SLIIT UNI
THE KNOWLEDGE UNIVERSITY

IT4010 – Research Project - 2023

Topic Assessment Form

Project ID: TMP-2023-24-015

Important instructions to students:

1. **According to the comments given by the supervisor, make the necessary modifications and finally, get the approval from the Supervisor and the co-supervisor.**
2. **If the project topic is rejected, identify a new topic, and follow the process as before.**
3. **The approved form must be submitted to the folder (will be notified later) on or before 10th July 2023.**

(Students should ensure that they complete all sections ranging from 1 to 7. Then, download the form and email to your supervisor before 26th June 2023. Please note that the corresponding supervisor of the project is responsible for completing sections 8 to 10.)

1. Topic (12 words max)

Enhancing Patient-Centric Care and Doctor Convenience in Hospitals

2. Research area the project belongs to

Machine Learning and Soft Computing (MLSC)

3. Team member details

Student Name	Student ID	Specialization
Member 1: **Dewantha A. A. A. R. S.** (Group Leader)	**IT20618186**	IT
Member 2: **Amaraweera O. G.**	**IT20616588**	SE
Member 3: **Jayasekara J. M. P. N. K.**	**IT20623418**	SE
Member 4: **Lakshan J. A. T.**	**IT20642150**	IT

4. Brief description of the research problem including references (200 – 500 words max) – references not included in word count

One of the major challenges for the patients and doctors is the medical history. Most of the time they use a book for the clinic but when it's lost, doctors must get the details all over again. Patients have to wait in lines to meet doctors for hours upon hours. Doctors do not come to the hospital to the exact time they say they would.

The doctors don't have a way to know how much patients he will get today. And if the patient is really old, that person can't even describe his symptoms. Doctors will have to examine them again to find all the symptoms which takes lots of time. Sometimes there are emergency patients waiting outside but the others won't let them cut the que. And also, patients do not have a way to know if the doctor has come to the hospital exact time as they said, and what number is going on the patient list now.

Most government hospitals do not use a proper system to maintain medicine and their vaccines and drugs. Sometimes medications get expired without even knowing. And there is no way to know if a drug is running out of stock or not. If a drug is not on that specific hospital, then from where can they get some for now.

In the hospital labs, patients cannot get their old reports which will be needed to compare with the currents reports and make decisions. There are lots of medical reports, test results, and treatment histories. Analyzing this data manually is time-consuming, prone to errors, and often overwhelming for healthcare professionals. Additionally, predicting future problems faced by cancer patients based on their medical records requires advanced analysis and pattern recognition, which can be challenging without the assistance of automated systems.

5. Brief description of the nature of the solution including a conceptual diagram (250 words max)

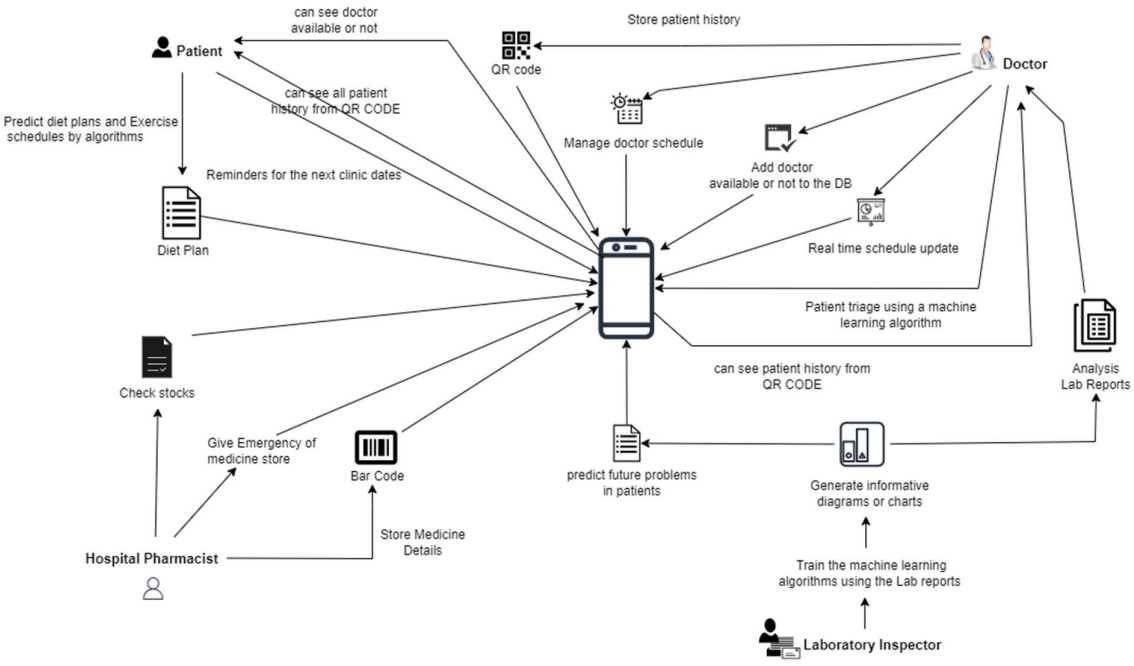
Our app aims to improve healthcare efficiency and convenience for doctors, patients, medicine storage, and hospital management. By digitizing patients' medical histories, doctors and patients can quickly access and understand their health situations, eliminating the need for physical clinic books. This streamlines the examination process, allowing doctors to efficiently assess patients and see more patients than before. Consequently, waiting times, costs, and patient stress are reduced.

