

IoT Platform for Real-Time Monitoring & AI Assistance

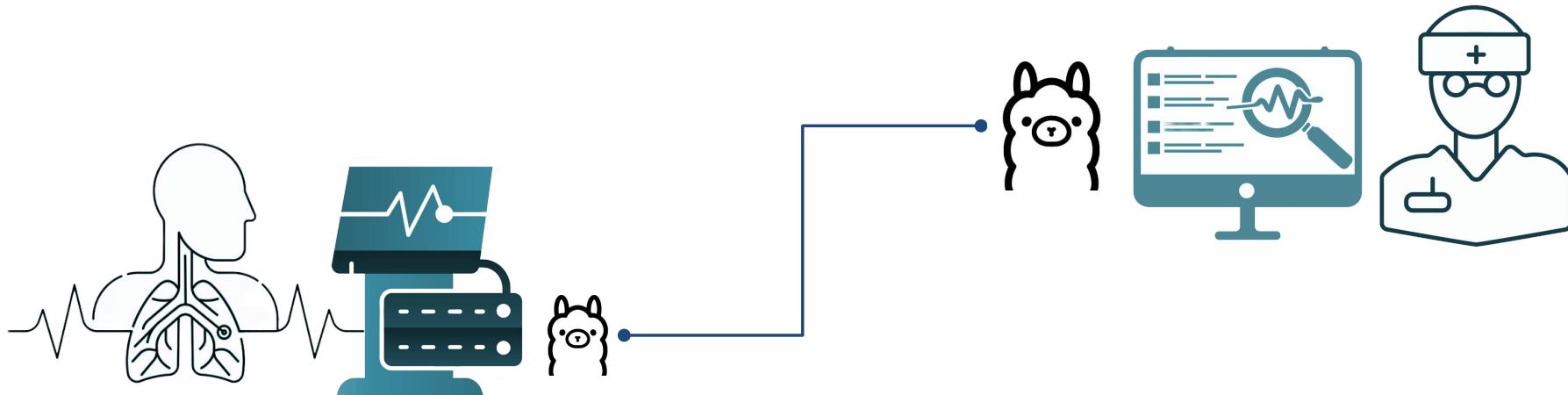
From Sensors to Assistant - An Unified Health Monitoring Solution

Acossi Giorgio - Castagna Marco

A Smarter Way to Monitor and Assist

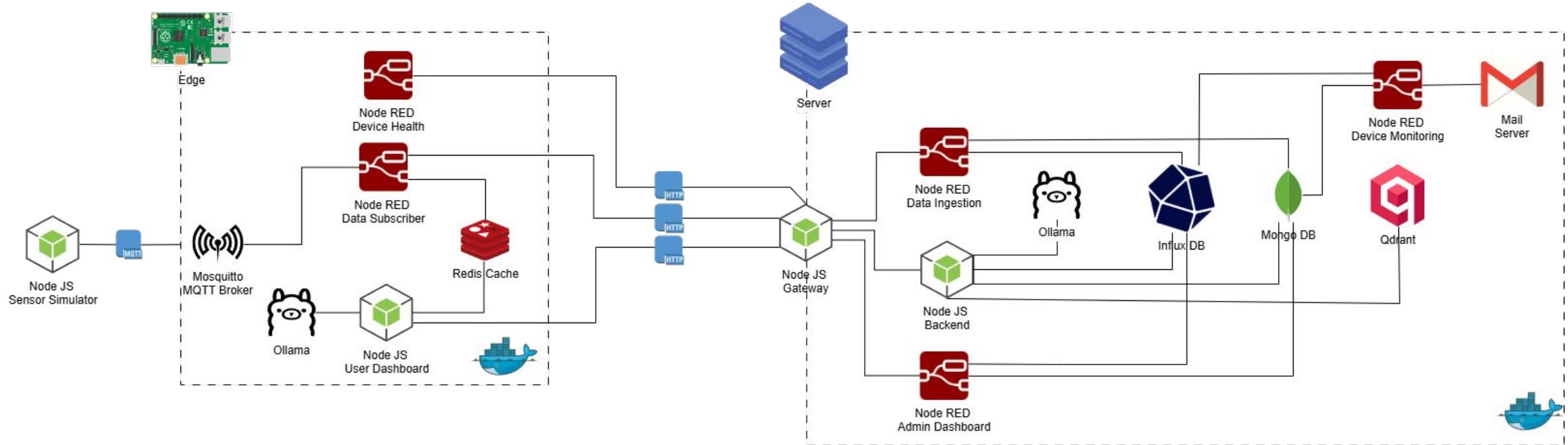
This **platform** acts as a bridge between patients, sensors, and clinicians. It continuously monitors **vital signs** and makes **remote supervision** easier and more reliable for medical experts.

