SMART HOSPITAL AUTOMATION SYSTEM

PROJECT REPORT

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in

Electronics and Computer Science

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CERTIFICATE

This is to certify that

We, Kunaal Kiran Kumar, Chirag Dhingra, and Anikeit Singla hereby declare that this project report entitled ***SMART HOSPITAL MANAGEMENT SYSTEM*** is an authentic record of our own work towards the Major Project, undertaken at Chitkara University Institute of Engineering & Technology, Rajpura, Punjab.

This project has been carried out under the graceful guidance of Dr. Amanpreet Sandhu during our sixth semester (January to April, 2022).

Signature

The above certified is correct to the best of our knowledge and belief.

Kunaal Kiran Kumar _____

Chirag Dhingra _____

Anikeit Singla _____

DR. AMANPREET SANDHU
Associate Professor, DECE

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Dean, DECE

ACKNOWLEDGEMENT

We would like to thank our project guide, Dr. Amanpreet Sandhu as our project advisor for her continuous effort in helping us develop our project from scratch to a successful prototype. Her support and expertise have been an essential driving force for our project.

We would like to thank our friends, Aditya Dubey and Shrey Kaliyar for helping us with some calibration of the hardware part of the prototype.

Last, but not the least, we would like to thank Hitesh Gupta for helping us with the selection and connection of some of the less durable sensors to our project.

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INTRODUCTION

As we know, in the current times due to pandemic and spread of epidemic diseases the hospitals are overcrowded and it becomes difficult for the staff to manage everything simultaneously. Even with advancement in technology people still need to wait in long queues for OPD and other appointments or they have to call the doctor/hospital for the same. Moreover, monitoring the patient's vitals at all times is not possible with manpower alone, and managing the whole hospital staff without the use of automation and technology has become very challenging.

Even with the existence of many hospital management software applications, there is no user-friendly system that can help in automating the hospital, hence making automation in the field of hospitals the need of the hour.

LITERATURE REVIEW

The goal is to make a complete solution for the management, monitoring, and automation of the hospitals, with a panel for patients that will continuously monitor their vitals. In the web application, there are different abstractions of logging into the database according to the designation of the individual.

It is an online portal on which one can have access to view and manage the complete hospital in terms of salary, shifts, specializations, departments, patients, medicines, rooms, patient's vitals, security, housekeeping, visitors, food and supplies, blood and other samples, equipment.

The different abstractions of logging include Administrators, Doctors, Nurses, Receptionist, Pharmacists, and Housekeeping.

In the administrator's portal, the administrator can add and manage the whole staff including their salaries, shifts, departments, and attendance. Management of complete hospital in terms of physical conditions like temperature and fire alerts are also provided. Administrators can also manage and check the rooms, beds, and ICUs available in the hospital.

In the doctor's portal, the doctor can check and manage his/her allotted patients who are admitted or have applied for appointments. The doctor can allow or reject appointments received by the patients according to their convenience and can check the history of the complete appointment and according to patients. Prescriptions for all the patients can be added directly from the doctor's portal and he/she can check the patient's previous medical history and prescriptions uploaded by patients for reference. Doctors have the complete facility to check complete patient's vitals including SPO2 level, BP, Pulse Rate, Heart Rate, ECG graphs, IV Bags details, and levels on the portal.

In the nurse's portal, the nurses can check assigned patient/s details including their prescriptions and medical history and complete the patient's vitals as mentioned above in the doctor's portion. Moreover, nurses can check their salary, shifts, rooms allotted, any doctor's notification, and emergency alerts from patients and their visitors/guardians.

In the receptionist portal, the receptionist can view and manage appointments, patients, nurses, and their shifts and housekeeping. Moreover, the receptionist can view and generate patient/s bills and complete receipts.

In the pharmacist portal, the pharmacist can view and check patients' current and previous prescriptions and can accept online orders for prescriptions. Moreover, the pharmacist can manage their inventory and generate bills.

In the housekeeping portal, the housekeeping staff can check their salary, shift, and their allotted floors and rooms. Staff can apply for leave also from their portal.

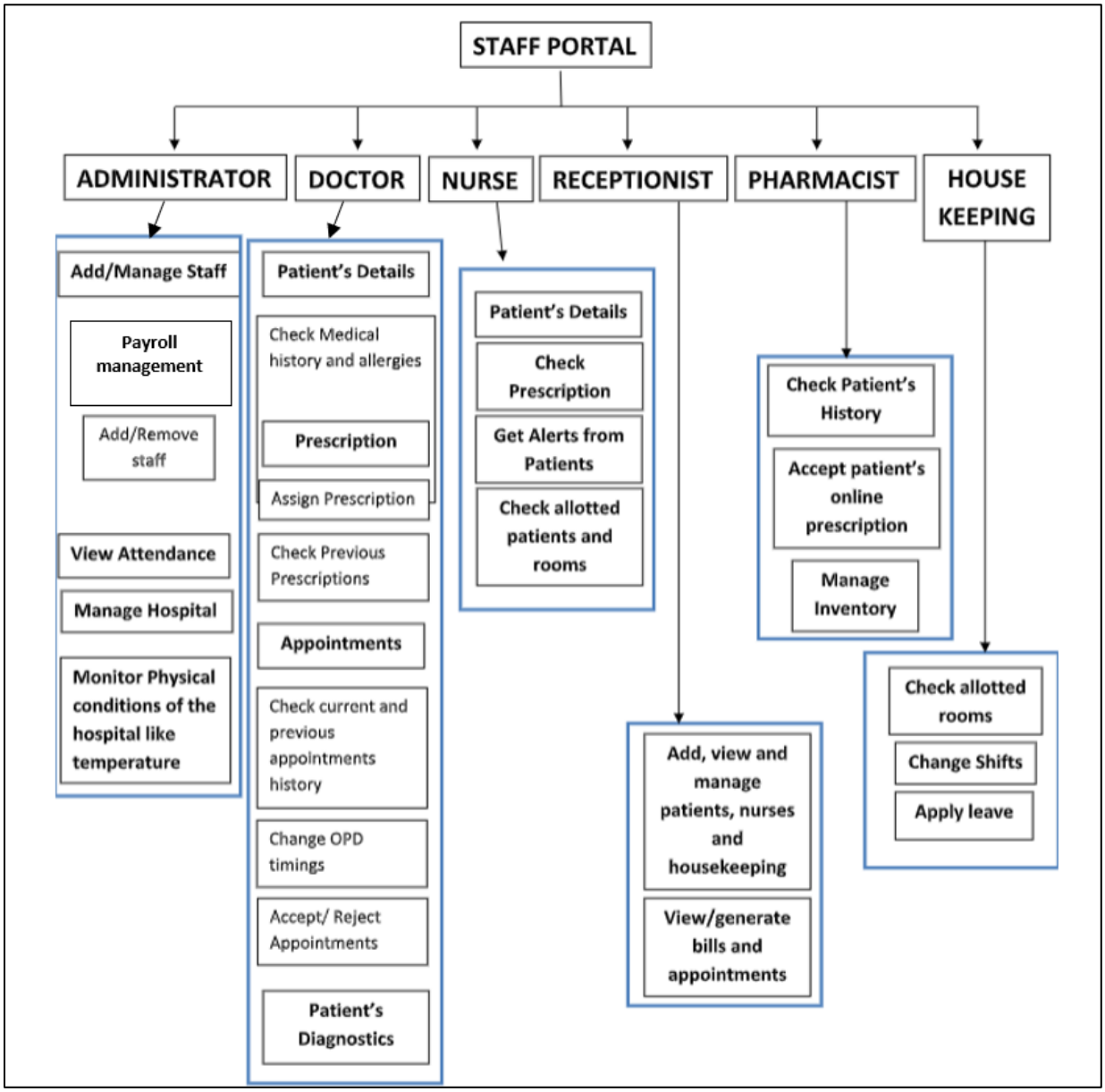
In the patient portal, the patients can Book appointments according to the doctor's specialization and available OPD timings and view appointments history. Moreover, patients can set up auto-appointments for regular checkups. Beds can also be booked using for admission purposes.
Prescription and prescription history can also be checked, Upload old prescriptions, and medical history from different hospitals and doctors. Check doctor's comments for any food intakes precautions. Moreover, direct orders can be made to pharmacies. Patients' guardians and visitors can generate an E-pass for entry, order food, and pay online hospital bills.

In the panel, for the admitted patients the panel can monitor vitals like oxygen level, heart rate, and blood pressure and uses the data in real-time to update the doctor and nurse and alert in case of any drift in the vitals from normal ranges. The patient can also control lights, AC, blinds, etc. from the hardware panel provided by beside their bed.