The app empowers doctors by providing them with a patient list before they enter their treating rooms. They can easily identify emergency cases and prioritize accordingly. Doctors, nurses, or attendants can mark attendance or indicate the doctor's presence at the facility. During patient visits, the app enables the marking of patient progress, ensuring patients with later numbers arrive at the hospital closer to their scheduled times. This eliminates the need for patients to wait in long queues for extended periods.

By utilizing barcode technology, our app tracks medication stock levels and expiration dates. It alerts healthcare providers when stocks are low or medications are nearing expiration, resulting in cost savings and improved patient safety. In emergencies, the app allows healthcare providers to quickly locate the nearest place to obtain specific medications.

Lab reports are directly sent to doctors and patients through the app. These reports not only provide comprehensive information on patient conditions but also generate graphs and charts for easy visualization and understanding. Utilize machine learning algorithms to automate the analysis of medical records and predict future problems of patients. By leveraging these algorithms, healthcare providers can extract valuable insights from the data and make informed decisions regarding patient care and treatment planning. This approach streamlines the process, reduces human error, and enables proactive intervention strategies.

Conceptual Diagram



6. Brief description of specialized domain expertise, knowledge, and data requirements (300 words)

Expertise:

1. App Development: Proficiency in mobile app development for both iOS and Android platforms using relevant programming languages such as Swift, Java, or React Native.
2. Backend Development: Knowledge of server-side programming languages like Python, Java, or Node.js to build the backend infrastructure and handle data processing.
3. Database Management: Experience in working with databases like MySQL, PostgreSQL, or MongoDB to store and retrieve patient and medical information securely.
4. User Experience (UX) Design: Understanding of UX principles to create a user-friendly and intuitive interface for doctors and patients.
5. Integration and API Development: Skills in integrating different systems, databases, and APIs to ensure seamless communication between the app, hospital management systems, and medical equipment.
6. Security and Privacy: Knowledge of healthcare data security standards and regulations, such as HIPAA compliance, to ensure patient data privacy and protection.

Knowledge:

1. Machine Learning: Familiarity with machine learning algorithms and frameworks (e.g., TensorFlow, scikit-learn) for tasks like natural language processing, data analysis, and predictive modeling.
2. Electronic Medical Records (EMR) Systems: Working with EMR systems like Epic, Cerner, or Allscripts to integrate patient medical records into the app.
3. Barcode Scanning: Utilizing barcode scanning libraries or APIs to capture and interpret medication barcodes accurately.
4. Cloud Computing: Experience with cloud platforms like AWS, Google Cloud, or Microsoft Azure for hosting the app, managing data storage, and ensuring scalability.
5. Version Control: Proficiency in using version control systems (e.g., Git) to collaborate with the development team and track code changes.

Data requirements:

We are getting all kind of data from a head nurse, a doctor and an engineer who gave this amazing idea to develop such a valuable app for the county. Through this person, we already have access to the current hospital databases.

7. Objectives and Novelty

Main Objective

This research topic focuses on analyzing strategies to enhance the number of patients seen by doctors each day in healthcare facilities. The aim is to improve workflow management and optimize appointment scheduling to increase patient capacity and reduce waiting times. Also, we hope to work through this research to prevent a medication management solution and to prevent the blockages in issuing the Lab report to prevent the shortage of medicine in a hospital. By addressing these aspects, the topic aims to improve access to healthcare services, enhance patient satisfaction, and maximize the efficiency of healthcare delivery.

