



# Operation Theatre Scheduling with Interlinking of Nearby Hospitals for Emergency

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**Abstract:** Operating theatre (OT) is always and the most important sector of the hospital and its surgical process management problem is always regarded as the kernel Operation Theatre itself is referred as the heart of hospital system. The current operation theatre scheduling in the hospitals of India are inefficient Interconnection of different hospitals is not present creating a chain of hospitals of different areas nearby and scheduling of theatres and reviewing the scheduled Operation Theatre (OT's) takes a lot of time. If a new case appears for operation the schedule of other operations needs to be reviewed very properly taking lot of time to search for free slot to avoid creating a clash. Even during a serve accident, it takes a lot of time sometimes due to traffic or various reasons that causes delay to reach the hospital nearby. If the interface or user friendly application is created providing linking and interconnection of different hospitals in nearby areas with providing all the details of hospitals interconnected with free slots of Operation Theatre(OT) availability of doctor, availability of staff, current machineries and other details of various hospitals at various locations it will save a lot of time by viewing all the details of various interlinked hospitals and shortest route to reach that hospital it can be also served as an emergency platform for a victim.

**Keywords:** Android Application, Searching algorithm, Availability of OT, Surgeries, Emergency

## DCLIV. INTRODUCTION

Scheduling and organizing of surgeries in any case and setting of Operation Theatre (OT) and management of the operation till the performance is a challenging task. There are many factors that needs to be taken into consideration - Surgeon's availability at current time, the patient's condition (more critical or less critical), availability of the Operation Theatre (OT) and the right medical devices/ surgical instruments and machineries available and many more considerations among other things. And if done rightly, it contributes a great part to improving the operational effectiveness of the hospital and also ensures timely care to patients with minimum or very less waiting time. Hence it is important that the staff and other management departments of hospital are supported with the right tool to make efficient and organized schedules.

Operation Theatre (OT) scheduling and management allows the users to manage several operating Theatres, in which they can organize and schedule patient's surgeries with the correct Surgical Team available currently. It comes with both a List as well as a Calendar view for the schedule to be managed indicated with color schemes. Administrators and executives utilize a fixed schedule and manually organize and modify the assignments on a case-by-case basis. In this senior design project, we work to alter this unvarying schedule into a working dynamic model which can be programmed to include different scenarios within the hospital based on specific hospital parameters. Operation Schedule Application For Hospital Management by implementing a Scheduling and organizing of surgeries in any case and setting of Operation Theatre (OT) and management of the operation till the performance is a challenging task. There are many factors that needs to be taken into consideration - Surgeon's availability at current time, the patient's condition (more critical or less critical), availability of the Operation Theatre (OT) and the right medical devices/ surgical instruments and machineries available and many more considerations among other things. And if done rightly, it contributes a great part to improving the operational effectiveness of the hospital and also ensures timely care to patients with minimum or very less waiting time. Hence it is important that the staff and other management departments of hospital are supported with the right tool to make efficient and organized schedules. With assorted linear integer program to decrease the differentiation between a surgical group's target and assigned time within an

operating room. Operating Theatre Management System (OTMS) provides a extensive Preoperative information system that enables hospitals to achieve stunning improvements in organizational performance and patient safety.

Operation Theatre Management System (OTMS) enables the total intra operative automation that will help the hospitals to achieve the control and effectiveness needed to succeed in this developing environment. Operation Theatre Management System (OTMS) covers all areas required for the Operating Theatre workflow and advancement processes from Booking of operating rooms currently available, Scheduling and assigning of OT staff, Operative record, Operating Room Intra-Operative checklist , Recovery observation, etc.

The module will also provide Interconnection of various hospitals on Google maps providing the user with an simplicity to just click and schedule the available Operation Theatre (OT) user is able to view all the details of hospital including type of hospital, availability of doctor with his specialization, staff availability, types of machineries available, Time separation or distribution of scheduled and non-scheduled Operation Theatre (OT's) , shortest and fastest route to reach that hospital on time . If all the OT's are booked in one nearby hospital user will be able to explore the above mentioned guidelines and parameters into another hospital interconnected in the chain on Google maps.