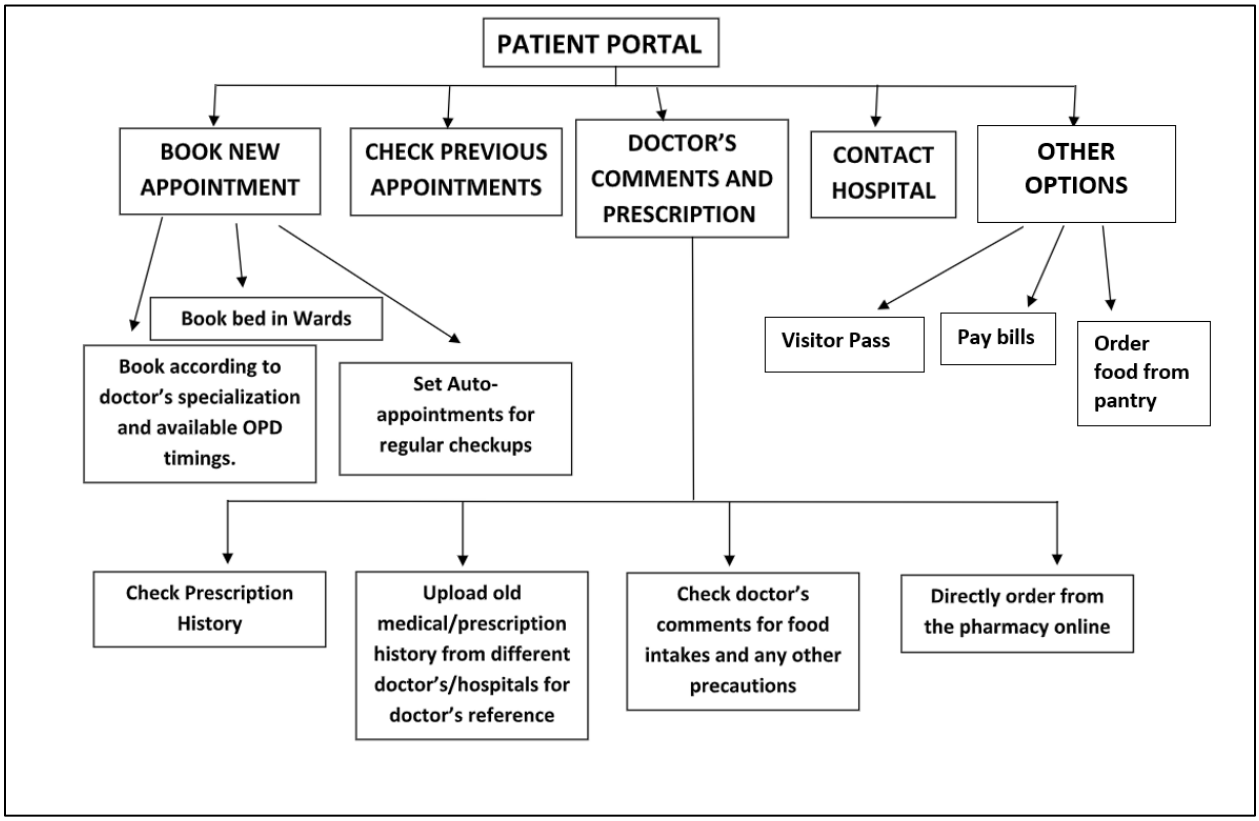
BLOCK DIAGRAM AND FUNCTIONING

A. BLOCK DIAGRAM

1. Staff Portal



2. Patient Portal



B. HARDWARE AND SOFTWARE SPECIFICATIONS

1. Hardware

Name of component	Quantity
ESP8266 Microcontroller	x 2
MAX30100 Oxygen and Pulse Sensor	x 1
LCD 16*2 Display	x 1
DHT22 Sensor	x 1
MQ2 Smoke Sensor	x 1
Fingerprint sensor	x 1
Breadboard/General PCB	x 1
Jumper wires, LEDs, push buttons, etc.	as required

2. Software

The software used include:

1. Visual Studio Code (Application Programming)
2. Arduino IDE (Firmware Programming)
3. Web browser: Chrome (Software Output)
4. Backend: Google Firebase (Firestore and Real-Time Database)
5. Charts.js API Used for generating analytics graphs.

C. OPERATION SCREENSHOTS

STAFF PORTAL:
ADMIN:

