



UNIVERSITY OF
LEICESTER

**School of Computing and
Mathematical Sciences**

CO7201 Individual Project

**Preliminary Report
AN AUTOMATED SYSTEM FOR
LOCAL GPS**

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DECLARATION

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1. Aims and Objectives

United Kingdom is the sixth largest economical country across the globe [1], and yet it is facing healthcare crises. Few of the major reasons that contribute to downfall of the healthcare sector within the UK are lack of staff, an aging population, burnout of existing staff and over population. On the 2nd of October 2024 a report published by BBC News stated that, the cities that had most patient per GP were Thurrock, Leicester, Blackburn with Darwen's, Luton and Melton Keynes and Portsmouth [4].

While this is just a broad overview of the healthcare sector, the ground reality is far more disturbing. Patients are not able to receive proper treatment due to reasons zero knowledge about availability of doctors or nurses, no information regarding minor injuries, never-ending appointment forms and, sometimes not even able to secure one appointment.

Inorder to address these issues, the aim of this project is to design/develop An Automated System for Local GPs, which will be helpful for both healthcare staff and Patients. The Web app would be developed considering objectives such as data security, less time-consuming processes and user-friendly UI. These objectives will cater the need of both healthcare staff and Patients by allowing staff to set availability prior then a month, retrieve medical history of patients with ease and provide prescriptions while maintaining medical records. On contrary, the patients will be able to manage/ view prescriptions, for minor injuries they could leverage informative articles and free one-to-one chat feature available on the Web App. This project will allow the patients to access the GP on-demand without waiting for weeks or months and this will also optimize the workload for the staff.

1.1 Challenges

- Security of the web application due to data confidentiality.
- User friendly Designs, without much re-routing.
- Easy appointment scheduling without much hassle.
- One-to-One Chat feature for GP and Patients.
- Payment integration.
- Cloud Deployment.

2. Requirements

2.1 Essential

- **Registration:** The patient will be able to register to the webapp using secure login credentials, allowing them to add/upload their previous medical history.
Registration of Doctors and Nurses will be performed by Admin.
- **Availability:** The Doctor and Nurses will be allowed to set their availability prior to a month.
- **Book appointment:** As per the need of patients they can book the appointment with the available Doctor/Nurse.

- **Provide prescription:** The Doctor will be able to access medical history of patients and provide a digital prescription on the web app.
- **Admin Dashboard:** The dashboard will help to add/delete patients, add/delete doctors, add/delete nurses and scheduling the bookings for senior citizens.
- **Staff Dashboard:** The Dashboard will help staff to set their availability, view booked appointments, provide prescriptions, view patients medical history and send prescription to pharmacy.
- **Patient Dashboard:** The Dashboard will show the Doctor/Nurse Availability, book appointment, view prescriptions, upload the prior medical history, previous booked appointments records.

2.2 Recommended

- **Deployment on the cloud**
- **Articles for minor injuries & awareness:** Inorder to tackle mild external injuries, Articles will be provided inorder to take safety measures at home which will reduce some staff workload.
- **View prescription:** The patient will be able to view the prescription provided by the Doctor/Nurse online.
- **Buy and Pay prescriptions:** For the prescribed medicine the patient can buy and pay for the prescription either online or offline.

2.3 Optional

- **One to one chat:** Due shortage of Doctor/Nurse, if in case there's a follow-up required for a specific patient, or a patient requires immediate attention the chat feature can be leveraged.
- **Responsive Web Application.**
- **Video Consultation**

3. Technical Specification

The below attached table provides brief description of each of the component that will be used in the project(refer table 1).

Component	Name	Summary
Database	MongoDB/ SQL	Storing and managing the data either in structured or unstructured format.
Backend	Python, Flask	Used to develop business logic.
Frontend	React JS, HTML, CSS, JS	Design a dynamic and responsive web application [6].

