

## Web Based Hospital Management System with Advanced Features

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**Abstract**—In hospital management maintaining patients as well as hospital related data is quite crucial job. Information management system is the very promising solution to it. In this paper we have discussed the “HOPE” which is a web based hospital management system. It provides ease to manage the hospital information. Along with that it offers various functionalities like taking appointment of doctor online, tracing appointment status, sending reports via mail, video conferencing with doctor, generating bill automatically, managing hospital administrative task and providing expert assistance to doctor. This system aims to fulfill all the hospital management requirements from administrative point of view. It will be helpful to build goodwill of patient.

**Keywords**-Expert diagnosis, web based hospital management, video conferencing, sentiment analysis

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### I. INTRODUCTION

Computer aided support system is the prime need of healthcare sector. With increase in work load of hospital, there is an acute need for certain automated tools for hospital management. In early stages hospital management deals with only storing the patient's information and retrieving it based on some primary key, commonly patient ID. Latter it is integrated with sensor based patient monitoring system where some sensors are installed on patient side and data is transfer to certain system. In addition to that, there is facility of sending the reports to patient via mail. But still there is wide scope for betterment in existing hospital management system. Internet and web services plays vital role in daily routine of a person. If health services are made available online, then it will be really convenient for the patients. Keeping this requirement in mind, we have developed an advanced hospital management system; called “HOPE” which is empowered with the web based assistance system.

### II. SYTEM OVERVIEW

The system has four important modules:

- Patient Module
- Doctor Module
- Receptionist Module and
- Hospital Activity Management Module

#### A. Patient Module

In this module there are various activities like

##### 1) Registration

Every new patient have to register himself by providing details like name, age, gender, communication address, e-mail ID etc. Once registered, the username and password is sent on the registered email ID which can be used to access the facilities in future. The user ID is the patient ID only. If required; patient can change his password as per his ease.[1]

##### 2) Sign up

In order to access the account, patient need to provide valid username and password. Four attempts are allowed for entering

correct information. After four unsuccessful attempts, the account will be locked. Password recovery option is also available. For retrieval of the password, user need to provide some information like; patient ID, complete name of patient and registered email ID. After recognizing correct CAPTCHA, new password will be sent on the respective email id.

##### 3) Appointment

Using this functionality patient can get appointment. First of all; one has to select the mode of appointment either personal or online. Then one needs to select appropriate specialty section like psychologist, cardiologist, gynecologist etc. Each section can have more than one specialist doctor. Facility to enroll under particular doctor among them is offered. Then patient has to provide the suitable appointment date. Schedule of particular doctor on particular date is checked and accordingly appointment is given. There is a provision to provide an expected time of meeting. If doctor's schedule is packed then message is prompted on screen accordingly. In this case, patient can check the availability of another doctor on same date or same doctor on another date [3].

##### 4) Check Appointment Status

It may happen that the appointment is cancelled or delayed due to some reason. It will be really convenient for patient if such notifications are received in advance. “Check Appointment Status” function does the same thing. We have tested this functionality and found that there is a delay of 15 min in actual appointment time and predicted time.

##### 5) Reports

Many times some tests or scans are prescribed and patient needs to wait for the report or separately need to collect that. In this section patient can get their reports online. File in PDF as well as image format can be uploaded by the receptionist and made visible to patients. Report download facility is also there.

##### 6) Prescription

Using this section one can see the prescription details.

##### 7) Bill Summery

All the billing details and the amount to be paid are available under this tab.

