

**Islamic University of Technology**  
**Department of Computer Science and Engineering**

**Lab3:Project Management**

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**Course Code:** CSE 4408

**Course Title:** System Analysis and Design

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## 1. Problem Definition and Project Justification

### a) Problem Statement:

Students and staff at the Islamic University of Technology (IUT) often struggle to locate essential medicines, especially during emergencies. The current system relies heavily on manual inquiries and store visits, with no centralized platform to check real-time medicine availability across nearby pharmacies.

This lack of digitization leads to wasted time, stress, and occasionally delayed access to necessary care. MedRadar addresses this critical issue by proposing a centralized platform that connects users with real-time pharmacy stock information, improving accessibility, efficiency, and emergency response.

### b) The Key Issues

The current process for finding medicines near IUT is inefficient and unreliable. Students and staff often struggle due to the lack of a centralized system and real-time information. This results in frustration, wasted time, and delayed access to treatment, especially during emergencies.

#### **Key problems include:**

1. Scattered and outdated information on medicine availability.
2. Wasted time contacting or visiting multiple pharmacies.
3. No centralized system for filtering by stock or location.
4. Absence of real-time updates on out-of-stock items.

### c) Project Objectives:

MedRadar aims to bridge the gap between medicine availability and patient access by creating a smart, centralized platform tailored to the needs of its users. It focuses on enhancing speed, accuracy, and convenience in locating essential medicines, ensuring timely and informed access to treatment.

#### **Key objectives include:**

1. Develop a location-based platform to filter nearby pharmacies
2. Enable real-time visibility of medical stock
3. Simplify the search experience with an intuitive UI
4. Integrate AI to suggest alternatives for unavailable medicines

### d) High-Level System Requirements

To achieve MedRadar's objectives, the system must support key functional and technical features that ensure reliability, accessibility, and ease of use for both users and pharmacy partners.

#### **The core high-level requirements include:**

##### **1. User Authentication System:**

Secure login and account management for both general users and pharmacy staff.

##### **2. Pharmacy & Inventory Management Dashboards:**

Interfaces for pharmacies to manage stock entries, update availability, and view usage analytics.

##### **3. Location-Based Filtering with Map Integration:**

GPS-enabled map features that allow users to find nearby pharmacies based on distance and medicine availability.

#### **4. Real-Time Stock Updates & AI-Powered Suggestions:**

Live inventory syncing and suggestions for alternative medicines when exact items are unavailable.

#### **5. Possible Medicine Order Feature:**

A potential module for users to reserve or request medicines online for later pickup or delivery (based on pharmacy preferences).

#### **e) Project Constraints:**

While MedRadar presents a highly impactful solution, its development and deployment are subject to several practical limitations that must be considered during planning and execution.

##### **Key constraints include:**

##### **1. Budget Limits:**

As a student-led initiative, the project is constrained to using only free-tier tools and services, with little to no access to premium APIs or paid infrastructure.

##### **2. Manual Inventory Updates:**

Real-time inventory data relies on manual input from pharmacy staff. Automated syncing with pharmacy systems may not be feasible in the initial phases.

##### **3. Privacy Compliance:**

To align with data protection guidelines, the system avoids collecting or storing any sensitive health or personal data.

#### 4. Technical Skill Gaps:

The development team has **limited experience** with advanced features like external APIs, AI integrations, and real-time data handling, , potentially affecting development speed and complexity.

#### f) Project Justification:

The following points justify the initiation and continuation of the **MedRadar project**, based on its alignment with organizational goals, feasibility, and anticipated impact:

##### 1. Management Backing

The Organization of Student Welfare (OSW) at IUT is expected to support MedRadar, as it directly contributes to student welfare by ensuring timely access to medicines.

##### 2. Appropriate Timing

There is high demand for medical assistance during exam periods and seasonal health issues. Additionally, new students frequently face difficulty identifying reliable local pharmacies. The present moment is ideal for rolling out a digital health support system.

##### 3. Strategic Goal Alignment

MedRadar supports IUT's strategic goals of improving student health access and modernizing campus services. It also encourages the adoption of digital solutions among local pharmacies.

#### **4. Practicality**

A functional Minimum Viable Product (MVP) can be developed and launched in a short timeframe. The use of free-tier cloud tools and services keeps development low-cost and reduces setup complexity, making the solution highly practical.

