very large number of diverse personal health devices is proposed. The system has the following characteristics: the system supports international standard communication protocols to achieve interoperability. The system is integrated in the sense that both a PHD communication system and a remote PHD management system work together as a single system. Finally, the system proposed in this paper provides user/message authentication processes to securely transmit biomedical data measured by PHDs based on the concept of a biomedical signature.

In this paper [10], In this paper, we present BIMS (Biomedical Information Management System). BIMS is a software architecture designed to provide a flexible computational framework to manage the information needs of a wide range of biomedical research projects. The main goal is to facilitate the clinicians' job in data entry, and researcher's tasks in data management, in high quality biomedical research projects. The BIMS architecture has been designed using the two-level modeling paradigm, a promising methodology to model rich and dynamic information environments.

3. Methodology

Biomedical Department Management System is a website which helps to store all the daily and monthly records of the Biomedical Department of any hospital.

Working for the website:

Initially, there is sign up for our website by the users. Our website opens with the admin login page first and also the user login (Login for the Engineers in the department who can access the website). There are details required to be filled in like username, password and verification code. After login, the dashboard opens. The dashboard displays icons of all the daily activities and information regarding numbers of pending/active equipment, stocks on hand, consumption of items, daily records, reports and engineers available. In the header we have access to all the records i.e. Daily Checklist record, Monthly PM record, Stock record, Issues, Transfer Requests etc. Users can go through each page and enter and save their records. Users can also change the password if required. Users can logout from the website after checking

their saved records. Daily records have options in them such as adding records and a daily Checklist. The equipment name, status, whether it is active or pending, creation date and time, updation date and time are recorded here. We can take action to delete the equipment records which are no longer required. There is also a search box available for finding out the equipment. Users can also change the number of records per page. Similarly, for stock availability there are options of adding stocks and stocks available on hand. Similarly, for Preventive Maintenance (PM) records there are options of adding equipment records and PM done record. We can add information like engineer name, company name, select equipment from the dropdown list, model number and date.

Operational Work Flow:

Firstly, the biomedical engineers of the biomedical department of any hospital coordinates with the supplier of the biomedical equipment. Then the biomedical department of the hospital allots the biomedical engineers and the company for the installation of this biomedical equipment. The biomedical engineers do the preparation of the site along with the help of software engineers. After arrival of the consignment, installation is carried out by the company. Test reports and calibration are required for biomedical equipment. User training is provided by the company to the biomedical engineers. Then the biomedical equipment is handed over to the biomedical department of the hospital.

Written information is fed to stores/purchases. The Biomedical department is divided into four parts: New equipment, Breakdown, Assets and Preventive Maintenance.

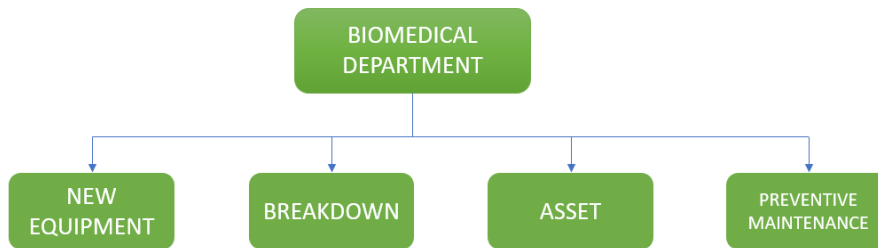


Fig 1. Shows the Operational Flowchart of Biomedical Equipment Management System.

Breakdown:

If an equipment breakdown occurs in any department, the working staff of that ward or department immediately complains to the biomedical department of the hospital. Then the complaint received is entered in a daily report register. After that, the biomedical engineers go and inspect the equipment. If the issue is minor, it is resolved then and there itself, but if it is major, then it needs to be taken to the department. If resolved on the spot, then a service report is prepared then and there and handed over to the complaining department with the equipment. If a major issue occur then biomedical engineers need to call a company person and solve the issue. After solving issue, then the equipment is handed over to the department where it has been allocated and two reports are prepared. One is handover report and another one is the service report. End.