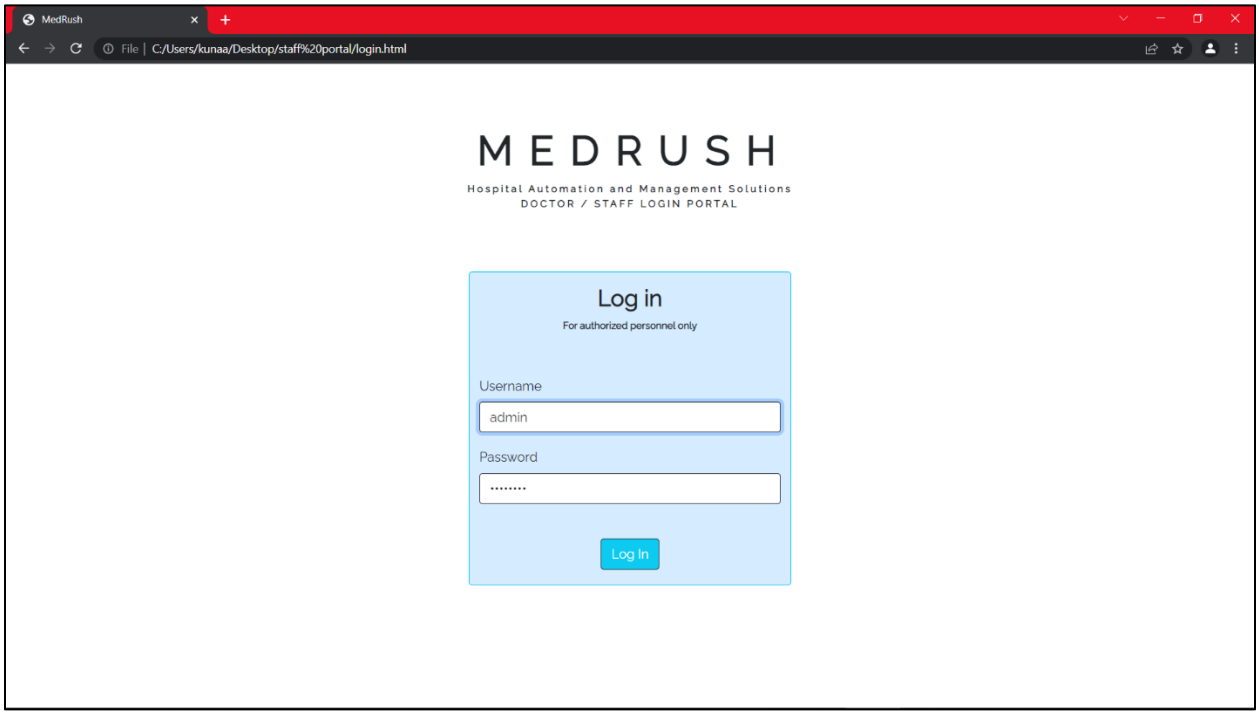


Image 1: Login Portal

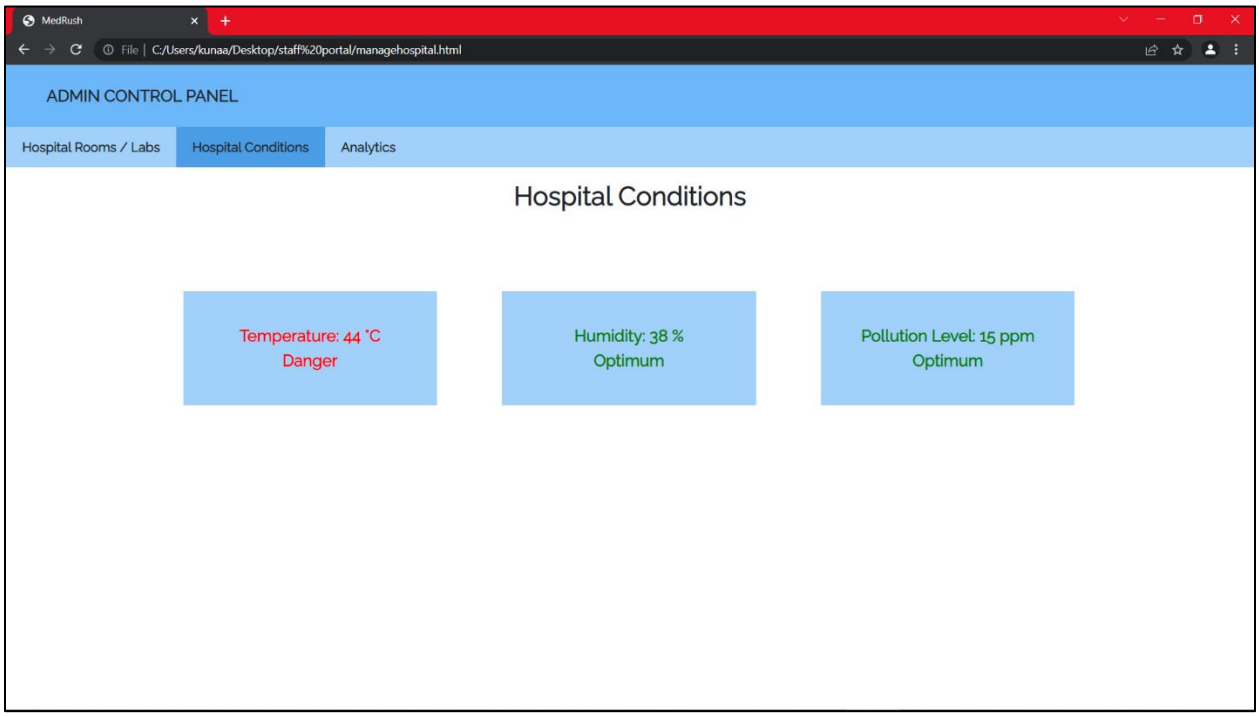


Image 2: Control Panel: Hospital Conditions

Image 3: Control Panel: Analytics

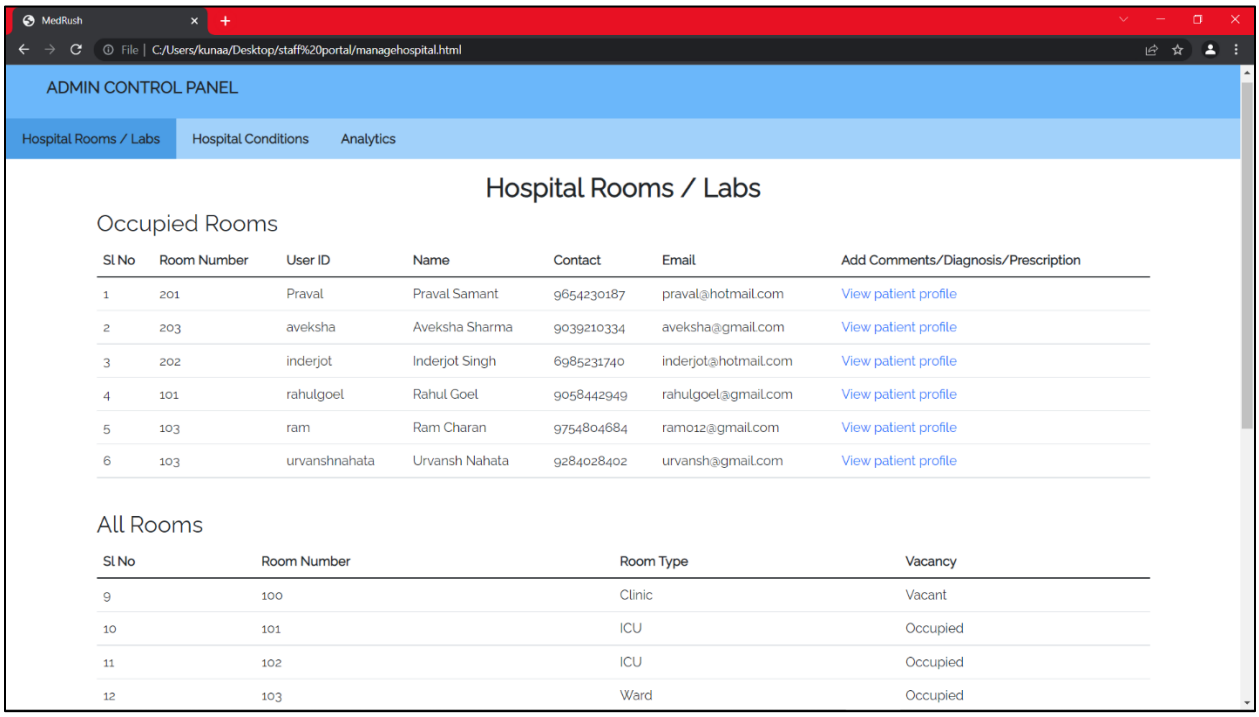


Image 4: Control Panel: Management

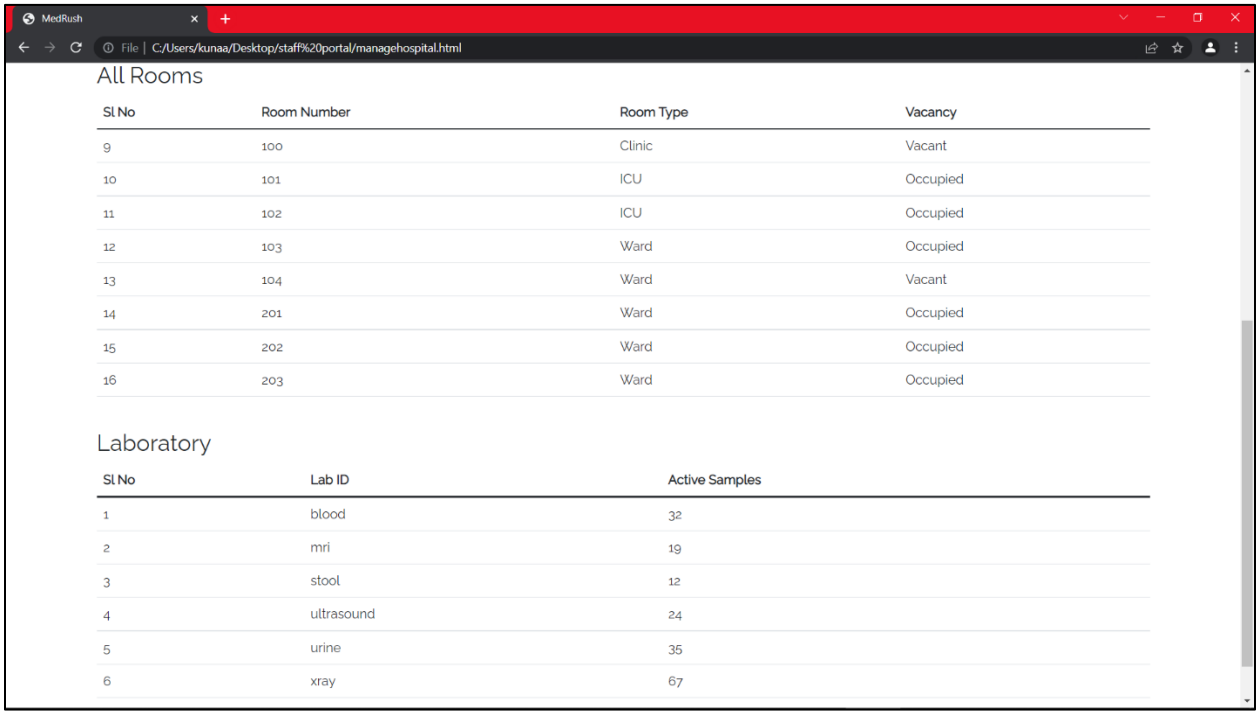


Image 5: Control Panel: Management

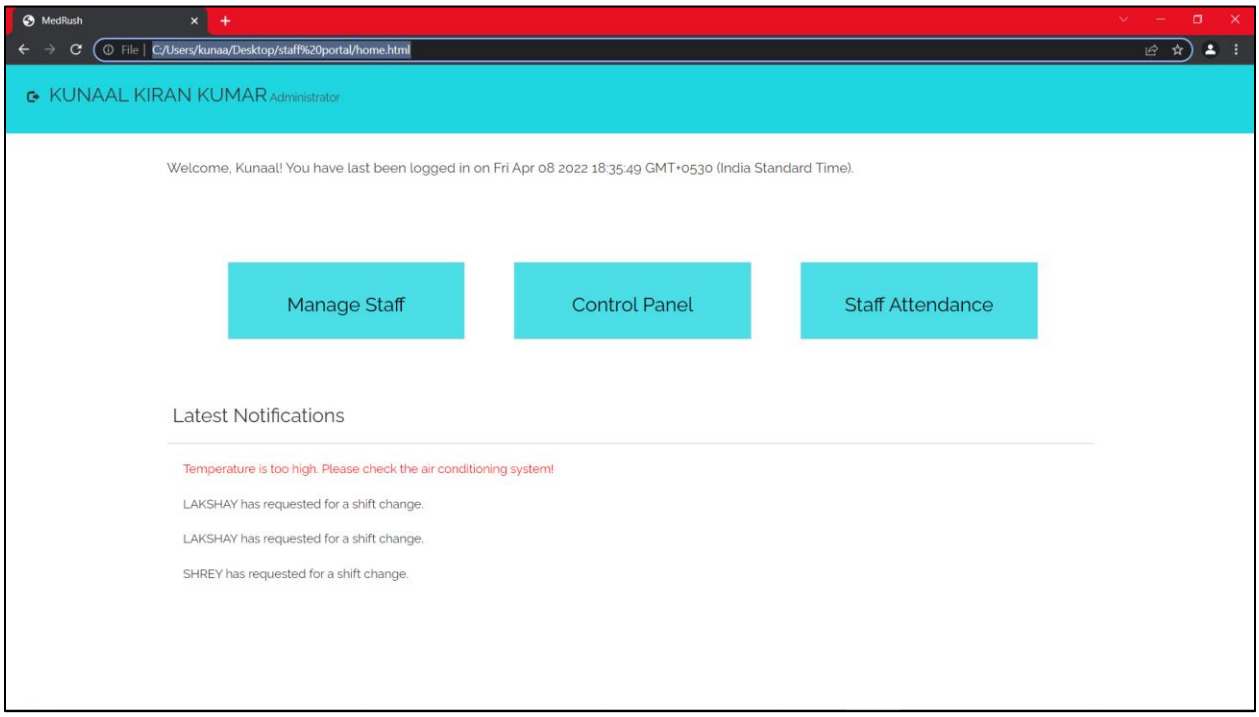
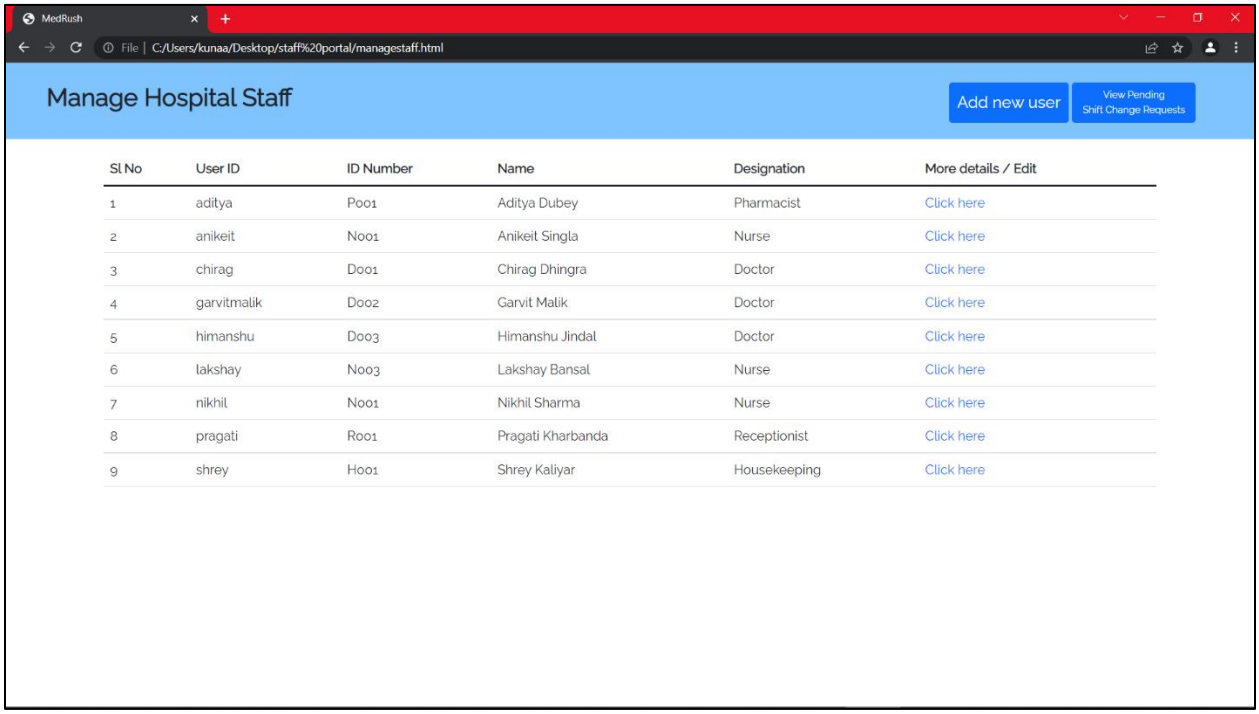


Image 6: Admin: Dashboard



Sl No	User ID	ID Number	Name	Designation	More details / Edit
1	aditya	P001	Aditya Dubey	Pharmacist	Click here
2	anikeit	N001	Anikeit Singla	Nurse	Click here
3	chirag	D001	Chirag Dhingra	Doctor	Click here
4	garvitmalik	D002	Garvit Malik	Doctor	Click here
5	himanshu	D003	Himanshu Jindal	Doctor	Click here
6	lakshay	N003	Lakshay Bansal	Nurse	Click here
7	nikhil	N001	Nikhil Sharma	Nurse	Click here
8	pragati	R001	Pragati Kharbanda	Receptionist	Click here
9	shrey	H001	Shrey Kaliyar	Housekeeping	Click here

Image 7: Admin: Staff Management

DOCTOR:

