University Of Frontier Technology,Bangladesh

Department of Software Engineering

Integrated Emergency & Healthcare Management System (IEHMS): Design, Feasibility, and Implementation

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LifeSwift

Integrated Emergency & Healthcare Management System (IEHMS)

Abstract

Emergency medical situations require swift and coordinated responses to save lives. This project introduces an **Emergency Medical Support System (EMS)** designed to optimize response times, resource allocation, and service reliability. By integrating **Geographic Information Systems (GIS)** and decision-support models, the system ensures effective coordination among citizens, NGOs, and clinics while minimizing misuse of emergency services. A feasibility study confirms its economic, technical and operational viability, and the phased development plan enables structured implementation. The proposed system not only reduces delays in crisis management but also enhances accountability, efficiency and equity in healthcare delivery during emergencies.

Keywords: Emergency Medical Services, Healthcare Management, GIS, Decision-Support Systems, Crisis Response, System Optimization

1.Problem Analysis and Motivation

Emergency medical situations require timely and efficient intervention to save lives and mitigate the impact of injuries or unwanted serious accidents. This project proposes a system to enhance the ability of an Emergency Medical Service to respond effectively. The goal is to provide a comprehensive, systematic approach to designing and optimizing an **Emergency Medical System(EMS) System**. It also aims to reduce the misuse of emergency services by finding alternative options and community resources for non-emergent patients.

The motivation for this project is to create a robust system that can:

- Provide timely and effective medical assistance during injuries or unwanted serious accidents.
- Ensure the availability of trained human resources and medical supplies.
- Improve response times and patient outcomes in emergencies.

In addition to appointments, patients can request emergency medical services such as:

- Blood (specifying blood group and required quantity)
- Medical equipment (specifying type and amount)
- Human resources (specifying qualification and number of personnel required)
- The system also provides patients with access to authenticated documents so that they can verify the legitimacy of the services and organizations involved.

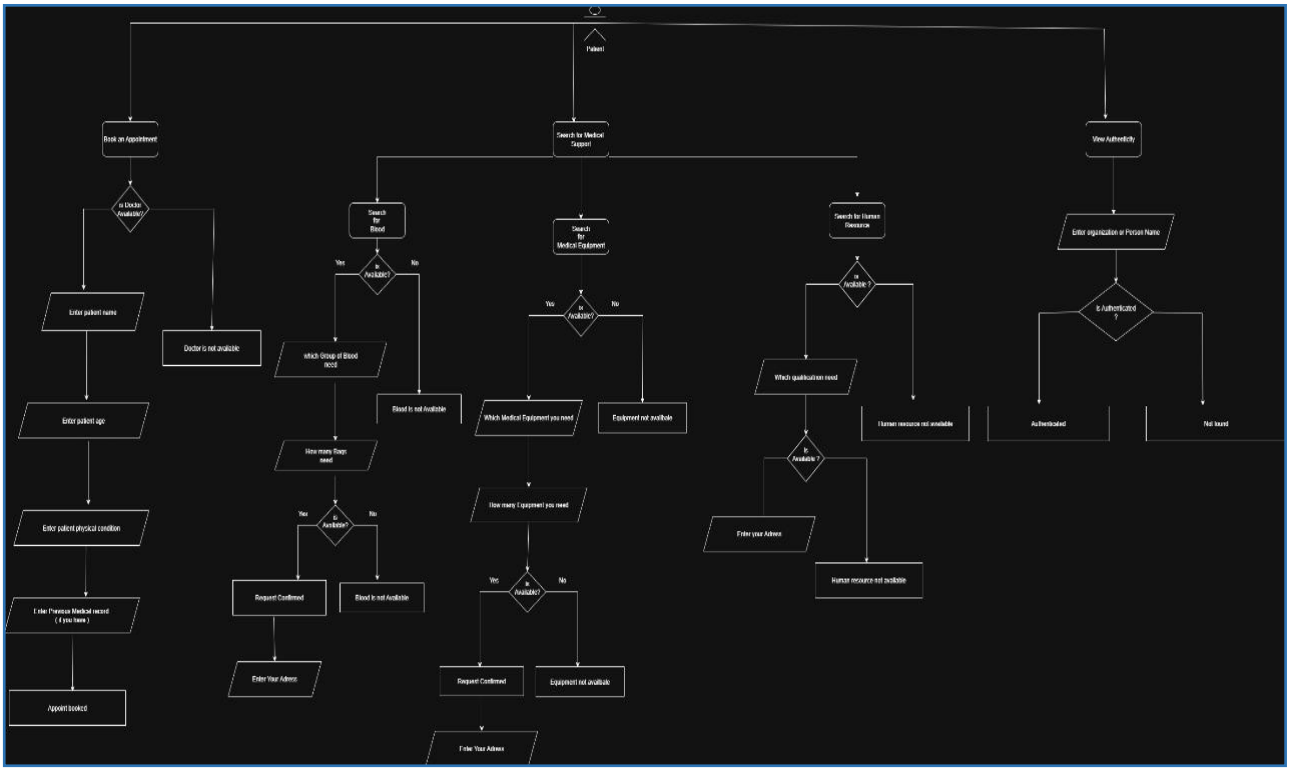
Since medical information is highly sensitive, the system will implement strong security mechanisms. All medical data will be stored in an encrypted form. Patients must be registered in the system to book

appointments or request emergency services. However, checking the authenticity of organizations will not require authentication, ensuring easy verification for all.