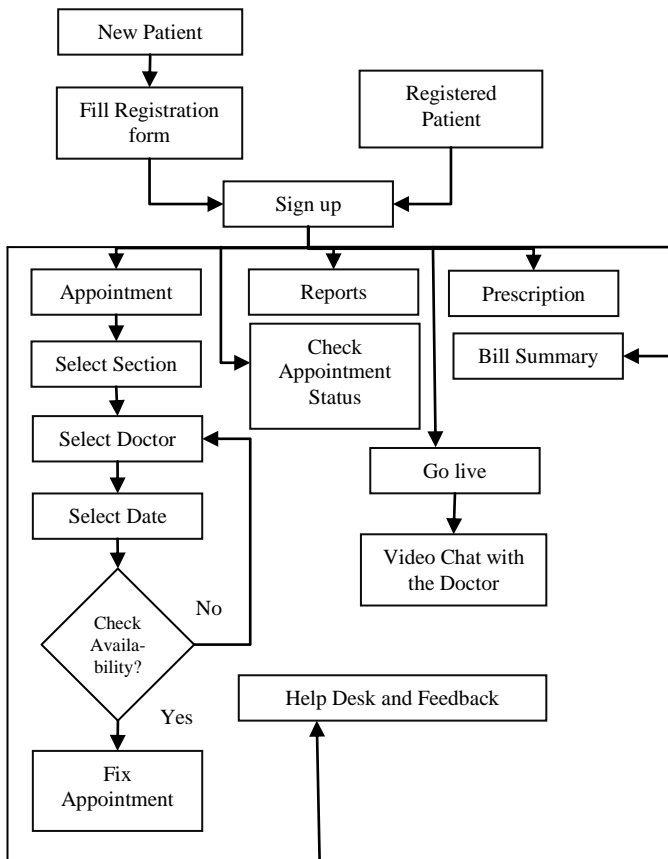


Figure 1. Patient Module

8) *Go live*

If anybody got online appointment, then one can discuss the health issues through video chatting. Live video streaming is done in web browser itself using webRTC. WebRTC is an open project supported by Google, Mozilla and Opera to bring high quality web browser based real time communications using simple JavaScript and HTML5. In May 2011, Ericsson put forward the first implementation of WebRTC. In our application we use webRTC for browser based live communication and PeerJS which simplifies peer-to-peer data, video, and audio calls. The main advantage of using webRTC is; it does not require any plug-in or setup installation for streaming [4].

In addition to all above services, patient can also give feedback about the services [1].

B. *Doctor Module*

For every doctor separate username and password is created. Provision of password change and recovery is same as that of patient module. The functions provided in this module are shown in fig. 2 and are explain as follows:

1) *Schedule*

Doctor has to select particular date and he can view scheduled appointments and surgeries on that day. Type of appointment is also available. In case of video appointment, five minutes before reminder message is sent to doctor as well as patient through SMS. Once patient go live and in case if doctor is not online; notification message is sent to doctor, receptionist as well as hospital manager.

2) *Get patient history*

All report details, past prescription and medical history of patient is available to doctor. Doctor can search a particular patient by patient ID.

3) *Remark*

Instead of writing on prescription pad, doctor can write any remark, case history, prescription etc. in remark section.

4) *Expert System*

Expert system is basically a decision support system. Doctor first has to select key symptom. Then question is prompted on screen with option. One has to select appropriate answer. Based on the previous level's answer, next level's question is prompted. This procedure is repeated for some iteration and at the end some diagnosis or recommendation is prompted.

For each key symptom there is a separate decision tree. Fig 5 shows decision tree for key symptom "fever".

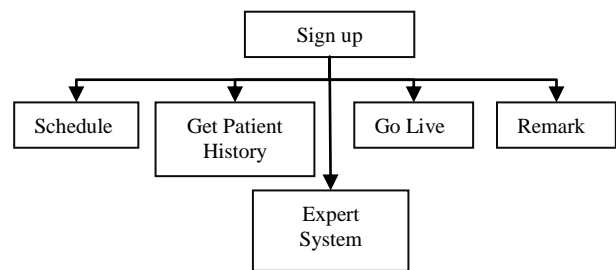


Figure 2. Doctor Module

C. *Receptionist Module*

Fig. 3 represents the various functionalities of receptionist module which are given below.

1) *Give Appointment*

Receptionist can give appointment to any patient from her account. She can access the appointment details and schedule of all doctors and based on availability she can give appointment on the requested date or can provide alternate date and time.

2) *Add Patient Details*

There is a provision of adding new patient who have not register yet. Test report and case history upload

Receptionist can upload the test report and case history which is then visible to doctor as well as patient. Once test reports are uploaded an auto generated mail containing report is sent on the registered email ID of patient.