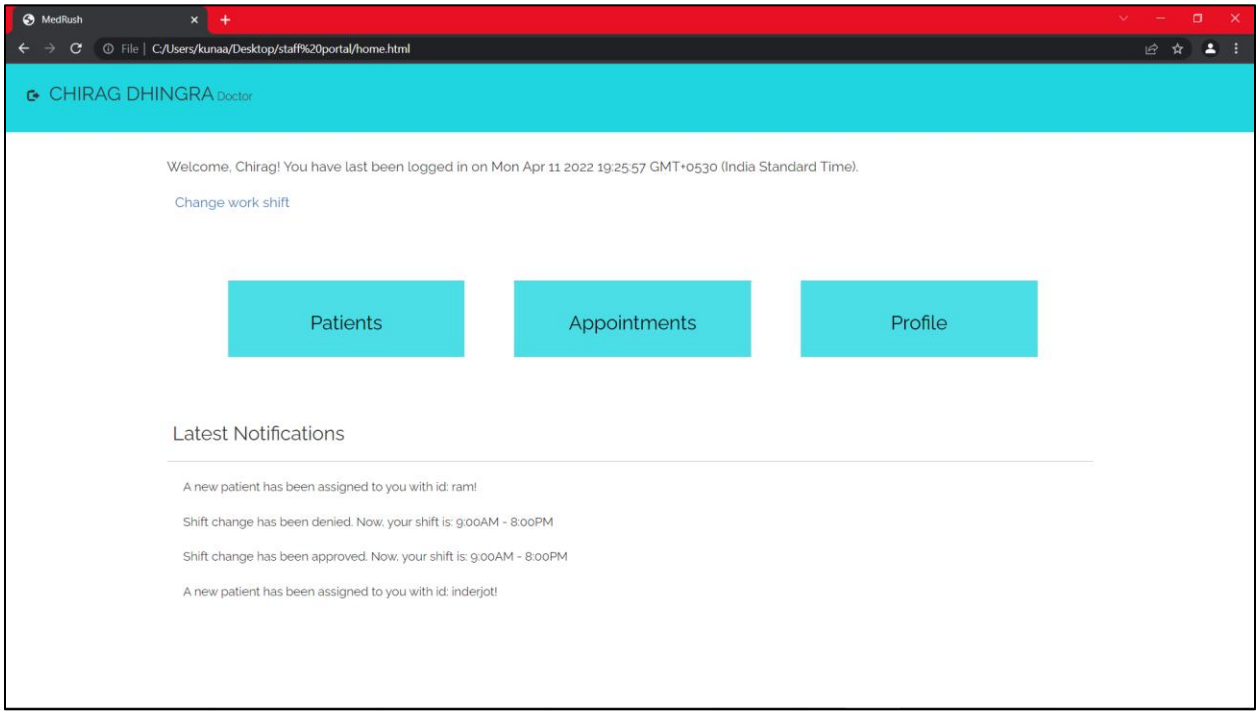


Image 8: Doctor: Dashboard

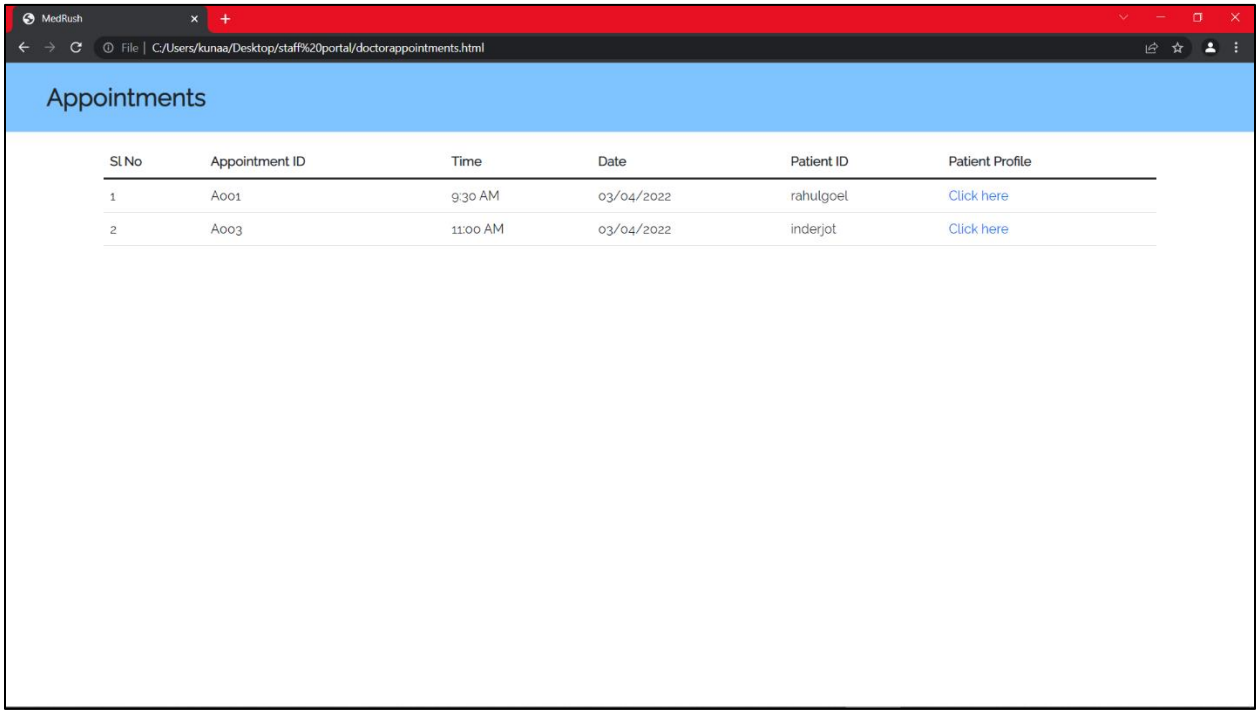


Image 9: Doctor: Appointments

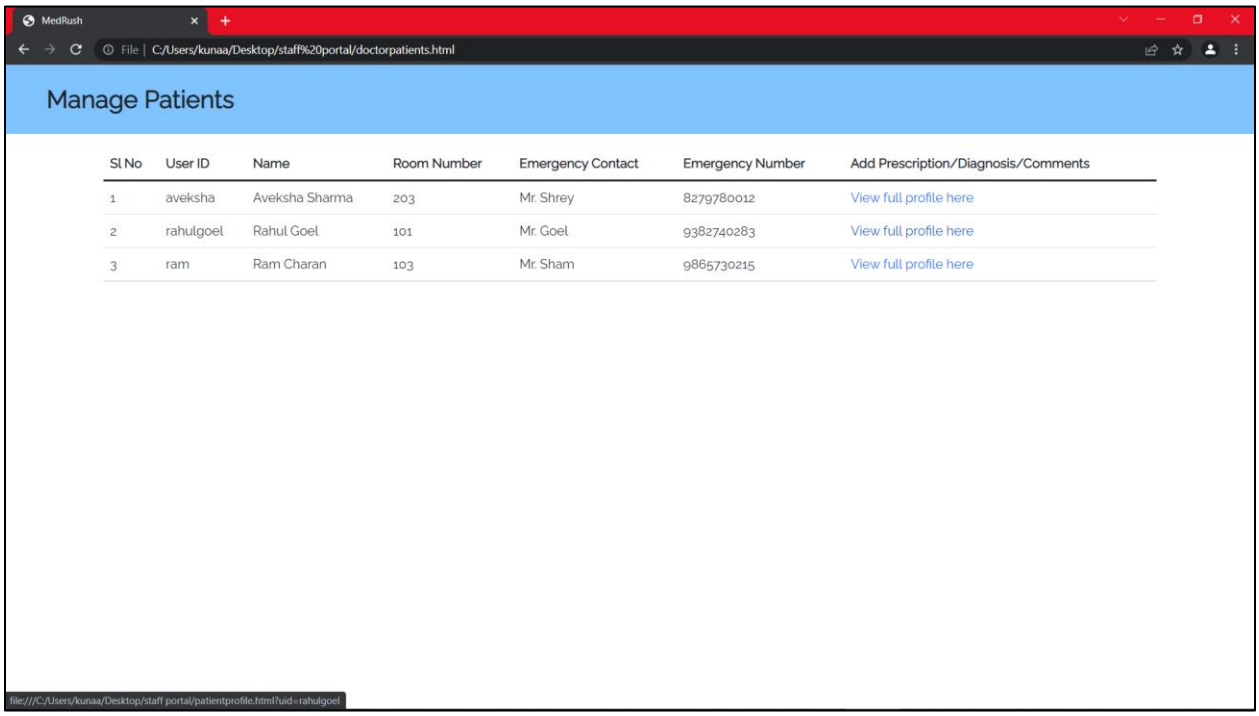


Image 10: Doctor: Active Patients

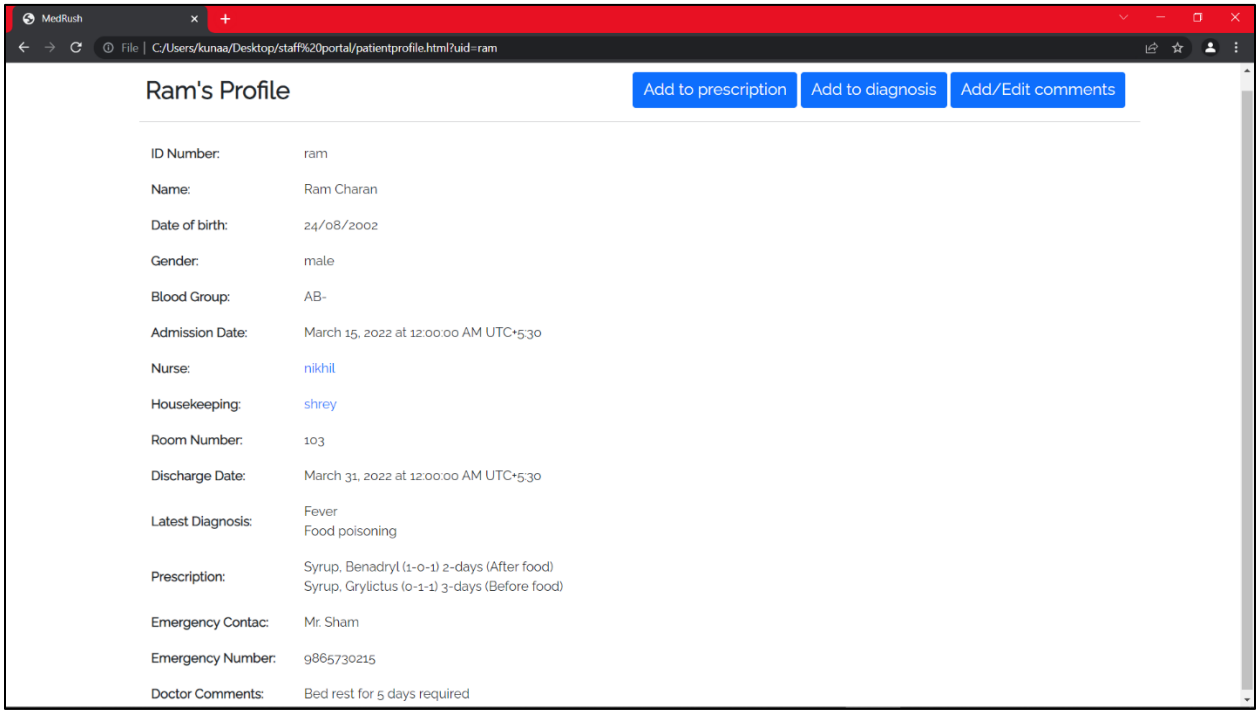


Image 11: Doctor view: Patient Profile