2.Literature Review

Various studies highlight that timely medical intervention can prevent a large portion of emergency-related deaths. According to the **British Red Cross,** up to **fifty-nine percent** of injury-related deaths may have been prevented if first aid had been administered before emergency services arrived. Road accidents, fire incidents, and cases of wrong treatment often claim valuable lives, but immediate action can create opportunities to save millions. Research also shows that **Geographic Information Systems (GIS)** and decision-support models play a vital role in improving response times and resource allocation. However, most existing systems lack the ability to handle **integrated multi-resource requests** and authentication features, making them vulnerable to misuse and fraud. This project addresses these gaps by proposing a more comprehensive and reliable **Emergency Medical Support (EMS) system.**

3.Methodology



4.Feasibilty Study

Economic Feasibility

- **Cost Analysis:** * One-time: Initial hardware, software licenses, development, training.
- **Recurring:** Maintenance, subscriptions, personnel.
- **Benefit Analysis:** * Tangible: Increased revenue, reduced costs (e.g., fuel), improved efficiency.
- **Intangible:** Enhanced customer satisfaction, better decision-making.
- **ROI Calculation:** Determine if financial benefits outweigh costs.

Technical Feasibility

- **Technology Assessment:** Evaluate required technology (e.g., **GIS)** and its ability to handle real-time data and compatibility.
- **Resource Availability:** Assess availability of hardware, software, network and specialized skills.
- **Risk Evaluation:** Identify risks like security vulnerabilities, integration challenges and system scalability.

Operational Feasibility

- **Workflow Integration:** Ensure the new system seamlessly fits into current processes without disruption.
- **User Acceptance:** Assess user willingness to adopt the system through factors like training and user-friendliness.
- **Organizational Impact:** Evaluate changes to roles and responsibilities, focusing on automation to reduce human intervention.

