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SMART EMERGENCY WRISTBAND FOR INSTANT MEDICAL ASSISTANCE

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Abstract:

Keywords: Collects Patient information, Instant Medical Assistance for Patient

INTRODUCTION:

The wristband is equipped with a range of sensors capable of continuously monitoring critical health parameters such as heart rate, body temperature, blood oxygen levels, and motion. Using these inputs, the device can detect early signs of health deterioration, sudden falls, or prolonged inactivity. In such events, the wristband immediately triggers an emergency alert system. This alert includes the user's real-time location (via GPS) and health data, which is sent to designated emergency contacts and nearby healthcare services through wireless communication technologies such as Bluetooth, Wi-Fi, or cellular networks. A key feature of the device is its automatic response mechanism, which eliminates the need for manual intervention in an emergency. For example, if the user becomes unconscious or is unable to call for help, the wristband's algorithms recognize the critical condition and send out alerts autonomously. This rapid response can significantly reduce the time it takes for medical professionals or caregivers to act, potentially saving lives. Additionally, the wristband can be linked to a cloud-based platform where historical health data is stored and accessible to authorized medical personnel for monitoring and diagnosis.

LITERATURE REVIEW / RELATED WORK

The concept of a **Smart Emergency Wristband for Instant Medical Assistance** builds upon ongoing advancements in wearable health monitoring, IoT-based emergency response, and mobile health technologies. The reviewed literature shows a clear need and potential for a holistic, wrist-worn system that can detect critical health events, share real-time location, and instantly notify emergency responders or caregivers. Your project has the opportunity to fill existing gaps by creating a more integrated, reliable, and accessible solution.

SYSTEM DESIGN

Architecture Diagram

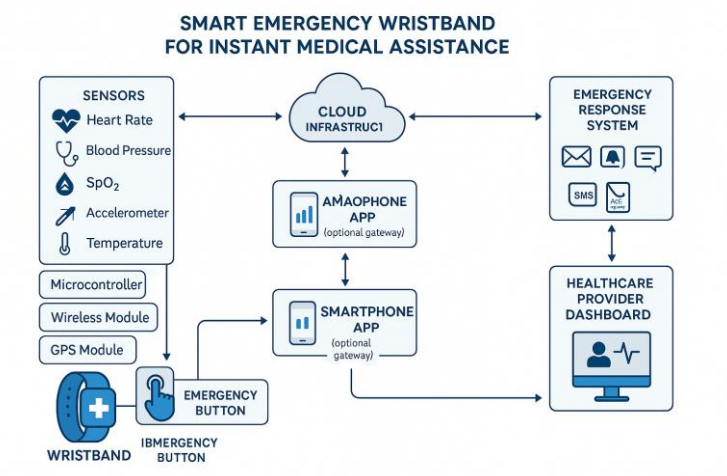


Figure 3.1: Architecture Diagram

Data Flow Diagram (DFD)