#### **5. Worthwhile Investment**

MedRadar saves time and effort in locating medicines, improving both user convenience and emergency response. Its scalability allows for future expansion to other institutions, and its reliance on free cloud services ensures it remains a cost-effective initiative.

## **2. Preliminary Feasibility Assessment**

### **a) Technical Feasibility:**

#### **1. Technological Availability**

MedRadar's development is supported by widely available technologies:

1. Google Maps API enables location tracking and nearby pharmacy display.
2. The MERN stack (MongoDB, Express.js, React, Node.js) offers a robust, modern development framework.
3. Various free authentication tools can be easily integrated to ensure secure user access.

#### **2. Skill and Infrastructure Availability**

The student development team is experienced with web development and is comfortable working with cloud-based tools and open-source frameworks. AI and real-time cloud support can be implemented using readily accessible technologies.

### 3. Potential Obstacles

Despite technical readiness on the development side, several challenges are anticipated:

- **Limited technical capacity** among local pharmacies may hinder smooth adoption.
- **Manual inventory updates** pose a risk of **data inaccuracy or delays**.
- **Sustainability concerns** if the system lacks long-term maintenance support post-launch.

### 4. Cloud/SaaS vs. Local Hardware

#### Why Cloud/SaaS is Preferred

- Eliminates the need for physical servers or infrastructure
- Enables access from anywhere via web or mobile apps through APIs.
- Highly **scalable** and **cost-effective**, ideal for student-led projects.
- Cloud platforms offer **automatic updates** and easier long-term maintenance.

#### Why Not Local Hardware

- Setting up and maintaining physical infrastructure is **costly and complex**.
- Local systems are harder to scale and maintain across multiple pharmacies or campuses.

### 5. Anticipated Deployment Challenges

- **Pharmacy onboarding** and training may require time and support.
- **Internet dependency** may limit functionality in low-connectivity areas.
- **Data accuracy** relies on timely and consistent manual updates by pharmacy staff.
- **Maintenance and scaling** will need long-term planning beyond the initial MVP phase.

#### b) Economic Feasibility

This section evaluates the economic viability of the MedRadar system by identifying both tangible benefits and tangible costs associated with its development and implementation.

**Tangible Benefits:****1. Reduces Time and Labor**

MedRadar streamlines the process of locating and managing medicine inventory, significantly cutting down on the time and manual effort for the users.

**2. Faster Emergency Response**

The system enhances the ability to quickly locate essential medicines during emergencies, contributing to improved patient care and potentially saving lives.

**3. Increased Pharmacy Sales**

By ensuring better inventory visibility and availability, MedRadar helps pharmacies attract more customers, thereby boosting their overall sales and revenue.

**4. Data-Driven Insights**

The system generates analytics and reports that enable informed decision-making. Pharmacies and health organizations can use these insights to optimize stock levels, track demand trends, and improve service delivery.

**Tangible Costs:****1. Development Time (Approximately 90–100 Hours)**

Designing and building the system requires an initial time investment by developers and project stakeholders.

**2. Cloud Hosting and Database Costs**

Hosting the platform on cloud infrastructure involves ongoing expenses for storage, data processing, and server uptime.

**3. Device and Internet Setup for Pharmacies**

Participating pharmacies may need to upgrade or acquire devices and ensure stable internet connectivity to use the system effectively.

**4. Training and Onboarding**

Staff members will need to be trained to use the system. Initial onboarding efforts may include workshops, guides, and support services.



## 5. Maintenance and Support

Regular maintenance will be necessary to address bugs, roll out updates, and provide user support, all of which involve long-term resource allocation.

### c) Operational Feasibility

This section evaluates the practical viability of implementing the MedRadar system within current operational settings.

#### 1. High Likelihood of User Acceptance

MedRadar is designed with the end-user in mind, targeting groups that are not only capable but also motivated to embrace technology for process improvement.

- **Tech-Savvy Users**

The primary users, IUT students, are increasingly familiar with digital tools and platforms, making them well-positioned to adopt new systems quickly and effectively.

- **Pharmacy Staff Seeking Process Optimization**

Many pharmacy teams are actively seeking solutions that reduce manual work and improve accuracy. MedRadar aligns with these goals, increasing the probability of positive reception.

#### 2. Fits into Workflow

Integration into existing processes is key to the success of any new system. MedRadar is designed to complement and enhance current workflows without significant disruption.

