Agentic Hackathon

TEAM AMBUNEXUS

AMBUNEXUS: A Smart Ambulance System

TEAM MEMBERS:

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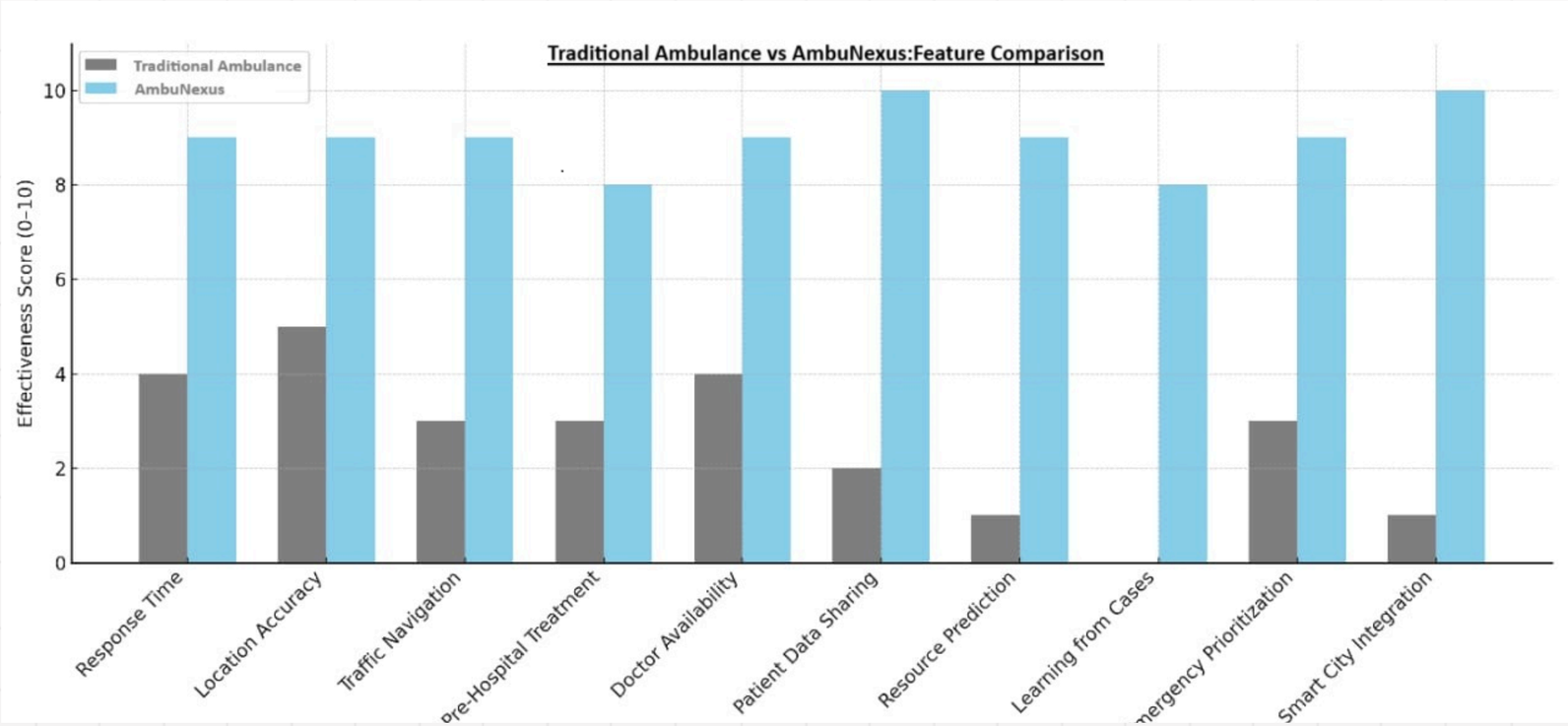
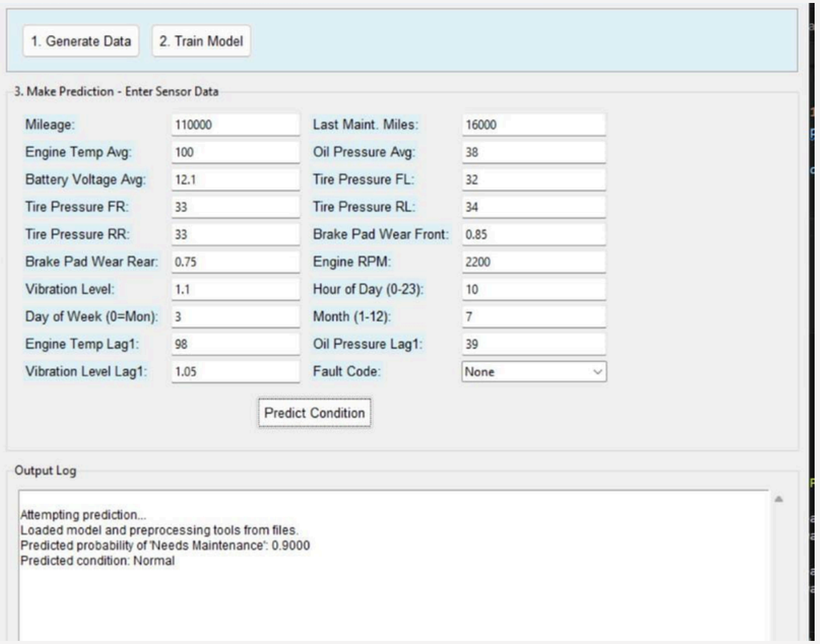
Problem statement

