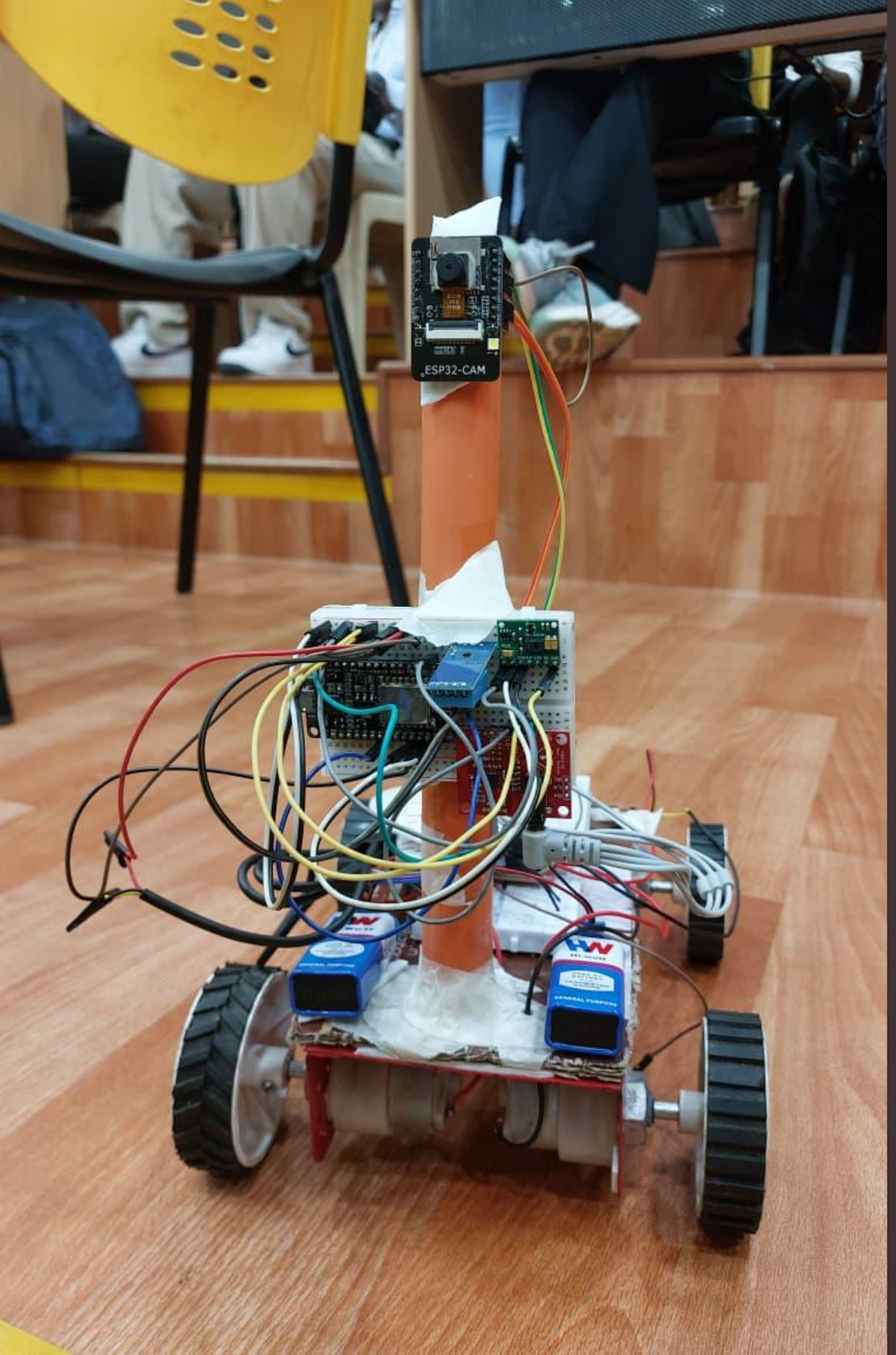

AI Powered Health Assistant for Assistant for remote patient patient supervision

InnovAct 2025 Hackathon

IoT Track

Team: VitalEyes | Yukti ID: IR2025-996023

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What are the issues we are trying to address?

In overcrowded hospitals, rural areas, or disaster zones, patients often lack timely medical attention and continuous monitoring.

1

Limited Physical Presence

Doctors and caregivers cannot always be physically present for continuous patient oversight.

2

Incomplete Monitoring

Traditional systems overlook the critical emotional and mental states, focusing only on physical vitals.

3

Accessibility Gap

A significant need exists for a low-cost, cost, mobile, and intelligent system that that can autonomously reach and monitor patients.

Introducing the Health Assistance Rover

Our solution is a compact, autonomous rover designed to revolutionize patient monitoring. Equipped with advanced biosensors and an AI-powered camera, it provides comprehensive health insights, ensuring no patient is overlooked.

- **Biosensor Integration**

  Monitors heart rate, SpO2, temperature, and ECG with precision.