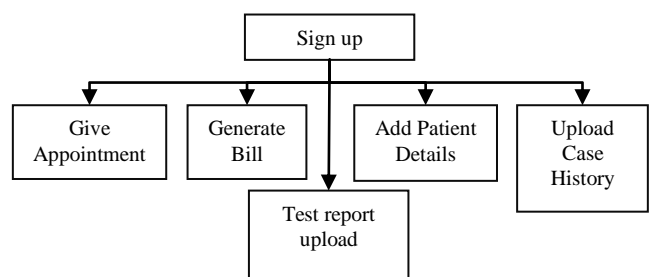


Figure 3. Receptionist Module

D. Hospital Activity Management Module

The last module is the hospital activity management module.

1) Prepare Operation Theater(OT) chart

OT is the place which is shared by many departments. Managing synchronization between all departments by considering emergency cases is a very crucial task. Traditional hospital management system works at department level. Opposed to that; in our online tool we consider hospital as a single entity. Because of this, all data is managed in integrated database which help to identify data relation and task dependency.

While preparing OT chart fair time slot is given to each department and one time slot is kept in buffer for the emergency. Availability of doctors, expert, supporting staff, medicine and other instruments are taken into consideration. If there is no conflict or any overlapped; the slot is fixed for particular surgery and automatically it is updated in schedule of concerned people like doctor, nurse etc.

2) Check Stock and preparing inventory list

All inward and outward records of inventory can be managed automatically. Admin can easily search for the availability of particular drug.

Facility to prepare inventory list is also available. As per requirement, concerned person can add the inventory. List of material to be ordered is prepared automatically [2].

3) Feedback Analyzer

In today’s competitive market, customer feedback is very important to survive. When it comes to corporate hospital, reviews given by the patient plays an important role in improving the hospital facilities. But these reviews can be in the form of huge data which is very difficult to analyze manually. So we have used sentiment analysis using Jacard Similarity Measure to explore the reviews. Here reviews categorize into three groups positive, negative and neutral.

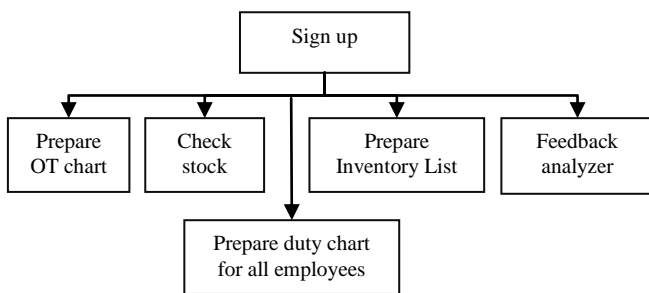


Figure 4. Hospital Activity Management Module

III. RESULT

Figure 6 and 7 shows snapshots for patient registration and doctor’s module respectively. In doctors module, schedule of the doctor on particular date showing all appointment is given.

Figure 6. Patient Registration Module

Patient Id	Name	Time	Type
P1	Ramesh Patil	10 A M	Normal
P3	Harshada Gadge	11 A M	Normal
P4	Swati Jadhav	11.30 A.M	Online
P7	Priyanka Patil	12.00 A.M	Normal
P9	Abhay Saraf	12.45 P.M	Online

Figure 7. Doctor Registration Module

IV. CONCLUSION AND FUTURE SCOPE

In this paper we discussed “HOPE” – a hospital management system. This system not only serves the information management requirement of the system but also act as the expert tool to assist doctor. The power of Internet and live video streaming is the key feature of the system. This product is useful for patient, doctors as well as hospital staff. The system has various advantages like

- Save time requirement for managing various task in hospital.
- Reduce waiting time of the patient.
- Replace bulky paper files with the integrated database.
- Doctor as well as patient can access the case details from anywhere.
- Provide expert assistance to doctor.
- Feedback analyzer help to improve the services provided which will in return help to build goodwill of the patient.

In future we can club the power of “Internet of Things” with “HOPE”. Sensor enabled patient monitoring system can be installed which will store data on cloud and can be accessed for further use.

