Agentic Hackathon

TEAM AMBUNEXUS

AMBUNEXUS: A Smart Ambulance System

TEAM MEMBERS:

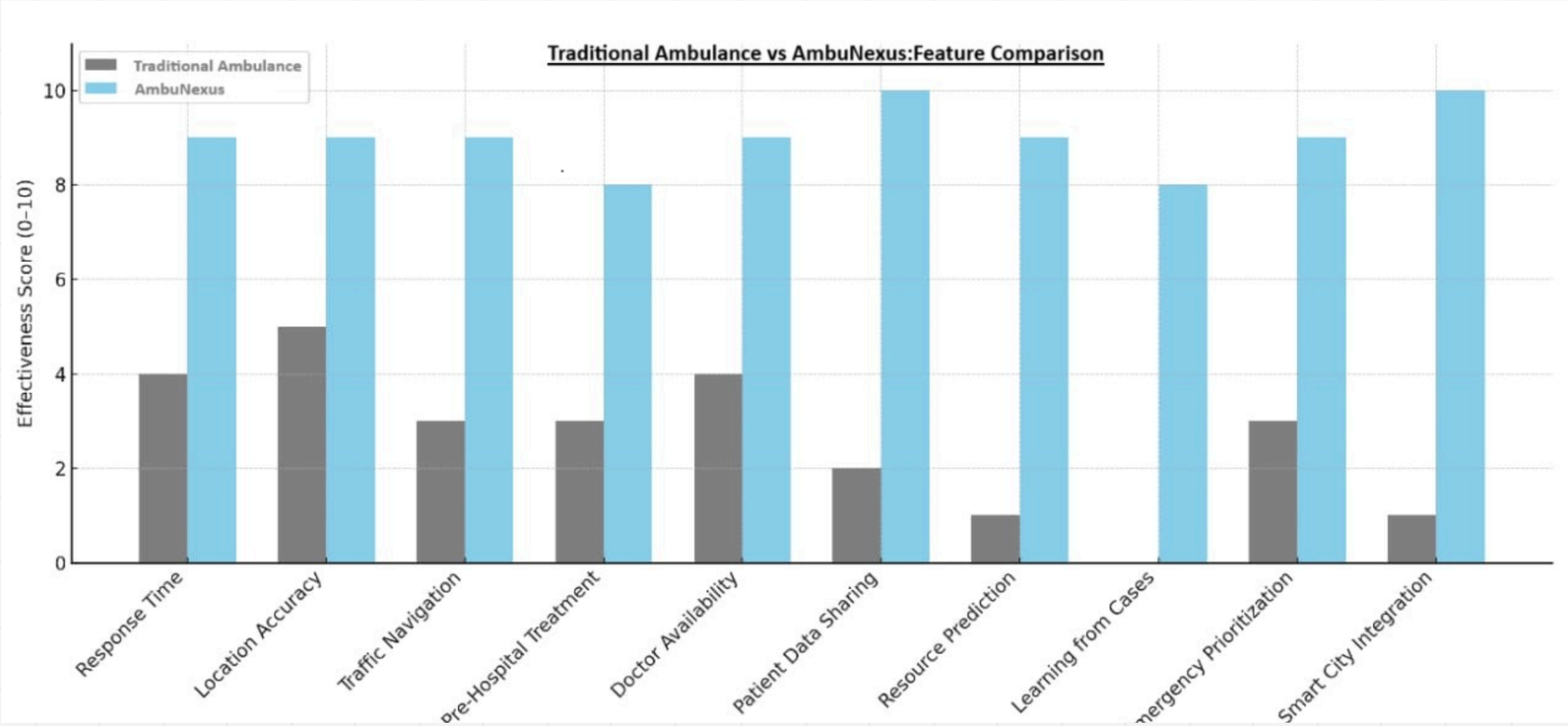
1.Jeslin Santeena Jeyasuresh(IT)

2.Lijo Felix(IT-B)

3.Narmadhadevi(IT-B)

Idea Title

- Ambulance services worldwide are critically undermined by unpredictable vehicle breakdowns, gridlocked roads, and inadequate patient-hospital coordination. This not only delays emergency response, but also poses serious harm to patients and strains healthcare resources.
- Introducing our AI-driven Smart Ambulance System–a transformational solution featuring predictive maintenance, dynamic traffic-aware routing with signal control, and real-time patient-data streaming–designed to keep ambulances operational, expedite arrival times, and ensure hospitals are fully prepared."



TECHNICAL APPROACH

Predictive Maintenance with AI/ML:

Onboard sensors continuously monitor engine, brakes, battery, and tire conditions.

Time-series ML models (e.g., CNN-LSTM, Isolation forest) run on the edge to detect deviations and predict failures before they occur

Dynamic Route Optimization & Traffic Signal Control:

- Real-time traffic data feeds into AI routing engines (e.g., via APIs like NextBillion.ai) to calculate the fastest path.
- Signal preemption systems override traffic lights–using V2X or acoustic sensors–to green-light the ambulance .