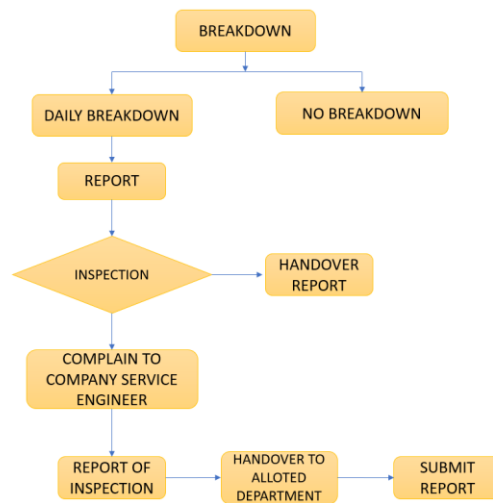


Fig 2. Shows flowchart of Breakdown

Assets:

In every hospital there is a lot of equipment which is used to maintain the equipment data and to update its servicing and other documentation, there is an asset file which helps the biomedical engineers in storing the informative data of equipment like working equipment, non- working equipment, new equipment, old equipment, unused equipment in store, condemned equipment, etc. If we biomedical engineers don't create assets file, then there will be a lot of misplace of data and equipment. Asset files record the history of an item, such as when it arrived at the hospital, when it was utilized, and when it was condemned. It stores the serial number, the name of the equipment, the model, the unique id assigned to the department, critical / non-critical, AMC or CMC, in use or in stock, and so on. Assets assist biomedical engineers in learning about every element of equipment and making the hospital's working procedure easier.

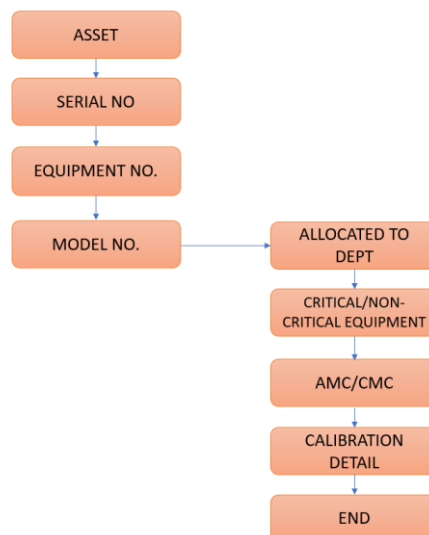


Fig 3. Flowchart of Asset File Management

Preventive Maintenance:

There are three primary aspects of preventative maintenance which include: AMC (Annual Maintenance Contract), CMC (Comprehensive Maintenance Contract) and Calibration (To verify and test the equipment). AMC: It solely includes service charges and instrument visit prices. Spare parts are usually

extra. CMC: It consists of service charges, visit charges, and parts costs. Calibration: Depending on the equipment, we can call the company representative for a calibration test or the Biomedical engineers / Clinical engineers. Calibration equipment is an analyzer kit that allows us to do calibration.

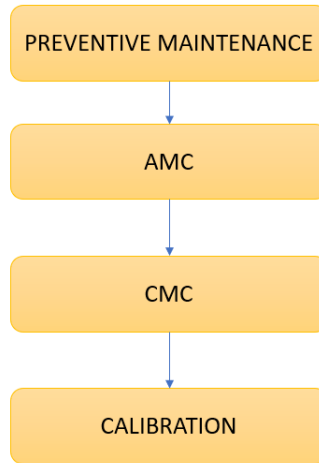


Fig 4. Flow chart of Preventive Maintenance

4. Result

The system will allow the biomedical department to handle equipment more efficiently as the website will store the data and database which is managed by MySQL and Bootstrap for styling webpages. The tool enables hospital employees to communicate equipment concerns, resulting in faster responses and less downtime. To ensure industry compliance, the system retains precise records, with a total of 15 entries on the website for devices such as syringe pumps, ICU beds, and so on, including preventative maintenance plans and calibration data. The design of the online application is dynamic and straightforward, making it simple for users to explore and engage with the system. By optimizing workflow activities, the automated solution will increase efficiency and productivity in the biomedical department.