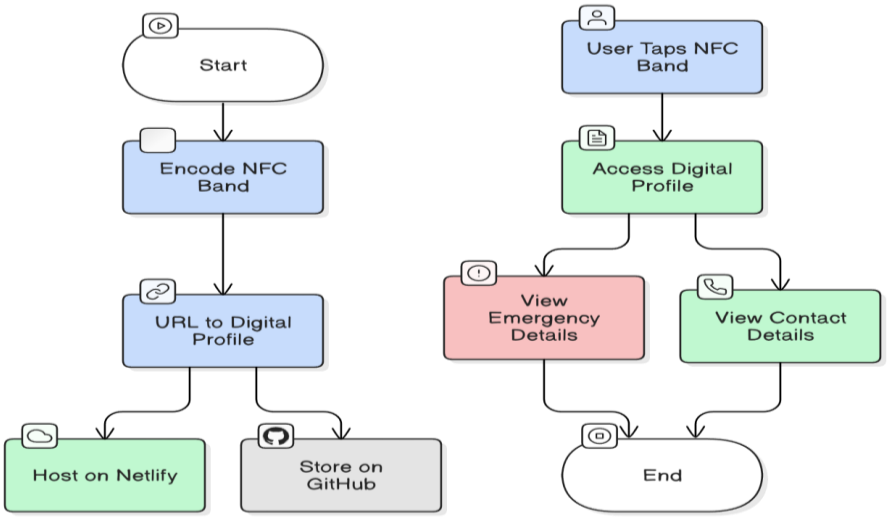


Figure 3.2: Data Flow Diagram

Use Case Diagrams

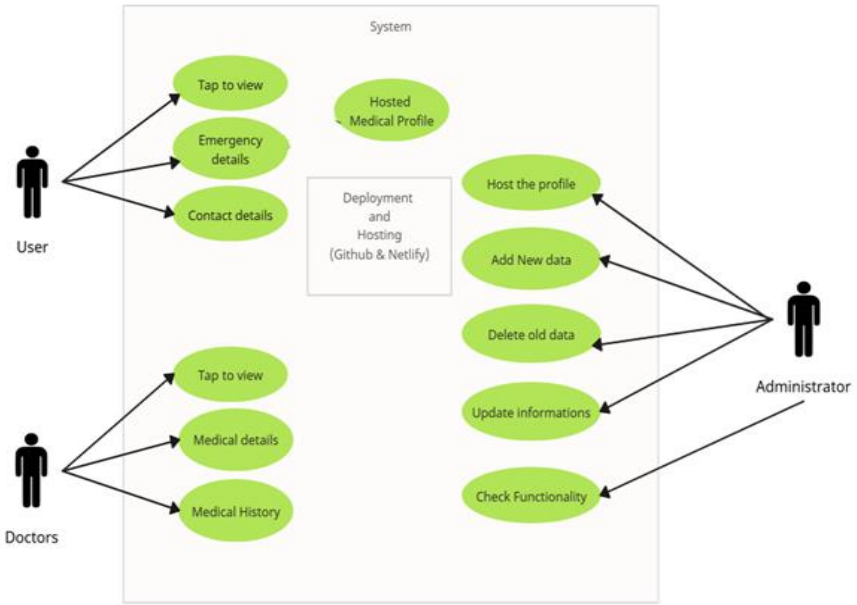


Figure 3.3: Use Case Diagram

Sequence Diagram

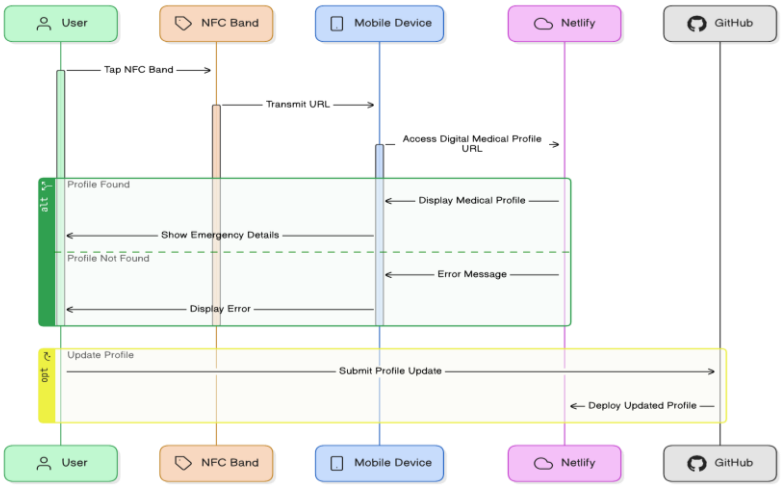


Figure 3.4: Sequence Diagram

Collaboration Diagram

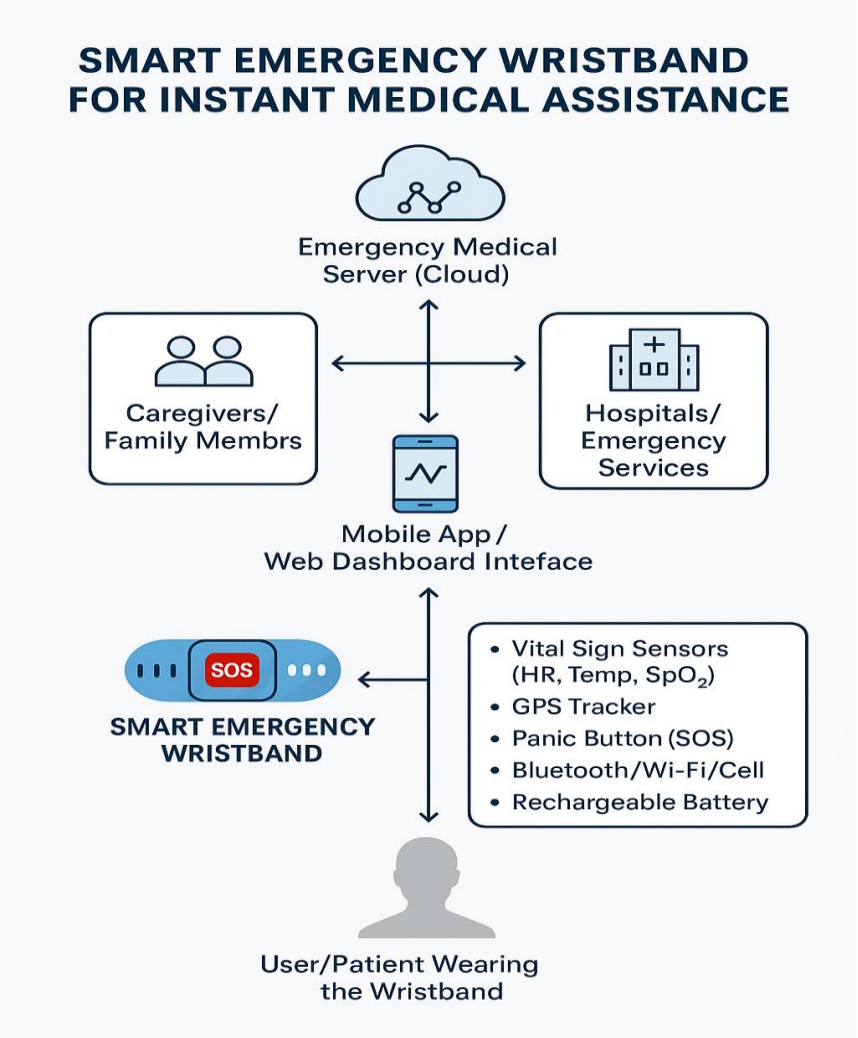


Figure 3.5: Collaborative Diagram

Database Design

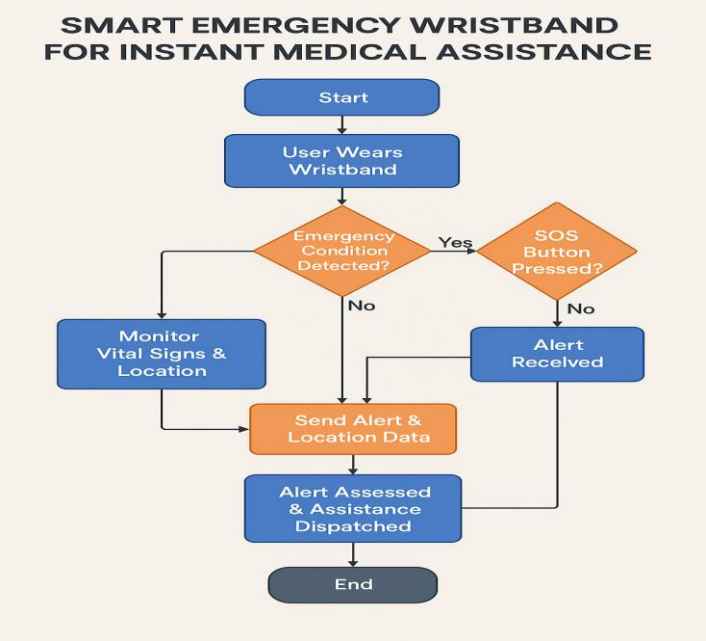


Figure 3.6: Database Diagram

RESEARCH METHODOLOGY

This project follows an applied research design aimed at solving real-world medical emergencies by developing a smart wearable device. The methodology integrates both quantitative and qualitative