- **Simple Dashboards and Live Updates**

The user interface is intuitive, with dashboards that provide real-time updates and actionable information. This enables users to make quick decisions and improves overall efficiency within the pharmacy environment.

- **Process Enhancement**

Rather than replacing current methods outright, MedRadar builds upon them, enhancing tracking, monitoring, and communication across various stakeholders.

### 3. Change Management

Although user acceptance is expected to be high, strategic planning is still required to manage the organizational transition smoothly.

- **Minimal Resistance Expected**

Due to the system's ease of use and alignment with user needs, resistance to adoption is anticipated to be low.

- **Training and Communication**

Successful implementation will require minimal but essential training sessions. Clear communication of the system's benefits and usage will be vital to ensure a seamless transition and sustained user engagement.

### 3. Costs and Benefit Outline:

An effective feasibility assessment must account for both tangible and intangible aspects of implementing a new system. The following outlines the expected benefits and costs quantifiable and qualitative, associated with deploying the MedRadar system.

#### 1. Tangible Benefits

These benefits can be directly measured and are likely to have a visible impact on operations and revenue:

- **Saves Users' Time in Finding Medicines**

The platform streamlines the search process by providing real-time availability of medicines across nearby pharmacies, reducing time spent by users.

- **Faster Emergency Response**

By minimizing delays in locating critical medications, MedRadar improves emergency preparedness and response time, particularly for life-saving drugs.

- **Prevents Sales Loss from Low Visibility**

Pharmacies gain better visibility for their inventory, reducing lost sales opportunities due to a lack of discoverability.

- **Enables Future Data-Driven Insights**

Data collected through the system can be analyzed to reveal purchasing patterns, inventory trends, and customer behavior, enabling smarter decision-making.

- **Generates Revenue through Orders and Sales from Pharmacies**

The platform facilitates direct transactions, increasing pharmacy revenue and potentially opening new revenue streams through subscriptions or partnerships.

## 2. Intangible Benefits

These advantages are harder to measure but equally critical to the platform's long-term success:

- **Builds User Trust in Local Pharmacies**

By ensuring inventory accuracy and timely service, MedRadar helps strengthen the reputation and reliability of small, local pharmacies.

- **Pushes Digital Adoption for Small Businesses**

The platform encourages digital transformation in small pharmacies, enabling them to compete more effectively in a digital-first marketplace.

- **Strengthens Platform Reputation in the Community**

A user-focused, efficient service builds positive brand sentiment, encouraging organic growth through word-of-mouth and community support.

## 3. Tangible Costs

These are the direct, measurable costs involved in developing and maintaining the system:

- **Development Time and Effort**

Initial setup involves substantial programming and design work, particularly in building backend services, APIs, and user interfaces.

- **Domain Registration and Hosting**

Costs include the purchase of a domain name and monthly/annual hosting fees for server infrastructure.

- **Maintenance Time (Debugging and Feature Updates)**

Regular system maintenance is required to fix bugs, ensure performance, and implement new features based on user feedback.

- **Future Server/Hosting Fees**

As the platform scales, increased hosting capacity and database storage will incur higher recurring costs.

#### 4. Intangible Costs

These involve less visible but potentially impactful challenges:

- **Limited Experience with Frameworks and Tech Stacks**

Developers may face a learning curve with newer technologies, which can slow development and increase the likelihood of technical errors early on.

- **Pharmacy Resistance to Digital Shift**

Some pharmacies may be hesitant or unwilling to move away from manual or traditional systems, requiring additional efforts to persuade and train them.

- **Efforts to Keep Inventory Updated**

Ensuring real-time accuracy of stock listings may demand ongoing manual or semi-automated input from pharmacy staff.

- **Data Privacy Concerns**

Users and pharmacies alike may have concerns about how their data is collected, stored, and shared. Addressing these through robust security protocols and transparent policies will be critical.

### 5. High Level Budget Outline:

Category	Description	Estimated Cost
Project Team	Developer hours: Team of 3 contributes to 90+ hrs	\$12,600
	Future hires (scale; 1 part-time dev for 6 months)	\$6000
Hardware	Internet / Power Backup	\$300/year
Software	Domain & Hosting(initial), Future Scaling (AWS/GCP), Google Maps API	\$100/year
Training	5 hours demo-based training per pharmacy (one time)	\$15 per hour per pharmacy staff
Miscellaneous	Legal/Registration and Marketing (initial rollout)	\$100
		\$500