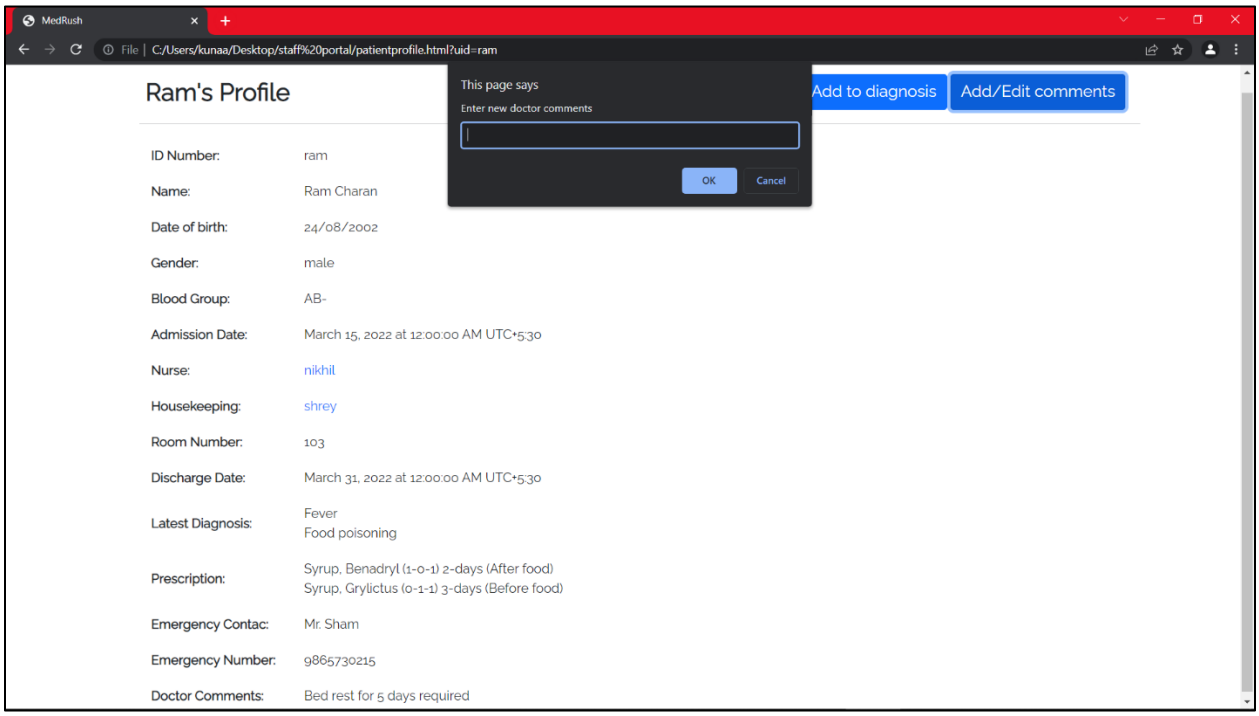


Image 12: Doctor: Add/edit Prescriptions, Diagnosis and comments using simple prompts

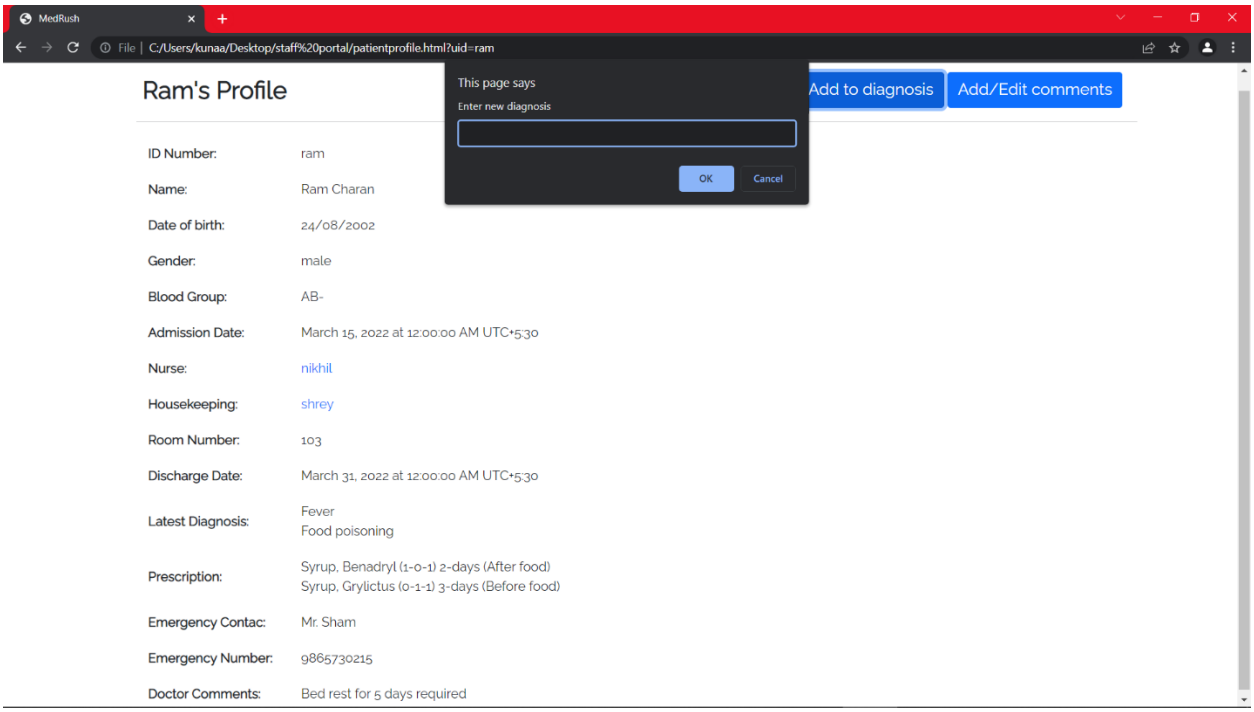


Image 13: Doctor: Add/edit Prescriptions, Diagnosis and comments using simple prompts

RECEPTIONIST:

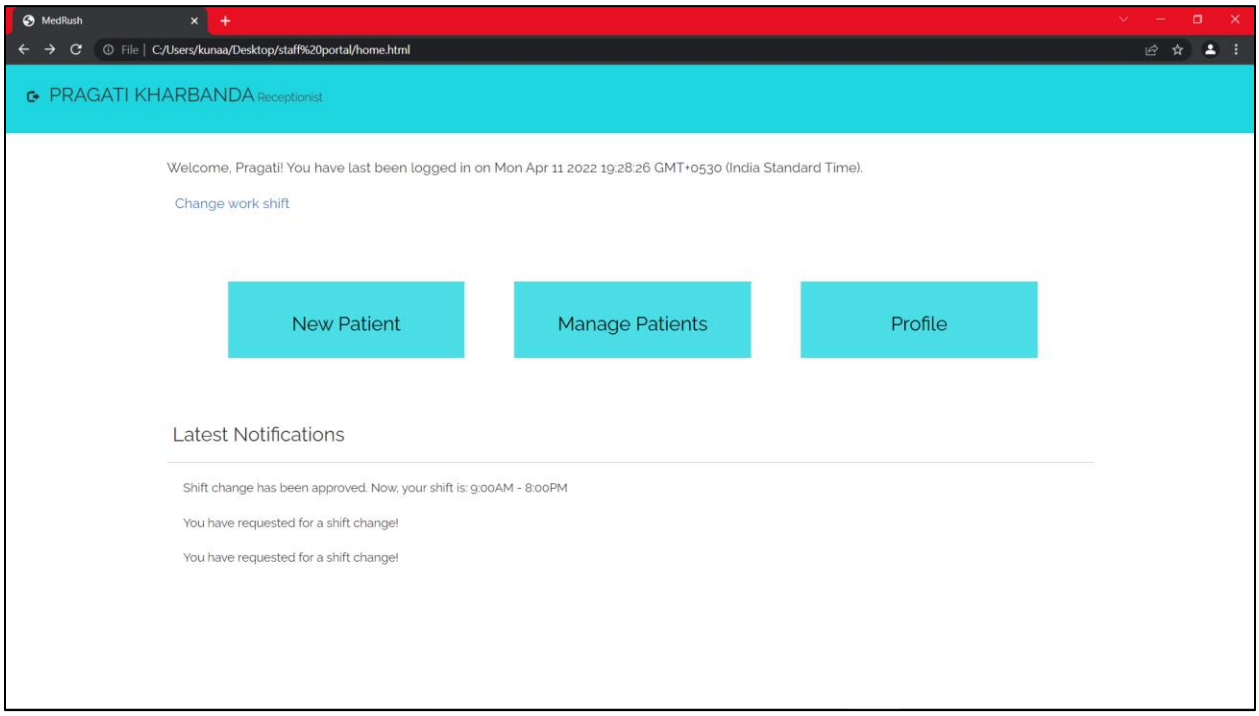


Image 14: Receptionist: Dashboard

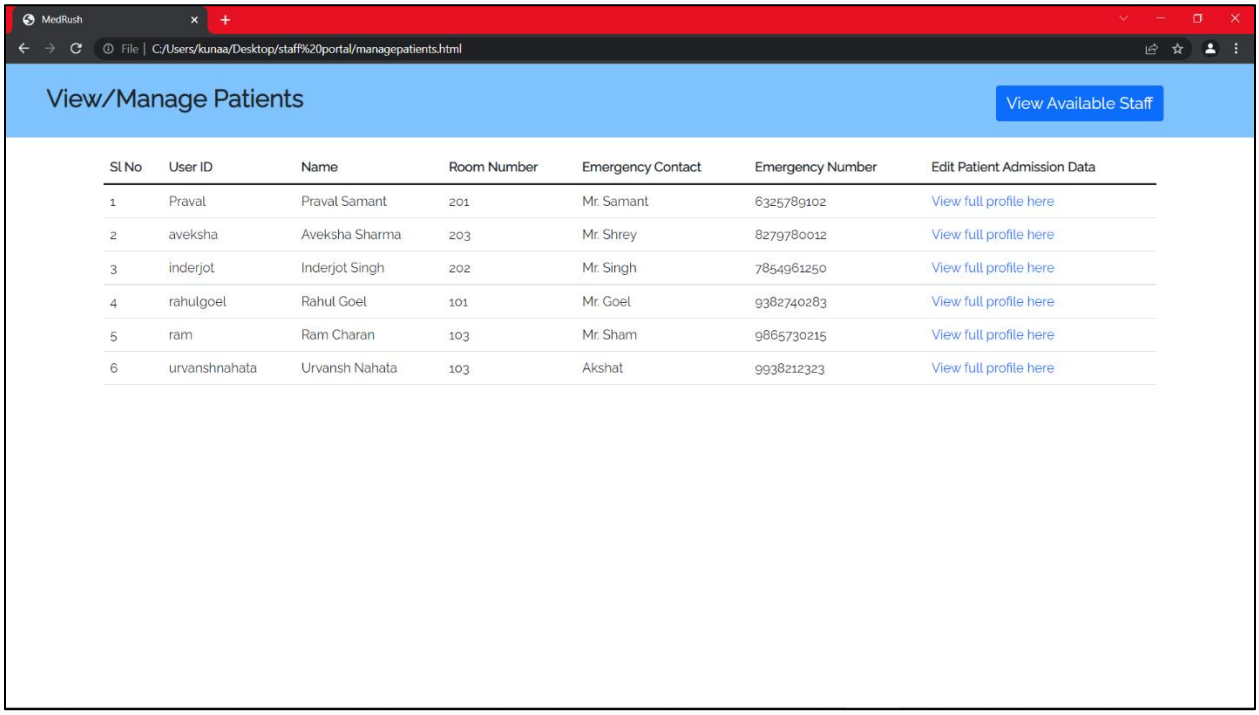


Image 15: Receptionist: All active patients

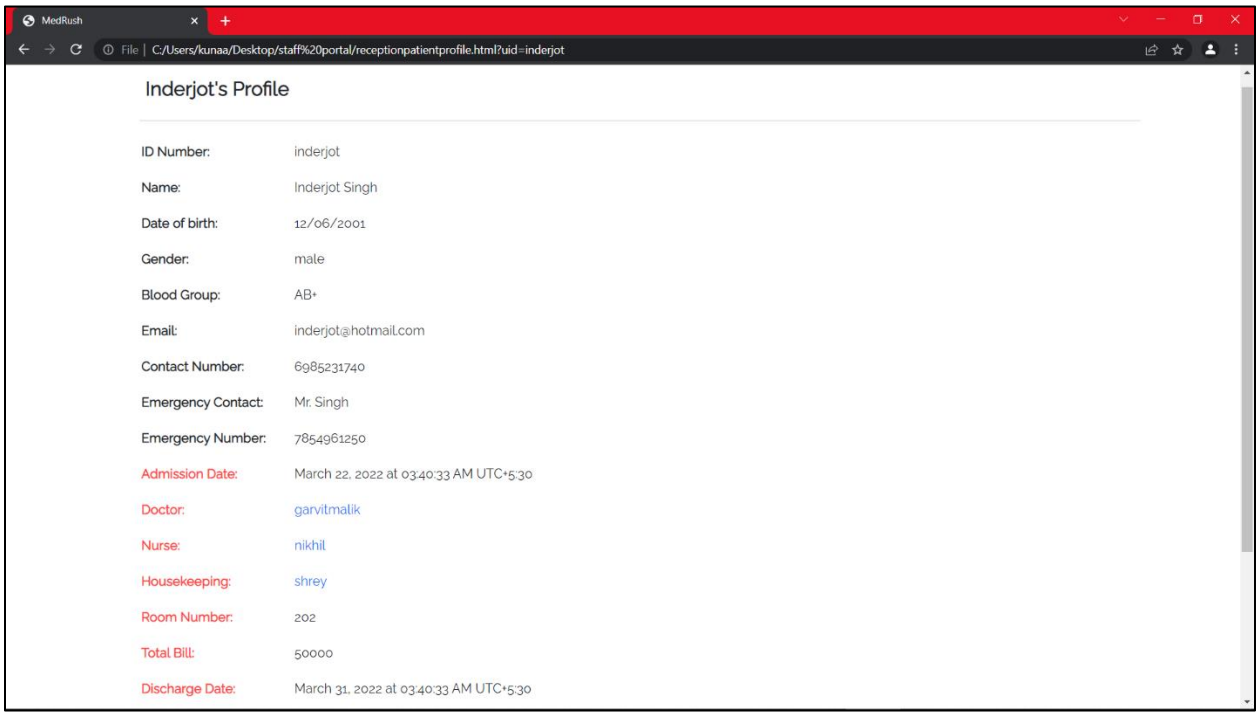


Image 16: Receptionist view: Patient Profile

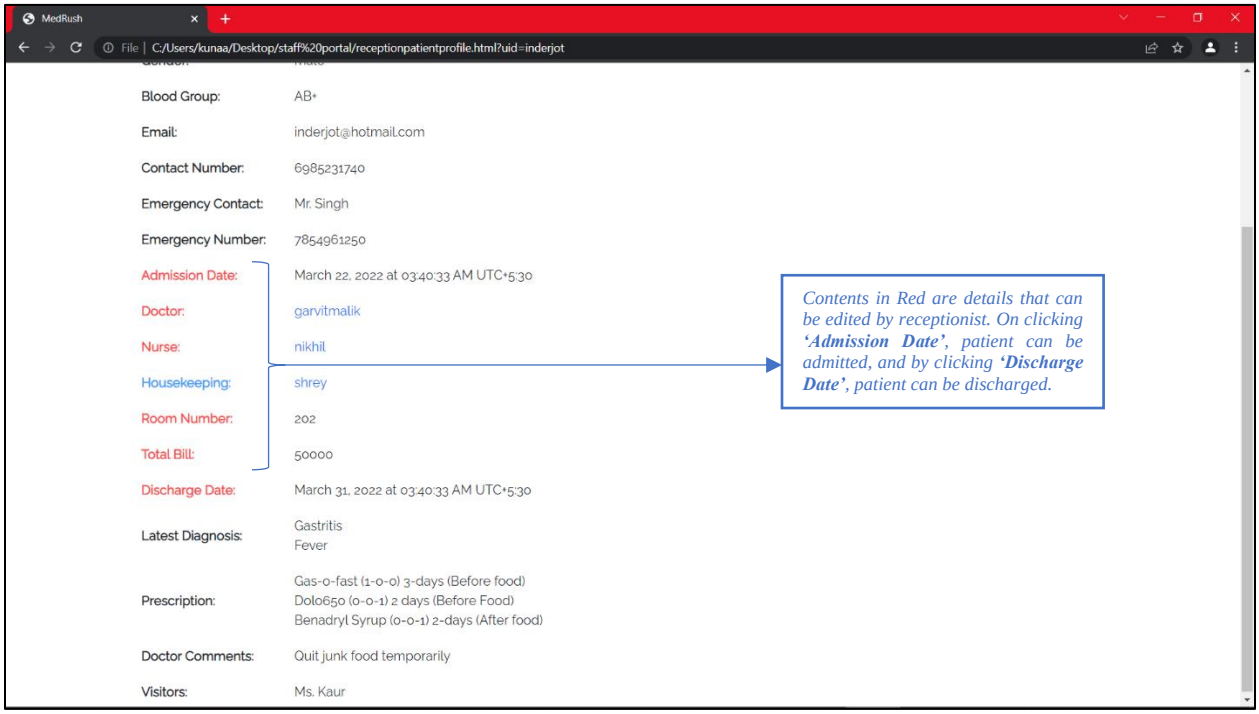


Image 17: Receptionist view: Patient Profile

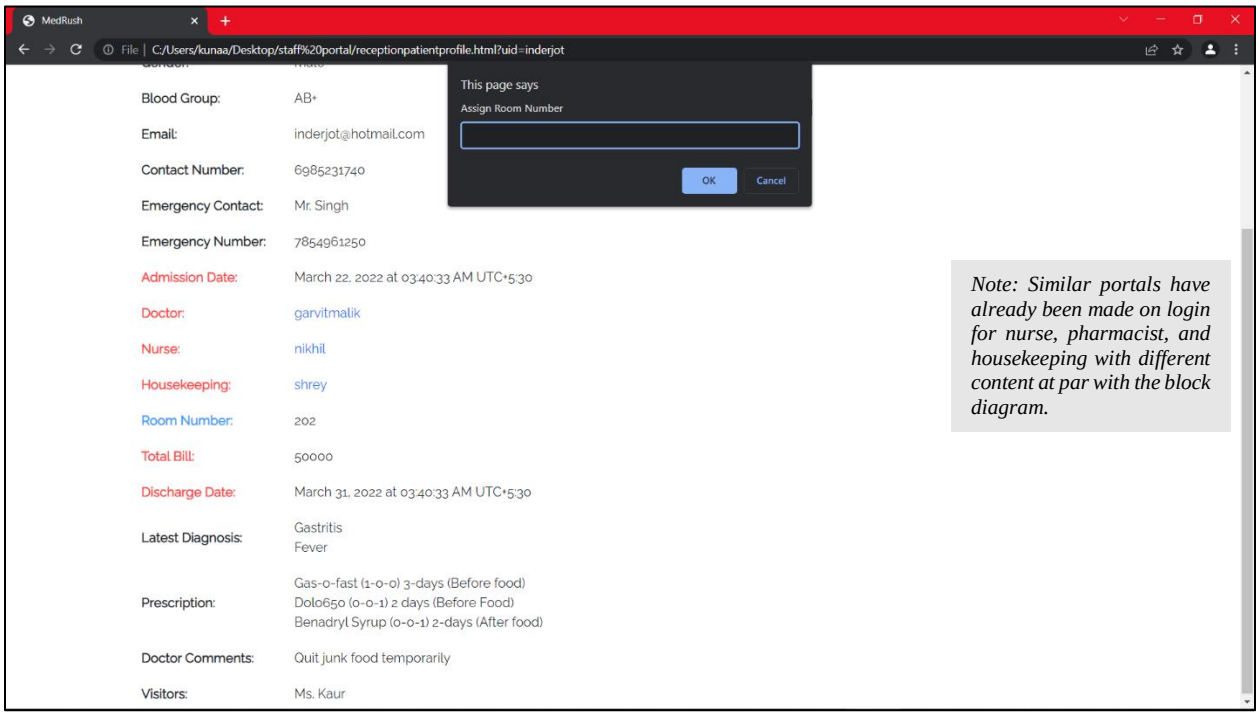


Image 18: Receptionist: Editing certain segments of the profile using simple prompts

PATIENT PORTAL:

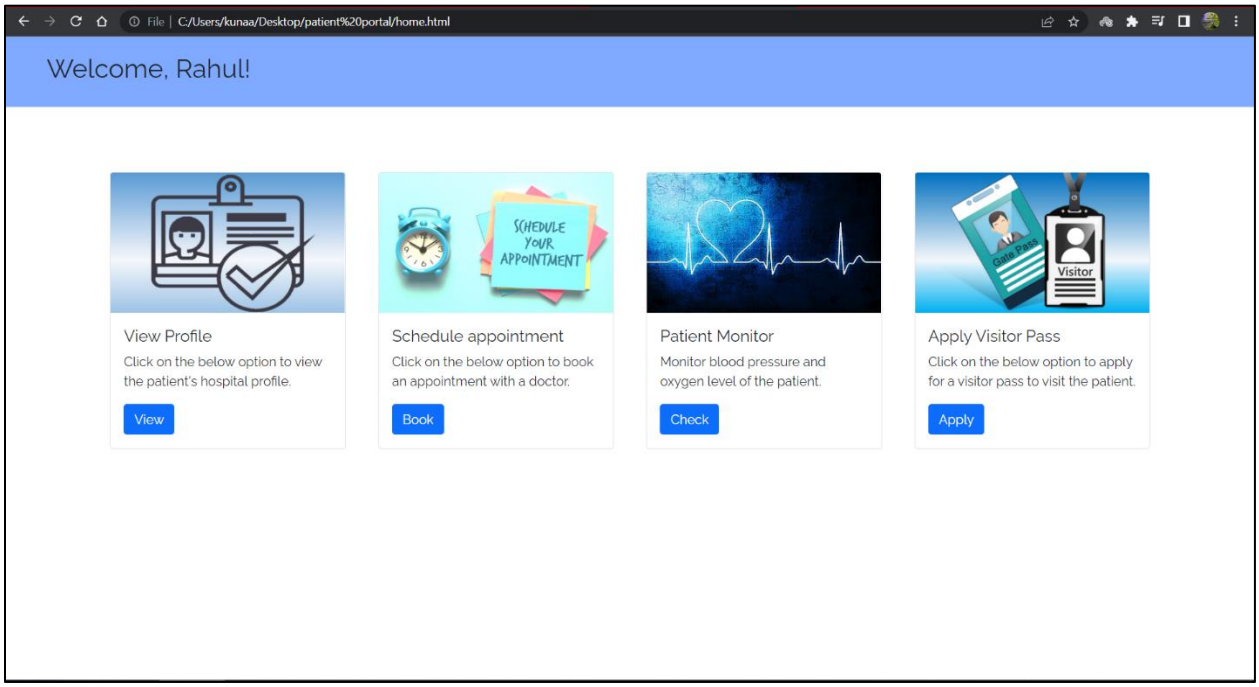


Image 19: Patient Dashboard

D. MORE DETAILS

DEVICE 1: Hospital Panel

1. NodeMCU (Microcontroller)
2. Fingerprint sensor (Attendance)
3. DHT22 Sensor (Temperature & Humidity)
4. MQ2 Sensor (Smoke Sensor)