Real-Time Patient Data Streaming (FHIR-Compatible):

- Patient vitals (ECG, SpO_2, etc.) are captured and transformed into FHIR Observation resources on the edge.
- These are streamed to cloud-hosted FHIR endpoints for hospital integrations, enabling clinicians to prepare in real-time

Business Analytics for AmbuNexus

Use Case

- The system addresses issues with unpredictable vehicle breakdowns, traffic congestion, and inadequate patient-hospital coordination that cause emergency response delays.
- The solution is an AI-driven smart ambulance system that uses predictive maintenance, dynamic routing, and real-time patient data streaming to keep ambulances operational and expedite arrival times.
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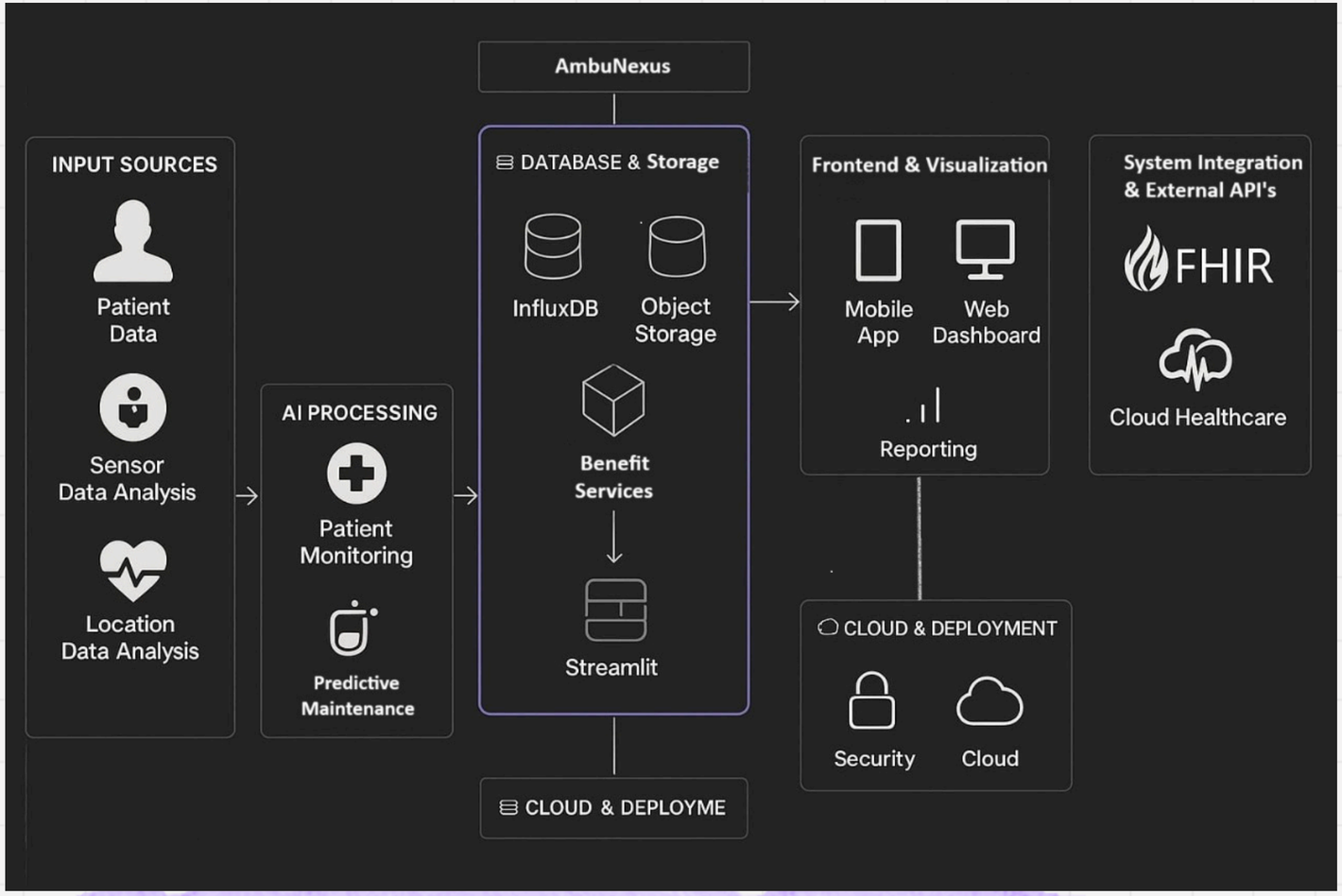
Potential Market Impact

- Increased fleet Availability: Predictive maintenance reduces unexpected breakdowns and keeps more ambulances ready for service.
- Faster Emergency Response: Dynamic routing and signal preemption can reduce travel time by up to 20%.
- Lower Operational Costs: Anticipating maintenance needs and optimizing routes can lower repair, fuel, and other expenses by 25-30%.
- Enhanced Patient Outcomes: Real-time patient monitoring enables earlier detection of deterioration, potentially increasing survival rates by 5-10%.

Scalability

- The solution is technically proven, with similar AI telematics systems achieving nearly 99% uptime in ambulance fleets.
- The system is designed with a cloud and deployment architecture, suggesting a scalable model with a web dashboard and mobile app.

workflow:



tech stacks:

AI/ML Models: AI/ML , CNN-LSTM , Isolation Forestt

Databases & Storage: InfluxDB , Object Storage

APIs & Integration: NextBillion.ai , FHIR , Cloud Healthcare

Frontend & Frameworks: Streamlit

youtube link:

part-1:https://youtu.be/1nedNJZCEAk

part-2;https://youtu.be/Km3N6-Srglo

part-3:https://youtu.be/rXwhMDpgHvM?si=D-QMyqg0ezKa3l_x