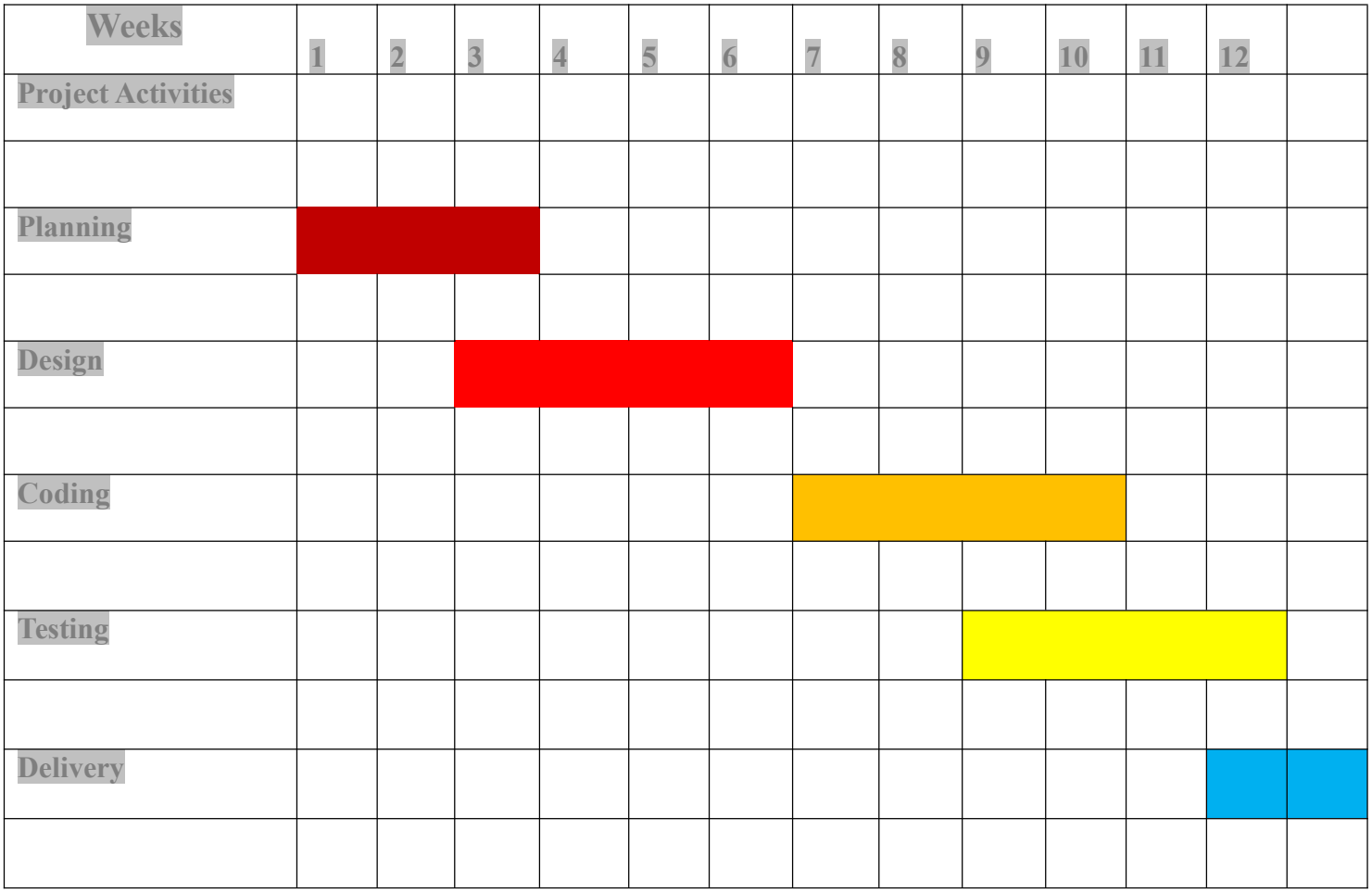
5.Main Phases

Phase	Task	Required Week	Responsible Person
Requirement Collection	Collect functional & non-functional requirements	Week 1	Project Manager / Analyst
Use Case & UML Modeling	Create use cases, UML diagrams (class, sequence, activity)	Week 2	System Analyst / Designer
Database and Backend Design	Design ER diagram, schema, backend logic	Week 3 – 4	Backend Developer / DB Engineer
Frontend Development (Mobile & Web App)	Build web and mobile UI, connect with backend	Week 5 – 7	Frontend Developers
Integration of APIs (Maps, Authentication)	Integrate Google Maps, authentication, third-party APIs	Week 8	Backend Developer / API Specialist
Testing (Unit, Integration, User Testing)	Conduct unit testing, integration testing, and user acceptance testing	Week 9 – 10	QA Engineer / Testers
Deployment Feedback	Deploy to server/app store,	Week 11	DevOps / Project Manager

Phase	Task	Required Week	Responsible Person
	gather user feedback		

6.work plan of the project(Preferably a date inserted grantt chart)

Figure 2 Provides:



7. Budget Details of *Integrated Emergency & Healthcare Management System (IEHMS)*

Project Budget Details

SL.	Criteria	Cost specification	Existing System (tk)	New System (tk)
1	Office Cost	Team meeting	25,000	20,000
		Project meeting	25,000	20,000
		First aid	1,000	500
2	Website Cost	Website maintenance	2,000	1,500
3	Office equipment Cost	Computer	10,00,000	9,50,000
		Laptop	2,00,000	1,50,000
		ATM machine	3,00,000	2,50,000
		CC Camera	1,00,000	1,00,000
4	Salary	Team	2,00,000	2,50,000

SL.	Criteria	Cost specification	Existing System (tk)	New System (tk)		
	Cost	Leader				
		System Designer	80,000	70,000		
		Software Engineer	1,00,000	1,00,000		
		Animator	60,000	60,000		
		Developer	50,000	50,000		
		Officer	40,000	38,000		
		Sentry	10,000	9,000		
	Total cost			21,93,000		20,69,000

8. Conclusion

The **Emergency Medical Support System (LifeSwift)** offers a unified digital platform that connects citizens, NGOs, rescue teams, and clinics for timely emergency care. By ensuring real-time medical resource , volunteer verification and multi-agency coordination, the system reduces delays and ensures reliable medical response during crises. Unlike existing fragmented systems, **LifeSwift** provides **authentic, efficient and trustworthy healthcare services** through direct communication and coordinated action. Importantly, the project directly fulfills the **United Nations Sustainable Development Goals**—by improving healthcare accessibility, promoting community resilience, and ensuring life-saving interventions in critical moments.

Thus, this initiative not only strengthens **Bangladesh's emergency healthcare** infrastructure but also builds a sustainable, future-ready model that fulfills **SDG** goals **100%**.

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[2] M. Aboueljinane, E. Sahin, and Z. Jemai, "A review on simulation models applied to emergency medical service operations," *Computers & Industrial Engineering*, vol. 66, no. 4, pp. 734–750, Dec. 2013.

Credit -

1. **Idea -** Sifat **+** Fahim
2. **Abstract -** Maha
3. **Problem Analysis -** Maha **+** Sifat **+** Fahim
4. **Literature -** Maha **+** Sifat **+** Fahim
5. **Methodology -** Fahim
6. **Feasibility study -** Sifat **+** Maha **+** Fahim
7. **Budget -** Sifat **+** Maha
8. **Conclusion -** Maha
9. **Reference -** Sifat