- **Emotional Analysis**

  Mounted camera uses AI to detect and interpret patient emotional states.

- **Web Dashboard Access**

  Real-time data visualization for patients and doctors, accessible anywhere.

- **AI-Driven Insights**

  Analyzes vital trends and provides proactive recommendations for care.

Our Technical Blueprint

Hardware Components

Rover Mobility & Control

Motor driver & ESP32 for robust navigation.

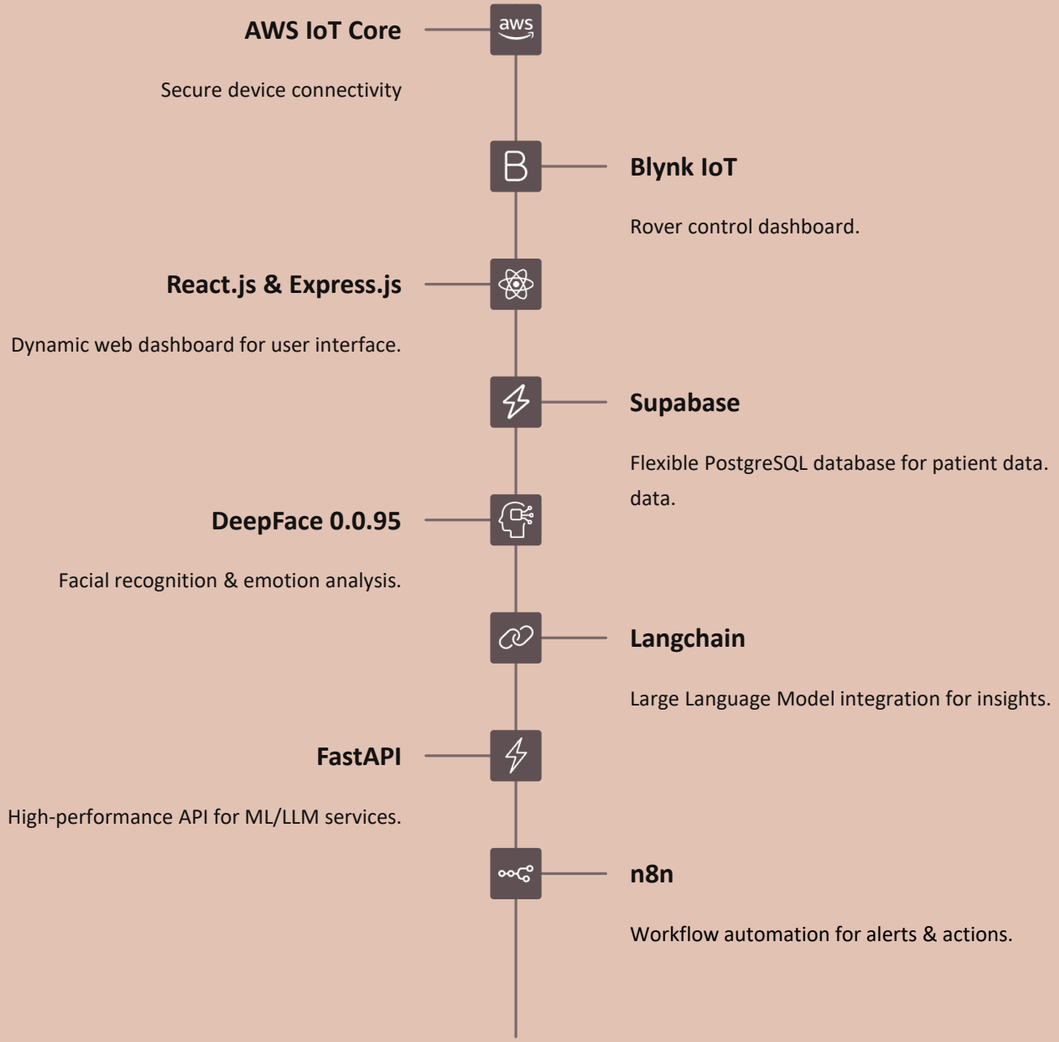
Vital Sign Acquisition

MAX30100 (SpO2/HR), DHT11 (Temp), Body Temp Sensor for comprehensive data.