It also provides intuitive **dashboards** and an **AI assistant** capable of interpreting the data, explaining what is happening, and suggesting the most appropriate actions to the patient.

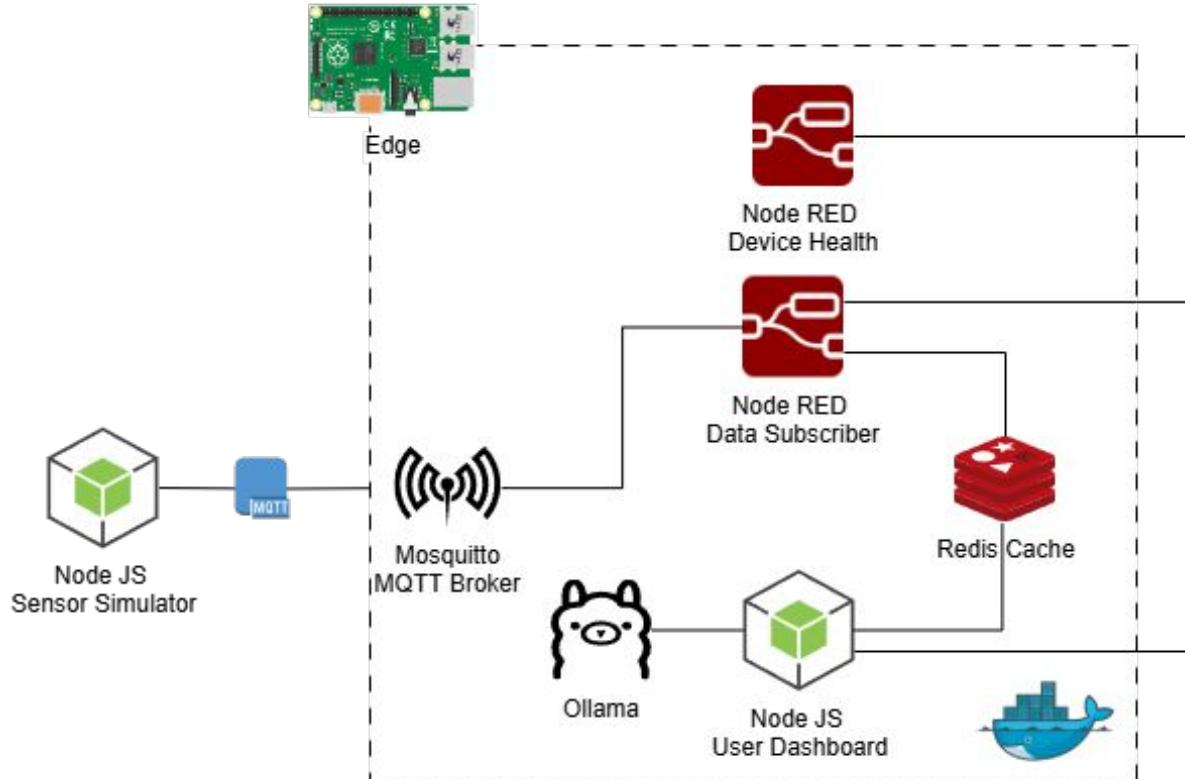


Architecture

Hybrid Approach



Edge Architecture Overview



Data Acquisition

- Sensor simulator
- MQTT broker for edge-level data ingestion

Data Processing & Monitoring

- Device health flow
- Data subscriber flow
- Redis cache for local data storage
- Patient vitals dashboard