API	REST	Used to communicate with the database.
Authentication	JWT/OAuth	Used for Secure authentication.
Cloud Deployment	AWS / Azure	Hosting the application, considering availability and consistency from CAP principles.
Version control	Git, GitLab	Version controls the whole project.
IDE	Visual Studio Code	Tool for editing code.
Testing	Manual testing, User Feedback(frontend), Unit testing, Postman (API)	Tests the robustness and security of the application.
Designing	Figma, Sketch (paper & pen), Draw.io	For each of the web application pages design a low-fidelity design, wireframes, ER Diagram, Use case diagram and Class diagram.
Documentation	MS Word	
Operating System	Windows	

Table 1: Technical Specification

4. Requirements Evaluation Plan

4.1 Evaluation Criteria

- **Functionality:** Features such as User authentication, prescription management and appointment booking are the essential aspects of this project, which should be fully functional.
- **Usability:** The User Interface, navigation and accessibility needs to be tested through user testing, especially considering elderly people.
- **Security:** Testing should be carried out to test that there is no data leakage and medical records are handled safely.
- **Scalability:** The Web app should be able to handle multiple users simultaneously, while maintaining the same responsiveness.

4.2 Testing Method

- **Unit Testing:** Each component should be tested individually.

- Integration Testing: Test how well frontend, backend and database work together.
- User Acceptance Testing: Test the application with end users like elderly people and Doctors.

5. Background Research and Reading list

5.1 Related Work

5.1.1 Existing Web Applications GP.

Currently there are various GP websites that provide the services online, but lacks in appointment booking, user interface or complex navigation. Regent Street Clinic [5] is one such example, this website has a load of pop-ups, and the UI is very much complex to understand from end user perspective. The major drawback seems to be in the appointment booking, as this application asks for up-front payment.

Another example is Leicester Holistic GP [3], where the website has a very bad user experience, for booking an appointment the form behaves weird, no-proper colours used and less interactive.

Similarly, Highfield Surgery Seven Street[2] website, serves all the necessary services, however, lacks the fundamental of website development, which would be the User Interface. The very first step to consider before building the UI is to identify the key users. Considering UK's current demographics, a lot of the users of healthcare services are elder people. Providing a lot of information such as news, options to book self-service would seem bit overwhelming to the elderly people.

The mentioned websites show a broad comparison about the existing GP web applications which have fail to provide a smooth experience to end user. Therefore, this project aims to deliver a user-friendly interface considering the principles of user interface and user interaction.

5.1.2 Articles

Upon browsing through existing GP web applications, the articles provide understanding about the challenges that were faced by GPs and the healthcare staff. The article "General practice on the brink: what should reform look like?" [8] written by Dr Rebecca Rosen that was published on 17th May 2022, tells about the problems that were faced by the Patient and GP and also provides a solution such as the major four fundamentals functions that GP must be able to cover, appointment scheduling for minor problems and acute problems and use of digital technologies.

Another article "The growing crisis in general practice: a call to save our surgeries"[5] written by Rebekah Price published on Tuesday 15 October 2024 informs about the crises that are being faced by the GP and administration workers.

5.1.3 Software Design and Technical Research

The publication “Software Testing Techniques and Levels in Software Development” [9] written by Samuel Gbli Tetteh tells when exactly to start with the testing, types of the testing software such as manual testing, automated testing, white box testing, black box testing, grey box testing, load testing and stress testing. However, it also mentions about the levels of the software testing that is unit testing, integration testing, system testing and validation testing.

In Addition, “Types of software Architecture pattern”[10] talks about the software architecture patterns that are been used in real world, where in this project the Micro-Service architecture will be used due to its functionality[11].

6. Time-plan and Risk Plan

6.1 Time plan

During the entire time plan, the software development life cycle stages will be considered and will be implemented accordingly.

NOTE: The time plan may change in case of any delays in previous tasks.

A Gantt chart has been provided for the time plan (refer figure:1).

Week 1: 10/02/2025 - 16/02/2025

❖ *Milestone Achieved: Planning and Requirement Analysis (Stage 1).*

In this week, the supervisor(in-person) meeting was scheduled, and additional tasks were to gather information about current GP system, design the ER-Diagram, Use Case Diagram for the project and submission of the Project Description (14th February 2025).