## DCLV. PROBLEM STATEMENT

The current Operation Theatre (OT) scheduling in the hospitals of India are inefficient Interconnection of different hospitals is not present creating a chain of linked hospitals and scheduling or booking of Operation Theatres (OT) and viewing the scheduled OT's takes a plenty of time and efforts. If the interface or platform is created providing linking of different interconnected hospitals in nearby areas feasible to user with providing all the details of hospitals interconnected with free slots of OT availability of doctor currently, availability of staff, availability of types of machineries and other details of various hospitals of different areas it will save a plenty of time and efforts by reviewing all the details of various hospitals nearby and shortest route to reach that hospital on time it can be also served as an emergency platform for a victim. Therefore, there is a need for adaptive interface to schedule or book Operation Theatre (OT) on just one click.

## DCLVI. SCOPE

The Operation Theatre (OT) is considered as the heart of the hospital and as one of the most resources preoccupying component. Hence its management and control is of key interest: and well organized planning allows to use as best as possible the availability of the Operating Theatre (OT). In this project we will make the model for solving the issues of scheduling and booking of the Operation Theatre.

## IV. LITERATURE SURVEY

In R. Miniati, F. Frosini, G. Cecconi, F. Dori, E. Ladanza, G. Biffi Gentili the paper of Operating Theatre (OT) scheduling model for activity observing and planning in (Roberto Miniati, 2014)hospitals is written as Operating Theatre (OT) scheduling which is one of the most time consuming areas within the hospital in terms of task management and safety control. Even though OT activity represents a significant issue in hospital, there is still a shortage of guidelines or regulations currently available in hospitals. On the other hand for post-surgery and pre-surgery infections many studies and specifications have been already provided, especially regarding specific avoidance and disciplined measures. Moreover the high cost deriving from the OT management presents a further key which must be accurately monitored for its excessive weight on the hospital's economic balance. Hence, the main goal of this paper is to develop a supporting model, which is based on particular performance indicators, able to provide support to the health departments. The focus of the model is to observe and control the main facets contributing to the effectiveness of OT activity. This topic allows hospital decision makers and hospital administrators to have a usable and extensively accessible tool for planning and replicating possible modifications within the Operation Theatre (OT) organization. Finally, for the tool validation, the dashboard is currently being verified, validated and applied to a real hospital department. (Roberto Miniati, 2014)

In Emilie Grand Girard, Christine Gertosio and Alain Dussauchoy of PRISMA, UNIV. Claude Bernard de Lyon 1 Villeurbanne their paper named as an Operating Theatre planning and scheduling problem in the case of a “block scheduling “ strategy published to sort out issues to some extend of Operation Theatre scheduling and other hospital management problem solving parameters. Nowadays, the convolution of the organization in the hospitals must take account of the increasing and managing cost of cares that has followed the progression in medicine. Material and human resources are most efficient but rare and not multipliable and extensible due to their costs, while in parallel the demand is increasing. In order to enhance the ratio quality of cares and cost of cares, it might be interesting to adopt to the medical cares some enhanced studies which are led in the industry practise. We proposed an Interactive Assistance System (IAS) -meant for new agile production systems involving humans - to help the operators to choose the most fruitful job at time of conclusion. Even though healthcare systems and organization is entirely different from industrial organizations, we think that such

Interactive Assistance System (IAS) could be very much helpful for certain medical units. The paper first presents the such Interactive Assistance System (IAS): its principle, its common character and its Web client server organization. Then, it illustrates the Interactive Assistance System (IAS) functioning by considering an endoscopy unit: it explains all the required steps of customization for this unit.