AI Assistance

- AI Assistant Chat
- Edge LLM for local filtering and safety

Cloud Architecture Overview

Data Storage

- Time-series storage - InfluxDB
- Application data database - MongoDB
- Vector search index - Qdrant

Data Processing Flows

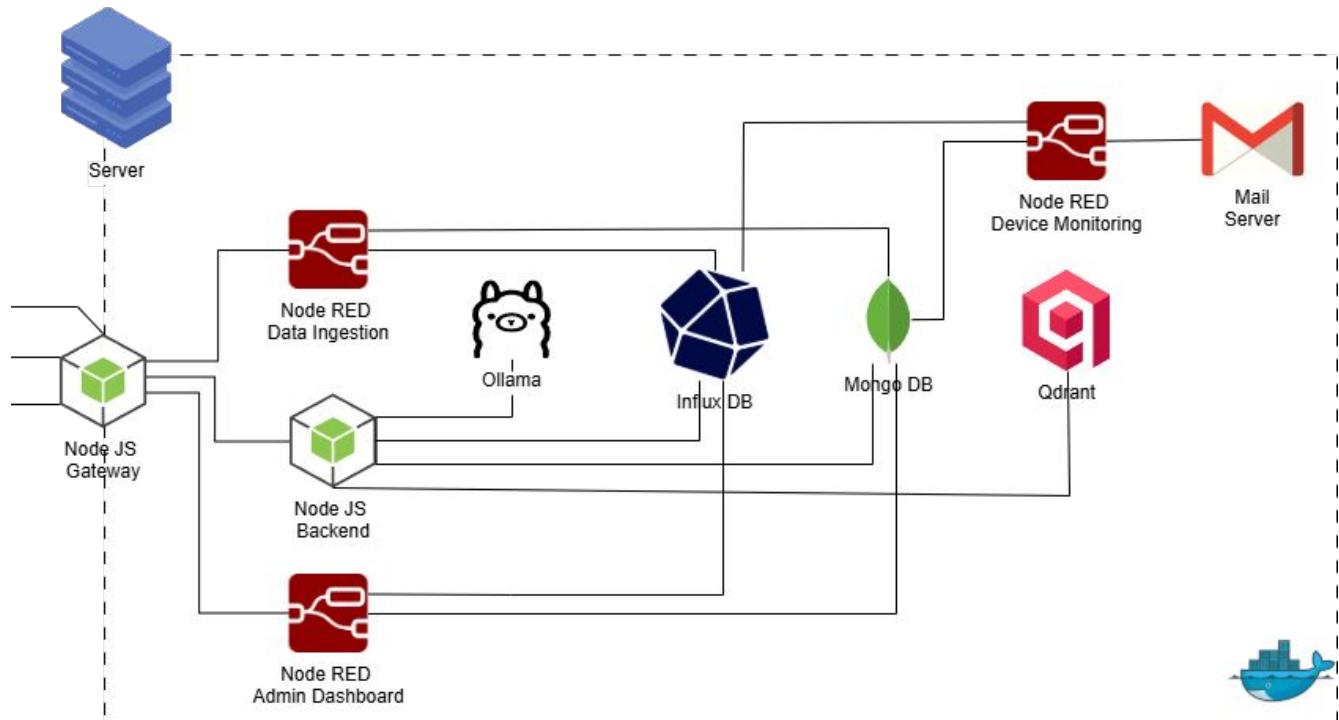
- Data ingestion flow
- Device monitoring flow
- Mail Server for notifications