- 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."

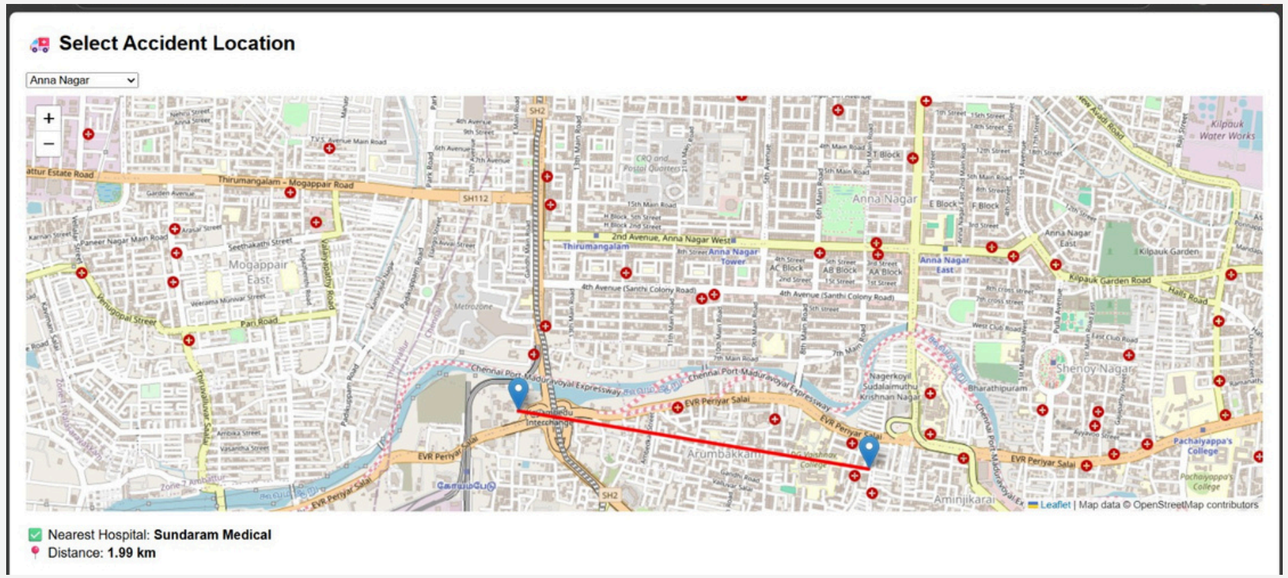


Prototype Overview

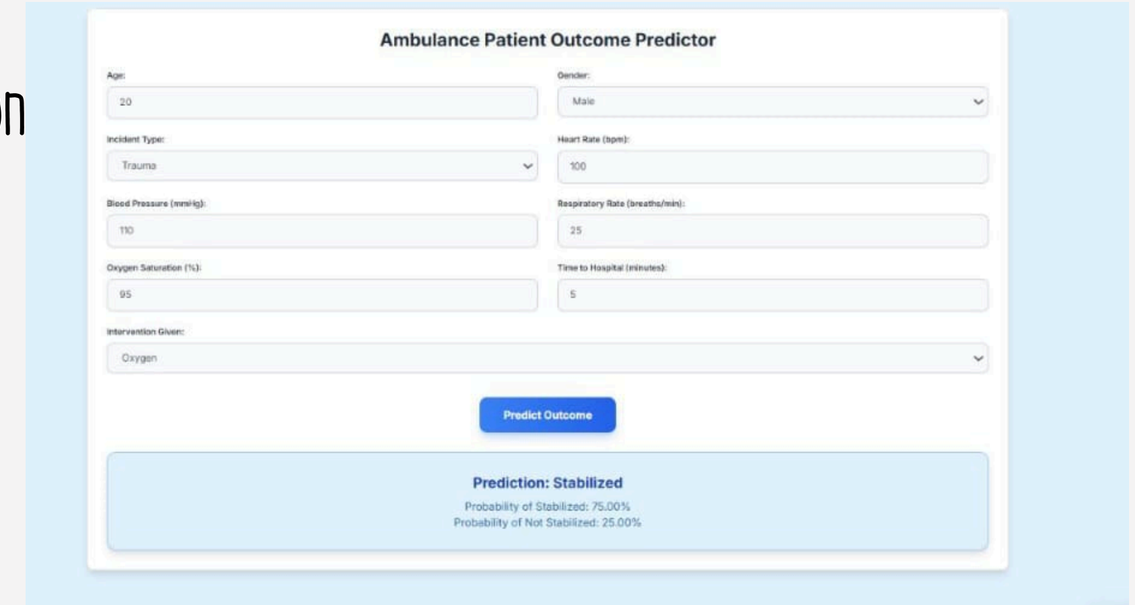
1)Vehicle failure Predictive Maintenance



2)Route optimization for the ambulance



3)Patient outcome prediction



Business Analytics

AmbuNexus – Business Value Proposition

Prevents Ambulance Downtime

AI-based predictive maintenance reduces breakdowns by up to 30%, increasing ambulance reliability and availability.

Cuts Response Time

Real-time traffic-aware routing and smart signal override reduce arrival time by up to 40%, saving lives during golden hour.

Enables Hospital Readiness

Vital signs like ECG & SpO_2 are streamed to hospitals before arrival, allowing doctors to prepare in advance.