In Kari Stuart .Erhan Kozan proposed a method for Reactive Scheduling model for the Operating Theatre (OT) by directing the disruption management and rescheduling: Problem of the day to day running of a operation surgery unit. The problem is shaped perfectly as a single machine scheduling problem with series of dependent processing time and due dates. The proposed optimization model series both elective and non elective patients in the online environment as well as offline environment. Reactive Scheduling and Booking for the Operating Theatre is treated as a single machine scheduling where are the tasks to assign to the machines in operating theatres with limited capacity. The patients list originally consists of elective patients that are scheduled in advancement. Emergency patients may arrive in random order on the day of surgery and will be added to the patients list immediately. In this particular paper focused on the Operating Theatre Surgical care units for Day surgery patients. (**Kari Stuart, 2011**)

## V. PROPOSED SYSTEM

Our proposed system adapts the booking of Operation Theatre (OT) in its free slot which will be displayed to user on interface using colour scheme (booked or vacant). This model uses Google maps to give the best possible shortest route to reach to the nearby hospital in less time. Also Interlinking of hospitals will be available on Google maps of various nearby locations supplied with on click booking facility of Operation Theatre (OT) during free slot available.

This makes the process very easy to just click on the available hospitals interlinked with each other. Availability of doctor, staff, availability of machineries, availability of ward, time division of Operation Theatre (OT) free slot or Operation theatre booked etc and various other details of various hospitals Due to this situation, user will just be able to convey about the accident in emergency to nearby hospitals. User will be able to view various types of hospitals with various types of surgeon available in it for operation

The request of booking made by user will be transmitted to hospital the hospital receptionist will check availability of staff, doctor, OT booking and other details and book the OT and respond it to user about the booking.

The aim in this work was to improve the Operation Theatre booking by introducing a Hospital network, which provides a feedback to the existing network; so that it can adapt the changing requirements of users and provides necessary information about bookings in hospitals if OT is booked for whole day then the user may switch to another in the chain. Our major objective is to create chain of hospitals for OT bookings on Google map.

## VI. AIM

The aim of this project is to solving the issues of existing operation theatre scheduling in the hospitals. This project will completely helpful for those people caused with accidents and injuries. In this project will implement modules such as Client side(User side) and Server side(admin side). In client side, we will implement modules such as Register, login etc. in an application, availability of doctors, hospitals and Operation theatres

## VII. OBJECTIVES

1) It provides the service like, In given hospital if the OT is free and user will schedule the OT and if the information will be given to the hospital to keep it vacant, If the OT will not be vacant then user will search for nearby hospital and will book the OT if it is vacant and will check shortest route to reach the hospital.

2) It provides the faster service to the user to schedule the OT in emergency situation.

### VIII. ALGORITHM

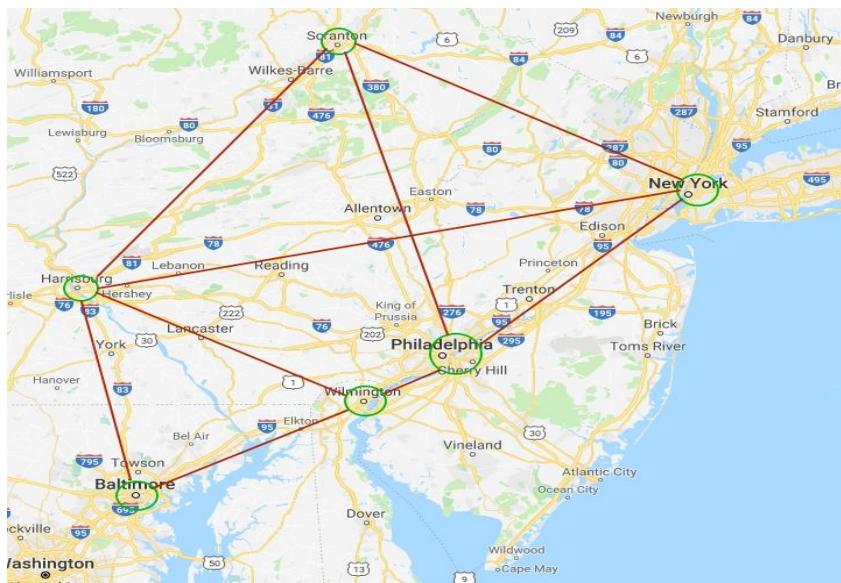


Fig. 1. Algorithm

A\* algorithm for locating the shortest path and alternative paths in real time.