Dashboards & APIs

- API Gateway and auth
- API Backend
- Admin dashboard

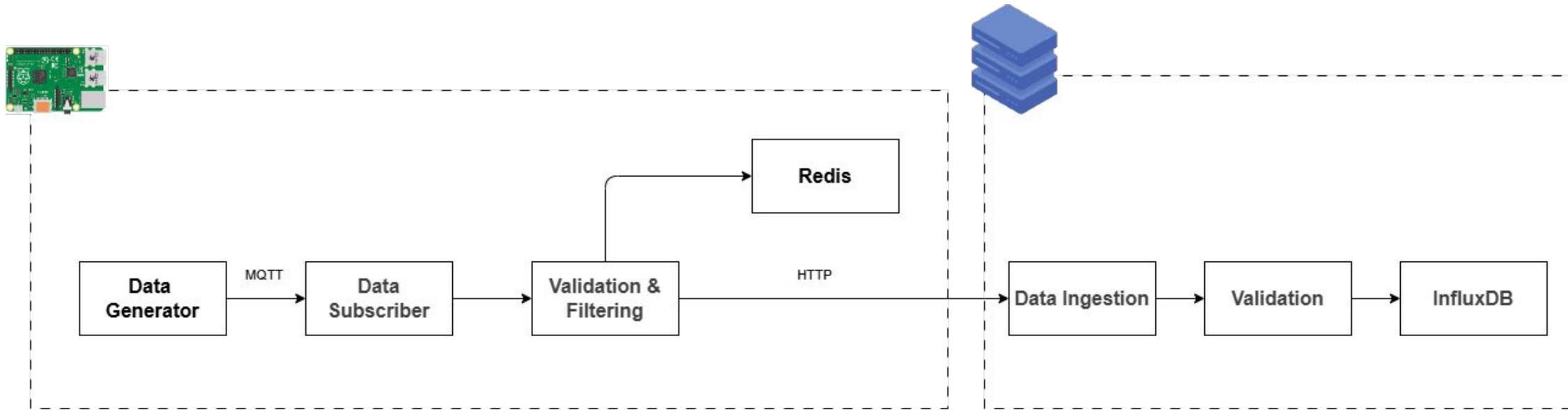
AI Assistant

- Chat (RAG) Pipeline
- Data Analytics Pipeline



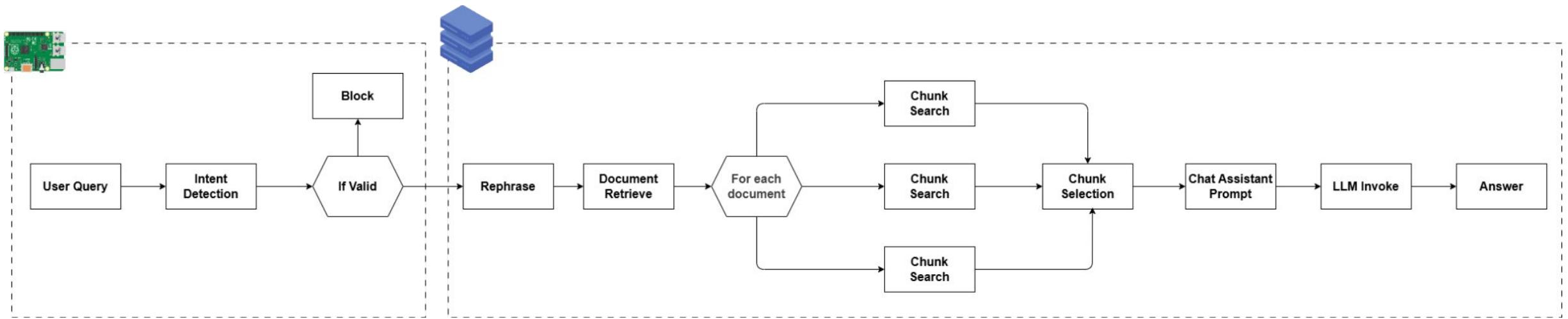
Core Workflow

IoT Data Processing & Ingestion



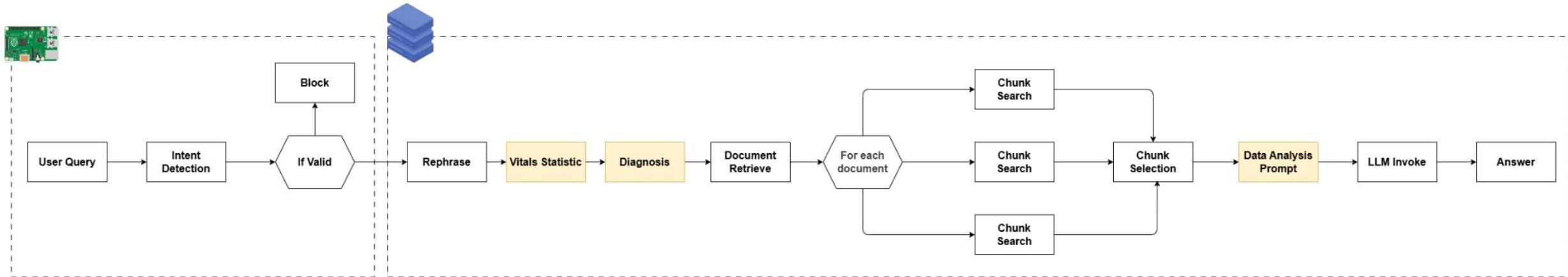
Core Workflow

Chat Assistant

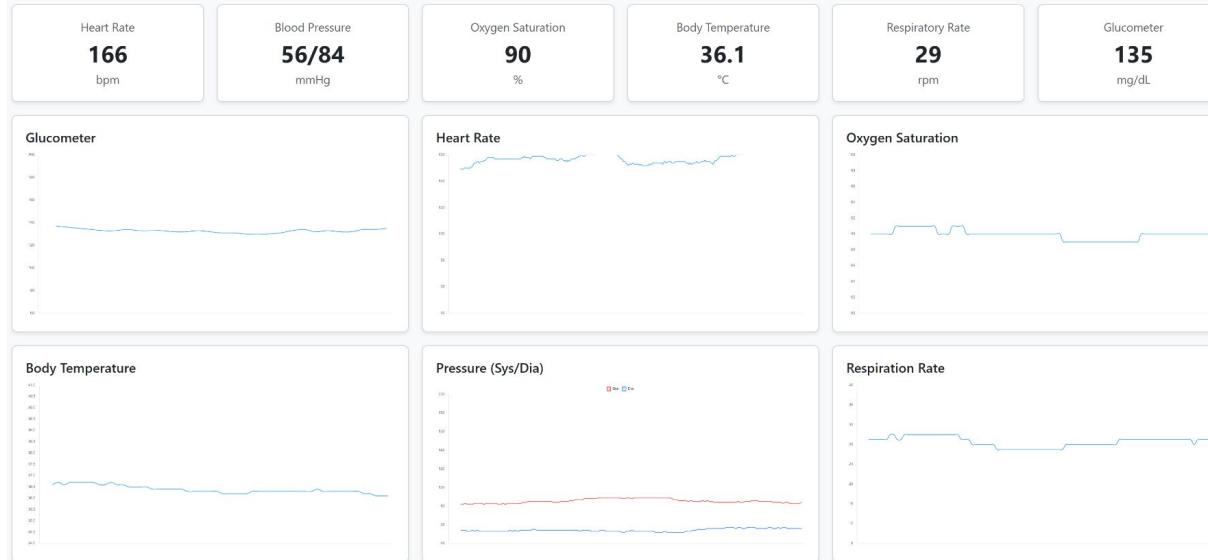


Core Workflow

Data Analysis



Patient Dashboard



HII! I'm your clinical assistant. I can help you to:

- Formulate and clarify clinical problems
- Analyze your vital data
- Contextualize symptoms and measurements

Note: You can use the green button with the chart icon to enable or disable the analysis of your biological data for each query.