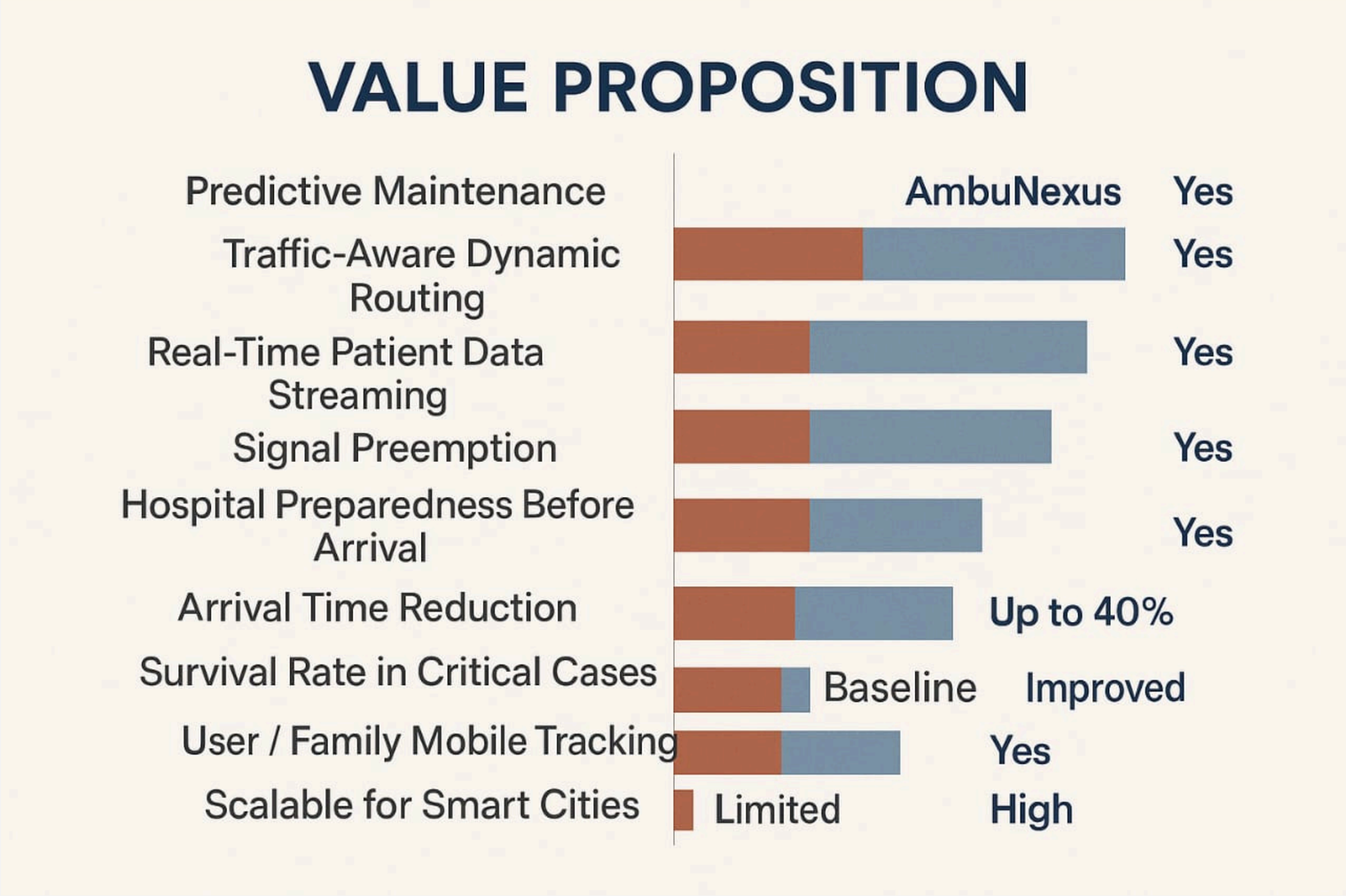
Scalable & Cost-Efficient

Easy integration with existing hospital, traffic, and ambulance systems using APIs and cloud infrastructure.