A\* algorithm is an enhanced form of Breadth first search. It avoids immoderate path and choose the most promising path to reach in less amount of time. It is a very clever algorithm. It is used appropriate the smallest path in real-life situations, like- in maps, games where there can be many impediment. It is formulated in terms of weighted graphs in case of Google map this weight is travelling time required for the algorithm to reach the destination. Starting from a specific node also called as source node of a graph, it constructs a tree of paths initiating from that node, enlarging paths one step at a time, until one of its paths ends at the pre-established destination node.

At each iteration of its main loop, A\* needs to decide which of its incomplete paths to extend into one or more lengthier paths. It executes successfully based on an estimate of the cost (total time taken) still to go to the goal node. Specifically, A\* selects the path that minimise the time to reach destination.

$$f(n) = h(n) + g(n)$$

where  $n$  is the destination node on the pathway,  $g(n)$  is the cost of the path from the initial node to  $n$ , and  $h(n)$  is a heuristic that estimates the smallest and shortest path from initial source to the destination.

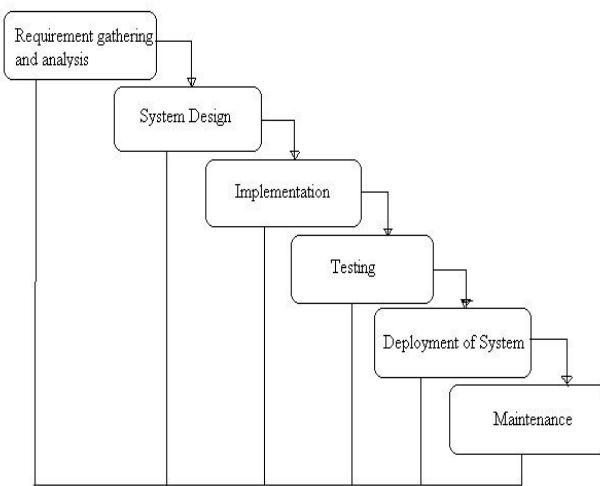
The heuristic is problem specific. In this case it is time taken to reach the destination (Team, n.d.)

### IX. METHODOLOGY

*Software Development lifecycle-*

The entire project bridged for duration of 6 month. In order to successfully design and develop a cost effective model the Waterfall model was accomplished and below there is waterfall model general overview.

## General Overview of "Waterfall Model"



## The Requirement gathering and Analysis Phase-

This phase started at the initial stage of our project, we had formed groups and modularized the project. Important points to be taken into consideration were

- To Define and visualize all the objectives clearly.
- To Gather requirements and evaluate them.
- To Analyze the coding languages needed for the project.
- To Define coding strategies.
- To Analyze future risks/problems correctly.
- To Define strategies to avoid the risks else define alternate solutions to this risks
- To Check financial feasibility
- To Define Gantt charts and assigns time spans for each phase

**X. FEASIBILITY STUDY**

Feasibility study is made to see if the project on achievement which will serve the purpose of the organization for the amount of work, effort and the time that spend on it. Feasibility study lets the developer predict the future of the project and its usefulness. A feasibility study of a system proposal is according to its implementability, which is the impact on the organization, ability to meet their user needs and successful use of resources. Thus when a new application is put forward it normally goes through a feasibility study before it is approved for development.

The document issues the feasibility of the project that is being designed and lists various areas that were considered very carefully during the feasibility study of this project such as Technical, Economic and Operational feasibilities.

**XI. CONCLUSION**

In the conclusion our project addresses the disruption management and rescheduling problem of the day-to-day running of a operation surgery unit. The problem is modelled as a single machine scheduling problem with order dependent processing times and due dates. The proposed enhancement model sequences both elective and non-elective patients in the online environment.

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