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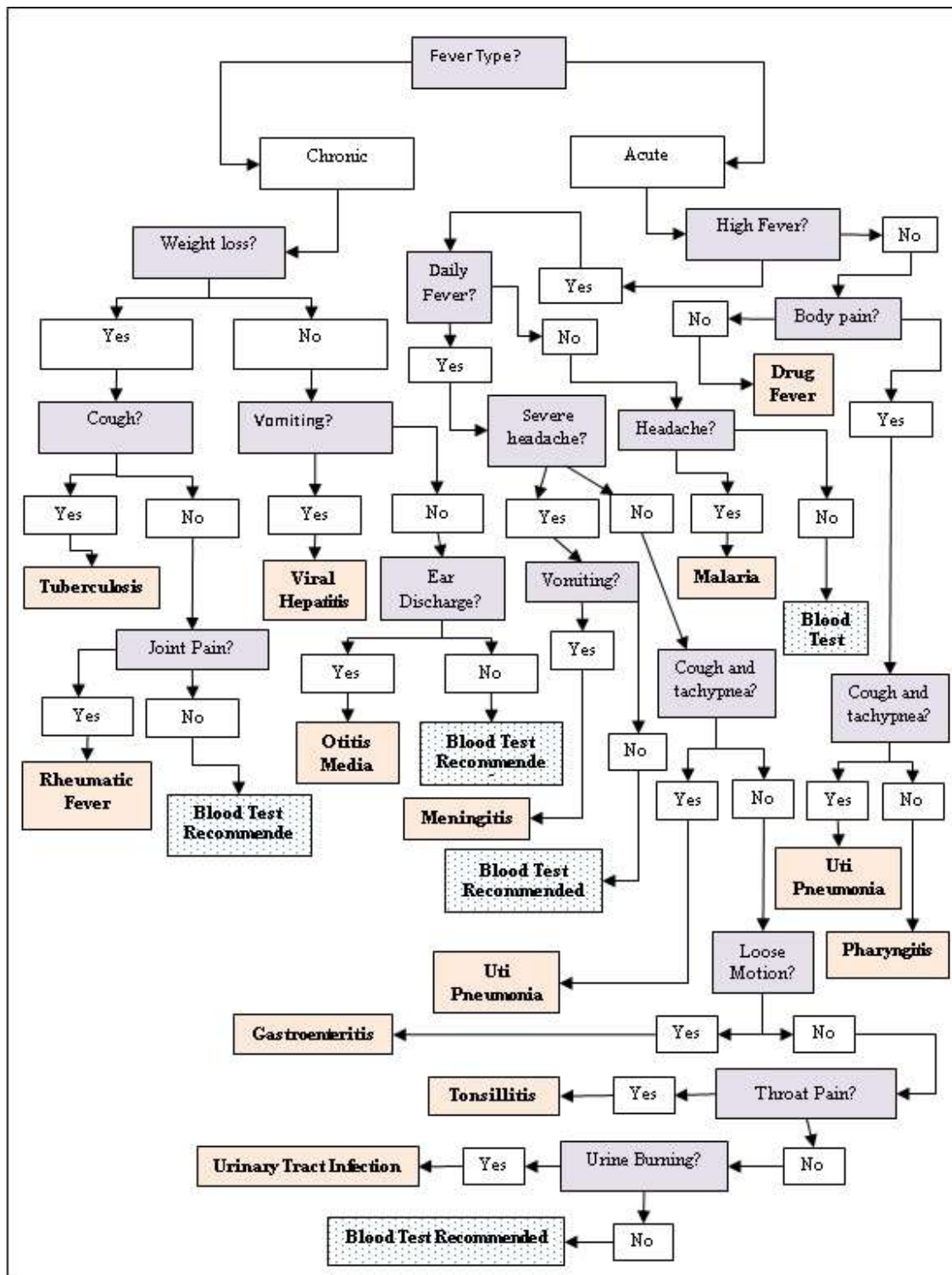


Figure 5. Decision Tree for key symptom "Fever"