Could you analyze my vitals data and tell me if there is any problem ?

Your vital signs indicate serious abnormalities requiring immediate medical attention:

- **Respiratory Rate:** 29 breaths/minute (normal: 12-20) – significantly elevated, suggesting respiratory distress.
- **Oxygen Saturation:** 89% (normal: 95-100%) – critically low, indicating hypoxemia.
- **Heart Rate:** 153 bpm (normal: 60-100) – severely elevated tachycardia.
- **Systolic Blood Pressure:** 56 mmHg (normal: 90-120) – dangerously low, indicating hypotension.

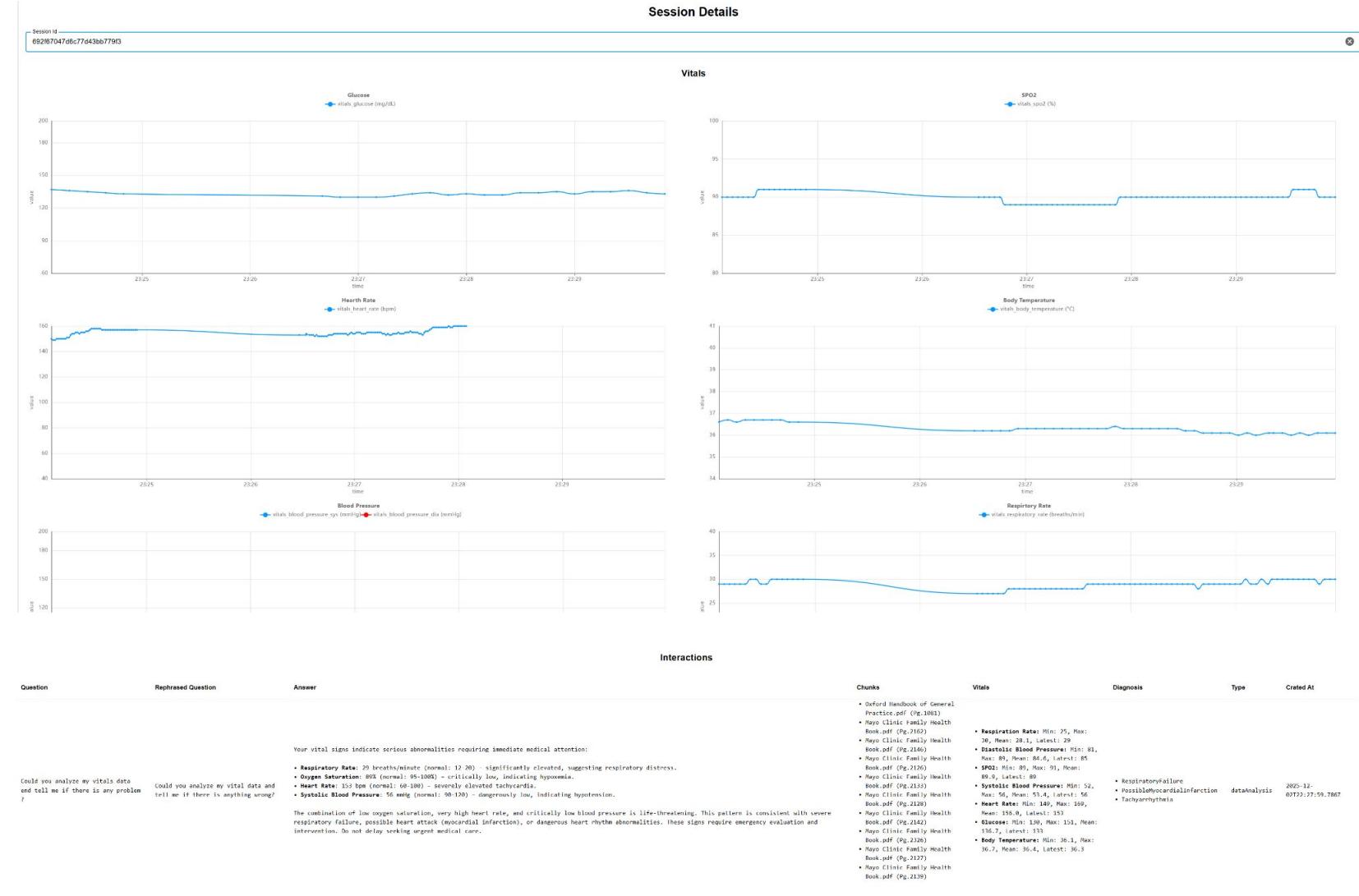
The combination of low oxygen saturation, very high heart rate, and critically low blood pressure is life-threatening. This pattern is consistent with severe respiratory failure, possible heart attack (myocardial infarction), or dangerous heart rhythm abnormalities. These signs require emergency evaluation and intervention. Do not delay seeking urgent medical care.