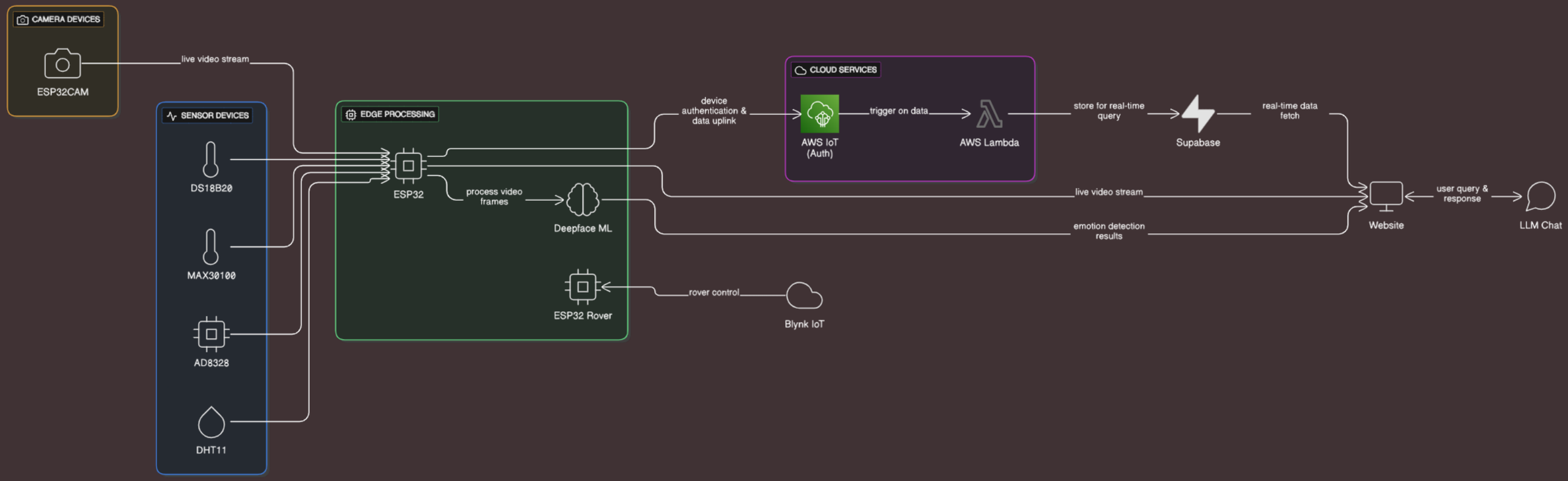
Visual & Auxiliary

ESP32-CAM for emotional analysis, AD3282 for ECG, and breadboard for prototyping.

Software & Platforms



Architecture Diagram



Prototype in Action

Our working prototype demonstrates the seamless integration of hardware and software, bringing autonomous patient monitoring to life. monitoring to life.

Autonomous Navigation

The rover adeptly navigates navigates diverse indoor environments, reaching patients when and where needed.

Real-time Data Capture

Sensors provide immediate, immediate, accurate readings of vitals, updated updated constantly on the the dashboard.

AI-Powered Emotion Emotion Detection

The camera accurately identifies emotional states, states, providing crucial psychological context.

Intuitive Web Interface

The dashboard presents complex data simply, enabling quick insights for caregivers.

Transformative Impact & Broad Applications

Our project addresses the surging demand for remote healthcare, elderly care, and disaster response. It's a low-cost, mobile, and intelligent solution poised to redefine patient monitoring.

- **Patient Outcomes**

  Improves care quality through continuous, comprehensive monitoring.

- **Caregiver Support**

  Reduces workload by providing autonomous assistance and real-time alerts.

- **Accessibility**

  Extends care to remote areas and overcrowded facilities.

What hurdles did we overcome?

Sensor Integration Complexity

Integrating diverse biosensors (ECG, (ECG, SpO2, Temperature) for accurate, simultaneous data presented significant hardware challenges.

Solution: Implementation of interrupts to remove interference of I2C sensors

Data Security

Ensuring safe low-latency data transmission from the rover to the cloud and dashboard was crucial for live monitoring.

Solution: Optimized data protocols protocols and efficient cloud infrastructure (AWS IoT Core) for minimal delay.

Emotional AI Accuracy

Achieving reliable emotion detection detection from a mobile camera, especially in varied lighting conditions, was a key hurdle.

Solution: Extensive training with diverse datasets and fine-tuning DeepFace models for robust performance.

What does the Future hold?

1 Implementation of rPPG model

Remote Photoplethysmography model can be used for detecting blood pressure using OpenCV

2 Usage of Industry-level Sensors

It will help us get more fine-tuned and accurate values from the sensors

3 Autonomous Navigation

Implementing obstacle and object detection to allow the bot to move automatically automatically and tend to patients without human intervention

Conclusion

Our solution is designed for continuous evolution, with clear pathways for enhancement and expansion:

Remote Patient Health Supervision

Doctors can access patient vitals remotely

Secure Data Transmission

Usage of AWS IoT to deal with safety issues

Enhanced Mobility & Navigation

Rover movement control from Blynk IoT web dashboard

AI Insights

AI powered emotion detection and recommendations based on analysis of health parameters

Acknowledgements

We extend our deepest gratitude to those who supported our journey.

Our Dedicated Team

- Ayush Jaiswal (Hardware Engineer) - 23BEC0204
- Saunok Roy (Fullstack Dev) - 23BEC0255
- Avanthika Hegde(ML Engineer) - 23BCB0069
- Aarush Lenka (Design & Automation) - 23BEC0325