Week 2: 17/02/2025 - 23/02/2025

❖ *Milestone Achieved: Defining Requirements (Stage 2) & Design (Stage 3).*

The task for this week was to draw Use Case Diagram, design wireframes for each of the web application page and prepare draft for the preliminary report.

Week 3: 24/02/2025 - 02/03/2025

❖ *Milestone Achieved: Start of Development (stage 4)*

The weekly supervisor(in-person) meeting will be held that will help to get feedback on the preliminary report. The task outlined for this week will be designing the login/register page for the web application and submit preliminary report (28th February 2025).

Week 4: 03/03/2025 - 09/03/2025

❖ *Milestone Achieved: Login/Register Successful.*

The group supervision meeting will be held in this week. The task to do within this week are to develop the backend logic of login/register and design the user interface for the

dashboard. Integration of backend logic and frontend code will be carried out. Upon successful completion of the login/register functionality, the manual testing and API testing will be conducted.

Week 5: 10/03/2025 - 16/03/2025

❖ *Milestone Achieved: Dashboard Successful.*

The supervisor(in-person) meeting is scheduled where the completed task will be shown and will get the feedback on the user interface of the login/register page and dashboard (if completed). This week the business logic for the dashboard will be completed and will start designing the Appointment booking page. Once done with the integration of frontend and backend for dashboard, manual testing and API testing will be done.

Week 6: 17/03/2025 - 23/03/2025

❖ *Milestone Achieved: Appointment Booking Successful.*

The logic for the appointment booking and designing the prescription management will be completed within this week. And the draft for the Interim report will be completed.

Week 7: 24/03/2025 - 30/03/2025

The supervisor(in-person) meeting is scheduled where I'll be showcasing the completion till the appointment booking and start designing the One-to-one chat feature. Therefore, the interim report will be submitted (28th March 2025).

Week 8: 31/03/2025 - 06/04/2025

The logic for the one-to-one chat will be implemented and the principal marker interview will be held.

Week 9: 07/04/2025 - 13/04/2025

❖ *Milestone Achieved: Essential Requirement Achieved along with few of the Recommended and Optional feature.*

❖ *Milestone Achieved: Testing (Stage 5).*

The supervisor (in-person) meeting will be held where the working application will be shown. The web application will be tested and if in case any backlogs are remaining it will be completed during this week. If time persist, the cloud architecture will be designed which will help to deploy the application.

Week 10 & Week 11: 14/04/2025 - 27/04/2025

❖ *Milestone Achieved: Deployment and Maintenance (Stage 6).*

The supervisor (in-person) meeting will be held and during this two week the application will be successfully deployed to the cloud and the final report template will be drafted and submitted (25th April 2025).

Week 12: 28/04/2025 - 04/05/2025

The group supervisor meeting will be held, and the previous backlogs will be completed along with start of the final report.

Week 13: 05/05/2025 - 11/05/2025

The supervisor (in-person) meeting will be held. During this week, continuation of final report and testing of the deployed application will be performed.

Week 14: 12/05/2025 - 18/05/2025

In this week, the final report and code will be submitted (16th April 2025).

Week 15: 19/05/2025 - 23/05/2025

In this week, the final viva will be conducted.

Time plan (Gantt Chart)