DEVICE 2: Patient Accessibility Panel: This panel is SIGNIFICANT because in ICU's where phones are not allowed, web-portal cannot be used. A physical portal can be helpful in that case.

1. NodeMCU (Microcontroller)
2. MAX30100 (Pulse Oximeter Sensor)
3. LCD 16x2 Display (Display Patient vitals)

E. MISCELLANEOUS

SCREENSHOT OF DATABASE

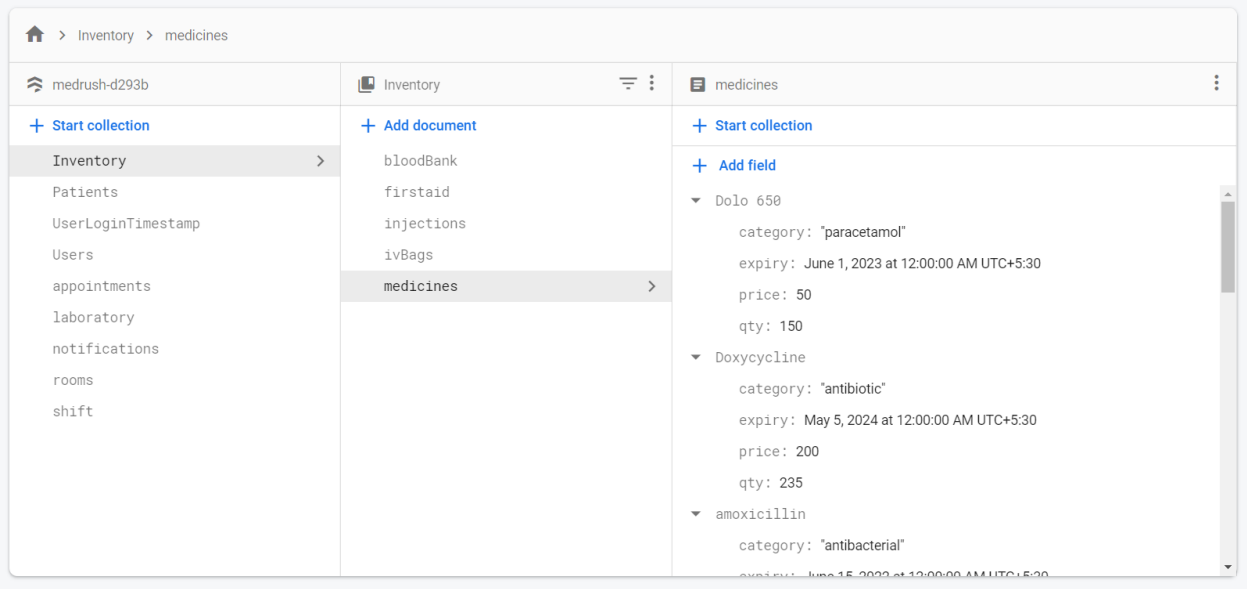


Image 20: Database (Google Firebase)

CONCLUSION

The SMART HOSPITAL AUTOMATION SYSTEM is what you may need to automate a hospital and get a portal that is simple to use and hassle-free. If implemented, the prototype can help many hospitals deliver their services with more efficiency.

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