approaches, combining sensor data collection with user feedback and system testing. This study uses an applied and experimental research approach to develop and test a smart wristband that can detect medical emergencies like abnormal heart rate, falls, or when a user presses an SOS button.

TESTING AND RESULTS

Testing

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub – assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring**.** Software system meets its requirements and user expectations and does not fail in an unacceptable manner.There are various types of test. Each test type addresses a specific testing requirement.

Types of Testing Performed

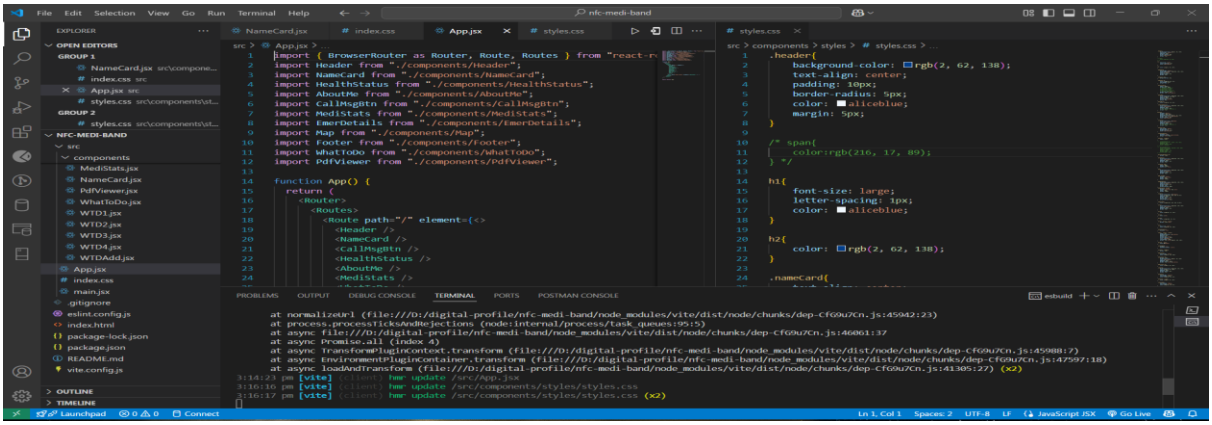
- ***Unit Testing:*** Tested individual components in isolation.
- ***Integration Testing:*** Verified interactions between different modules.
- ***Functional Testing:*** Validated the complete application against specified requirements.

Case No.	Scenario	Sr. No.	Action	Expected Output	Actual Output	Result
1	NFC Tag Scanning	A	User scans an invalid NFC tag	Message: "Invalid NFC tag detected"	Message: "Invalid NFC tag detected"	PASS
		B	User scans a valid NFC tag	Display patient details on screen	Display patient details on screen	PASS
		C	NFC tag is damaged or unreadable	Message: "Error reading NFC tag"	Message: "Error reading NFC tag"	PASS