ID	Task	Start Date	Due Date	Week																
					FEB				MAR				APR				MAY			
					10/02	17/02	24/02	03/03	10/03	17/03	24/03	31/03	07/04	14/04	21/04	28/04	05/05	12/05	19/05	26/05
1	Milestone: Requirement Gathered Supervisor Meeting(In person) Information Gathering ER-Diagram Use Case Diagram Project Description	10/02/2025	16/02/2025	Week 1	■															
2	Use Case Diagram Wireframes Preliminary Report	17/02/2025	23/02/2025	Week 2		■														
3	Supervisor Meeting(In person) Frontend : Register/Login Submit Preliminary Report	24/02/2025	02/03/2025	Week 3			■													
4	Milestone: Login/Register Successful Group Supervision Meeting Frontend: Dashboard(Doctor/Nurse/Patient) Backend: Login /Register	03/03/2025	09/03/2025	Week 4				■												
5	Milestone: Dashboard Successful Supervisor Meeting(In-person) Frontend: Appointment Booking Backend: Dashboard	10/03/2025	16/03/2025	Week 5					■											
6	Milestone: Appointment Booking Successful Frontend: Prescription Management Backend: Appointment Booking Interim Report	17/03/2025	23/03/2025	Week 6						■										
7	Supervisor Meeting(In-person) Frontend: One to one chat Interim Report Submission	24/03/2025	30/03/2025	Week 7							■									
8	Backend: One to one chat Principal Marker Interview	31/03/2025	06/04/2025	Week 8								■								
9	Milestone: Essential Requirement Achieved Supervisor Meeting(In-person) Testing Previous Backlog Completion	07/04/2025	13/04/2025	Week 9									■							
10	Supervisor Meeting(In-person) Cloud Deployment Final Report Template Submission	14/04/2025	27/04/2025	Week 10 & 11										■	■					
11	Group Supervision Meeting Final report Previous Backlog Completion	28/04/2025	04/05/2025	Week 12												■				
12	Supervisor Meeting(In-person) Final Report Code Testing	05/05/2025	11/05/2025	Week 13													■			
13	Final Report Testing Final Report and Project Code submission	12/05/2025	18/05/2025	Week 14														■		
14	Viva	19/05/2025	23/05/2025	Week 16															■	

Figure 1: Gantt Chart

6.2 Risk Plan

The table 2 shows the risk, impact and mitigation that can be occurred during the development of the project.

Risk	Impact	Mitigations
Data Privacy	High	Secure the login using JWT.
Integration Service	High	Perform API testing at earliest stage.
Payment Integration	High	Troubleshoot any integration issue.
Failure of single node	High	Deploy the application in two regions.
Cloud Deployment	High	Plan early deployment inorder to mitigate upcoming issue.

Table 2: Risk Plan

7. References

1. *GDP of United Kingdom*. (2024, November 16). Retrieved from Statistics Times: <https://statisticstimes.com/economy/country/uk-gdp.php>
2. *Highfield Surgery*. (n.d.). Retrieved from <https://highfieldsurgerysevernstreet.co.uk/>
3. *Leicester Holistic GP*. (n.d.). Retrieved from <https://www.leicester-holistic-gp.co.uk/>
4. Nick Trigg, & Wesley Stephenson. (2024, October 02). *The places with the worst GP shortages revealed*. Retrieved from BBC NEWS: <https://www.bbc.co.uk/news/articles/cjd51y9vn9do>
5. Price, R. (2024, October 15). *The growing crisis in general practice: a call to save our surgeries*. Retrieved from BMA: <https://www.bma.org.uk/news-and-opinion/the-growing-crisis-in-general-practice-a-call-to-save-our-surgeries#:~:text=A%20crisis%20in%20General%20Practice,load%2C%20the%20pressure%20is%20immense>
6. *React*. (n.d.). Retrieved from React: <https://react.dev/>
7. *Regent Street Clinic*. (n.d.). Retrieved from <https://www.regentstreetclinic.co.uk/>
8. Rosen, D. R. (2022, May 17). *General practice on the brink: what should reform look like?* Retrieved from nuffieldtrust: <https://www.nuffieldtrust.org.uk/news-item/general-practice-on-the-brink-what-should-reform-look-like>
9. Tetteh, S. G. (2024). *Software Testing Techniques and Levels in Software Development*, 1-10.
10. *Types of Software Architecture Patterns*. (2024, June 20). Retrieved from GeekforGeeks: <https://www.geeksforgeeks.org/types-of-software-architecture-patterns/>
11. *What are Microservices?* (2025, January 03). Retrieved from GeekforGeeks: <https://www.geeksforgeeks.org/microservices/>