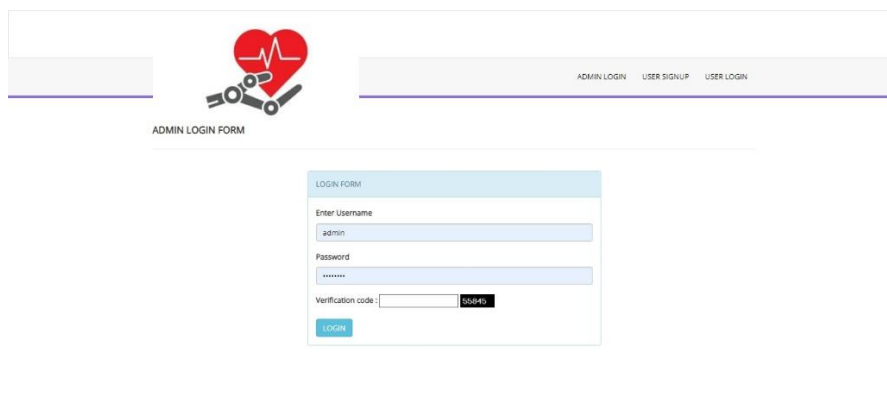


Fig 5. Admin Login Page

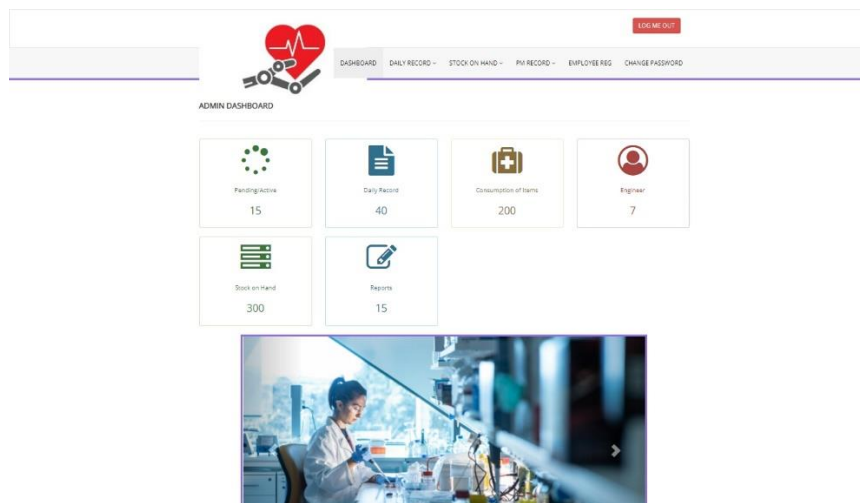


Fig 6. Admin Dashboard

5. Conclusion

The main objective of implementing Biomedical Department System in our project is to allow the user to experience an interactive and innovative system. It will help the service engineers to work flexibly accordingly as the work load of paper documentation, history cards, reports etc. will be less as everything will be stored in the system safely. Also will make the work easy in finding the details of a small single equipment and its history.

6. Acknowledgement

We are profoundly grateful to our guide, Prof. Geetha Narayanan for her expert guidance and continuous encouragement throughout to see that this project reaches its target, from its commencement.

We would like to express the deepest appreciation towards Dr. Jitendra Toravi, Head of Biomedical Engineering Department and Prof. Geetha Narayanan, Project Coordinator, whose valuable guidance supported us in completing this project. Finally we must express our sincere gratitude to all the staff members of the Biomedical Engineering Department who helped us directly or indirectly during this course of work.

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