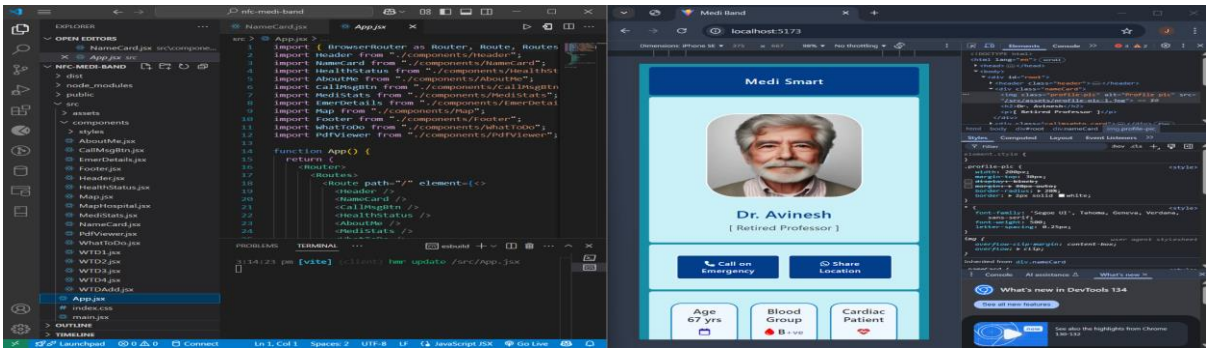
2	**Medical Record Access**	**A**	**User tries to access medical records without scanning NFC**	**Message: "Please scan NFC tag to proceed"**	**Message: "Please scan NFC tag to proceed"**	**PASS**
		B	**User accesses medical details after scanning NFC**	**Display medical history & vitals**	**Display medical history & vitals**	**PASS**
		C	**System fails to fetch medical data**	**Message: "Data unavailable, try again later"**	**Message: "Data unavailable, try again later"**	**PASS**
3	**Emergency Contact Retrieval**	A	User clicks on "Emergency Contact" button without NFC tag	Message: "Please scan NFC tag first"	Message: "Please scan NFC tag first"	PASS
		B	User clicks on "Emergency Contact" button after scanning NFC tag	Display emergency contact details	Display emergency contact details	PASS
4	**Download Medical Report**	A	User clicks on "Download Report"	Medical report downloads successfully	Medical report downloads successfully	PASS
		B	User tries to download report without scanning NFC	Message: "Scan NFC to access report"	Message: "Scan NFC to access report"	PASS
5	**Security & Access**	A	Unauthorized user tries to access private data	Message: "Access Denied"	Message: "Access Denied"	PASS
		B	Authorized user accesses data via NFC tag	Patient details are displayed	Patient details are displayed	PASS

Table 5.1: Sample Test Cases

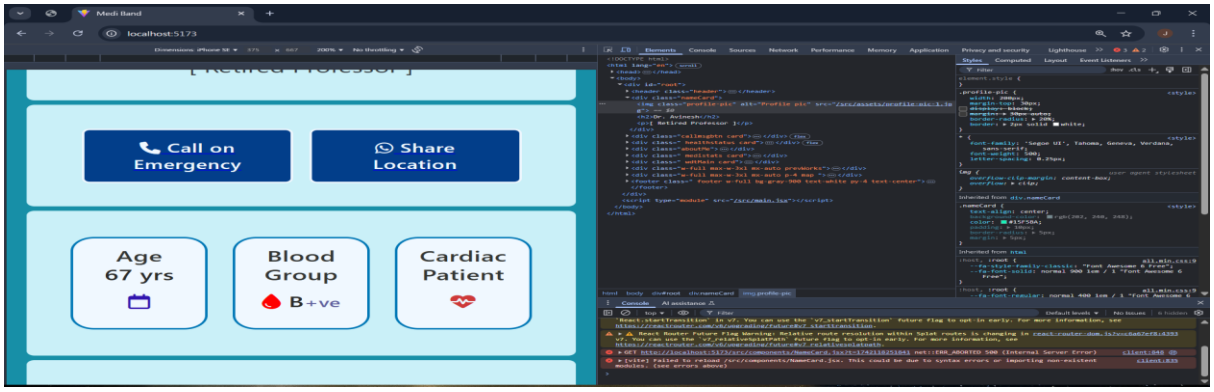
VI.SCREENSHOTS:



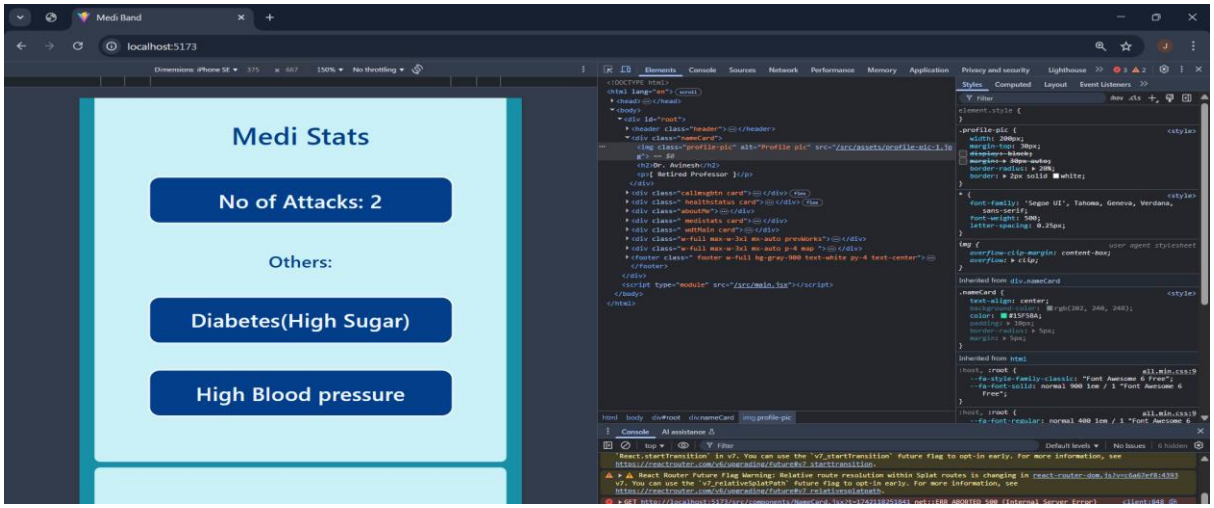
Project file in VS Code



Running project in localhost



Basic details and contact buttons



Medical stats of the person

VII.CONCLUSION

The NFC-based Medical Band is a promising solution aimed at enhancing healthcare accessibility and patient record management. The system offers an efficient and cost-effective way to store and retrieve medical information instantly, eliminating the need for paper-based documentation. With its simple and user-friendly design, it ensures that patients receive timely and accurate medical care. During the development process, the main objective was to create an intuitive system that can function without the need for complex installations or databases. The implementation of React.js for the frontend has provided a seamless and interactive user experience, while NFC technology has enabled quick and hassle-free data retrieval. Although the current system has some limitations, future enhancements such as cloud integration, biometric security, and real-time health tracking can significantly improve its functionality. Overall, this project is a step toward modernizing healthcare solutions and ensuring that patients receive the best possible medical attention with minimal delays.

VII.FUTURE ENHANCEMENTS

- Multilingual Support: The system can be designed to support multiple languages, making it accessible to users worldwide, especially in hospitals or clinics serving diverse populations.
- Biometric Authentication: To improve security, fingerprint or facial recognition can be implemented, ensuring that only authorized personnel access sensitive medical data.
- AI-Powered Insights: Machine learning algorithms can be used to analyze patient data, predict potential health risks, and provide recommendations for better healthcare management.
- Expanded NFC Functionality: NFC technology can be further utilized to grant access to hospital rooms, authorize medicine prescriptions, or even schedule automatic medical appointments.

XI.REFERENCES :

Books Referred:

1. "Near Field Communication: From Theory to Practice" – by Stefan Krug
2. "React.js Essentials" – by Artemij Fedosejev

Web Links:

1. NFC Forum (https://nfc-forum.org/) – Official NFC technology standards and updates
2. React.js Documentation (https://react.dev/) – Official documentation for React.js
3. Medical IoT and Wearable Devices (https://www.medicalwearables.com/) – Information on NFC and IoT in healthcare