High Impact, Low Overhead

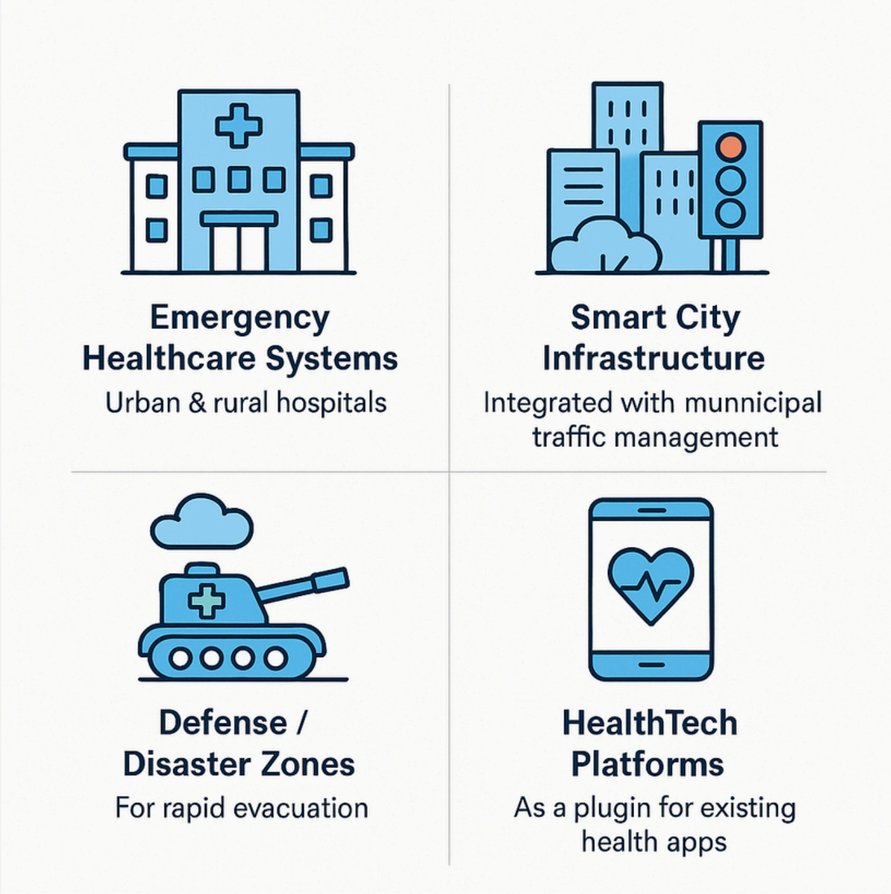
Uses open healthcare standards (FHIR), making it low-cost to scale across cities, hospitals, and private fleets.