Member Name	Sub Objective	Tasks	Novelty
Dewantha A. A. A. R. S.	Automated Analysis of Medical Records and Predictive Modeling for Future Problems in Patients Using Machine Learning Algorithms.	The main task of this project is to develop a machine learning-based system that analyzes medical reports of patients, predicts future problems they may encounter, and generates informative diagrams or charts to visualize the predicted outcomes. 1. Utilize machine learning algorithms. 2. Train the machine learning algorithms using the dataset to learn patterns and associations. 3. Apply the trained algorithms to new medical reports to analyze and extract relevant information. 4. Generate informative diagrams or charts to visualize predicted future problems. 5. Use these visualizations to aid healthcare professionals in understanding and communicating potential risks and complications to patients.	Integrating machine learning algorithms to analyze medical reports and predict future problems in patients. **Justification:** By leveraging artificial intelligence, the system can extract valuable insights and identify patterns that may not be apparent using traditional methods.

Amaraweera O. G.	Patient Interaction System.	Develop a system for patients to check their own medical records and use a QR code to get the same data from any hospital. 1. Create a simple and user-friendly interface for patients where they can see all their medial details in the simplest way possible. 2. Users can view the doctor is in the premises and which number is currently going. 3. After every clinic, the app gives reminders for the next clinic dates. 4. According to the medical records app gives simple diet plans and exercises schedules for each patient.	1. Medical History on QR code **Justification**: Every patient gets registered to the system via their NIC and given a QR code which contains all the medical reports and conditions. Authorized doctors and the relevant user can view the personal medical details from anywhere. 2. Reminders. **Justification**: Patients get a notification when the time is near for the next appointment with the doctor. 3. Diet plans and Exercise schedules. **Justification**: According to the patient's medical record, the app is programmed to make a simple diet plan and exercise schedules for each patient. The app gives little advice to take care of the patient through an algorithm.

Jayasekara J. M. P. N. K.	Doctor Workload Management System.	Develop a doctor workload management system that enables efficient scheduling, task allocation, and resource utilization for healthcare providers. 1. Create an interface to inform the patient whether the doctor is available or not. 2. Create an interface to add patient's medical details to the system. This data will be added to the QR code. 3. Manage doctor's schedules. Here the doctor can get an understanding of the program for the next day. 4. Prioritize patient visits. 5. Real-time Schedule Updates. 6. Use machine learning for patient triage.	1. Real-time Schedule Updates **Justification**: This is done as a note of task completion. The doctor can make a note about the patient who is currently being treated and the patients who are going to receive treatment can look at that note. There the patient can get an understanding regarding their treatment time. 2. Use machine learning for patient triage. **Justification**: Using machine learning algorithms to assess patient urgency based on symptoms, medical history, and other relevant factors.
Lakshan J. A. T.	Medication Management System.	1. Barcode Integration: Develop a system that can scan medication barcodes accurately and efficiently. 2. Stock Level Tracking. 3. Expiration Date Monitoring. 4. Low Stock Alert. 5. Cost Savings Analysis (ML). 6. Emergency Medication Locator. 7. Patient Safety Notifications.	1. Implementation of a centralized inventory management system. **Justification**: Implementing a centralized system that leverages technology would streamline the process, improve efficiency, and provide real-time information on stock availability and expiration dates. 2. Integration of RFID or barcoding technology (ML). **Justification**: A reliable and automated way to track and manage medication inventory. It improves data accuracy and enables quick identification of expired or low-stock items.

			3. Collaboration with other hospitals and suppliers through a network. **Justification**: By sharing resources, hospitals can overcome shortages and minimize the risk of running out of critical medications.

8. Supervisor checklist (supervisors should fill sections from 8 to 10)

1. Is this research problem valid?

Yes	x	No	

2. Is the proposed research group, correct?

Yes	x	No	

3. Is the proposed research area, correct?

Yes	x	No	

4. Do the proposed sub-objectives match the students' specialization?

Yes	x	No	

5. Is the required domain expertise, knowledge, and the data available either through the supervisor or external supervisor?

Yes	x	No	

6. Is the scope of the solution practical?

Yes	x	No	

7. Do all sub-objectives have sufficient novelty?

Yes	x	No	

9. Your final decision:

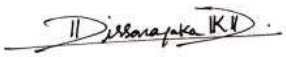
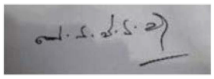
Acceptable: Mark/Select as necessary

Topic Accepted	x
Topic Accepted with minor changes (should be followed up by the supervisor) *	
Topic to be Resubmitted with major changes*	
Topic Rejected. Topic must be changed	

* Detailed comments given below

Comments

10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Dr.	Kapila	Dissanayaka	
Co-Supervisor	Ms.	Bhagyanie	Chathurika	
External Supervisor	Dr.	Rajitha	Samarasinghe	

Summary of external supervisor's (if any) experience and expertise

Dr. Mrs. Rajitha Samarasinghe:
Doctor
Apeksha Hospital, Maharagama.
Sri Lanka.