Value Proposition



Fields of Application

- Emergency Healthcare Systems - Urban & rural hospitals
- Smart City Infrastructure - Integrated with municipal traffic management
- Defense / Disaster Zones - for rapid evacuation
- Private Ambulance Services - To gain competitive edge
- HealthTech Platforms - As a plugin for existing health apps



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

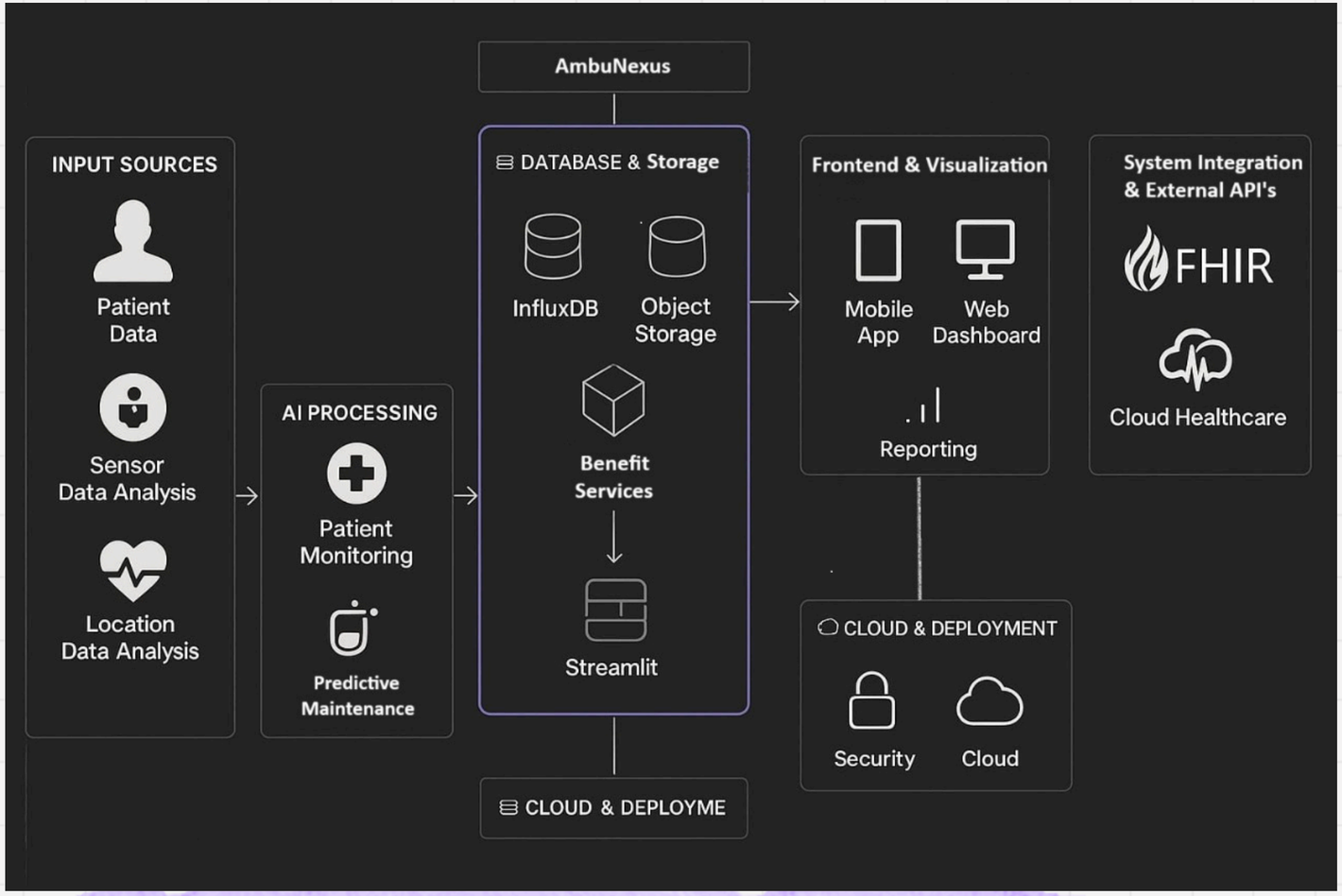
Dynamic Route Optimization & Traffic Signal Control:

- 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

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

Future Scope

- AI-based traffic prediction
- Integration with police/fire emergency systems
- Mobile App for users/families to track ambulance
- Machine Learning for real-time hospital bed availability
- Partnership with city governments and health networks