Expert Dashboard

Devices			
Device Id	Name	Status	Last Update
device-1	Device-1	Green	2025-12-02T22:29:30.981Z
device-2	Device-2	Red	-
device-3	Device-3	Red	-
device-4	Device-4	Red	-

Sessions				
ID	Device Id	Created At	Updated At	Status
692f541177676d3f4c8d7b87	device-1	2025-12-02T21:03:27.201Z	2025-12-02T21:03:27.201Z	Green
692f53e177676d3f4c8d7b85	device-1	2025-12-02T21:02:25.433Z	2025-12-02T21:03:25.870Z	Red
692f126c3ab92063c48e2507	device-1	2025-12-02T16:23:08.460Z	2025-12-02T16:27.37.269Z	Red
692f10233ab92063c48e2506	device-1	2025-12-02T16:13:23.677Z	2025-12-02T16:23:06.825Z	Red
692f0b423ab92063c48e2505	device-1	2025-12-02T16:15:52.34.336Z	2025-12-02T16:13:23.674Z	Red
692f0b273ab92063c48e2504	device-1	2025-12-02T15:52.07.228Z	2025-12-02T15:52.33.436Z	Red
692ec61f505b94edfe6651c9	device-1	2025-12-02T10:57.35.199Z	2025-12-02T15:52.07.223Z	Red
692ec5aa505b94edfe6651c7	device-1	2025-12-02T10:55.38.849Z	2025-12-02T10:57.34.354Z	Red
692ec4cd505b94edfe6651c6	device-1	2025-12-02T10:51.57.716Z	2025-12-02T10:55.38.008Z	Red
692ec3fb505b94edfe6651c4	device-1	2025-12-02T10:48.27.131Z	2025-12-02T10:51.56.577Z	Red
692e1535a252cd30bc591bea	device-1	2025-12-01T22:22.45.094Z	2025-12-02T10:48.27.128Z	Red
692e1ff306e1f7db71b6970	device-1	2025-12-01T22:09.03.277Z	2025-12-01T22:22.43.804Z	Red



Simulation Scenario

Base AI Assistant

Dashboard

Chat

Hi! I'm your clinical assistant. I can help you to:

- Formulate and clarify clinical problems
- Analyze your vital data
- Contextualize symptoms and measurements

Type me a question, for example:

- "I don't feel very well, which parameters are out of range?"

I think that i could have some fever, what i could do ?

Take your temperature to confirm a fever (typically defined as 100.4°F/38°C or higher). Rest and drink plenty of fluids to stay hydrated. Monitor your symptoms closely. Seek medical attention immediately if:

- You are under 3 months old with any fever
- Your temperature exceeds 103°F (39.4°C)
- You experience severe symptoms like confusion, stiff neck, shortness of breath, chest pain, or a rash
- Fever lasts more than 3 days without improvement
- You have underlying health conditions like heart disease, diabetes, or weakened immunity

For most adults and older children with mild fever, home care (rest, fluids, over-the-counter pain relievers like acetaminophen or ibuprofen) is sufficient unless symptoms worsen or persist.

 Close

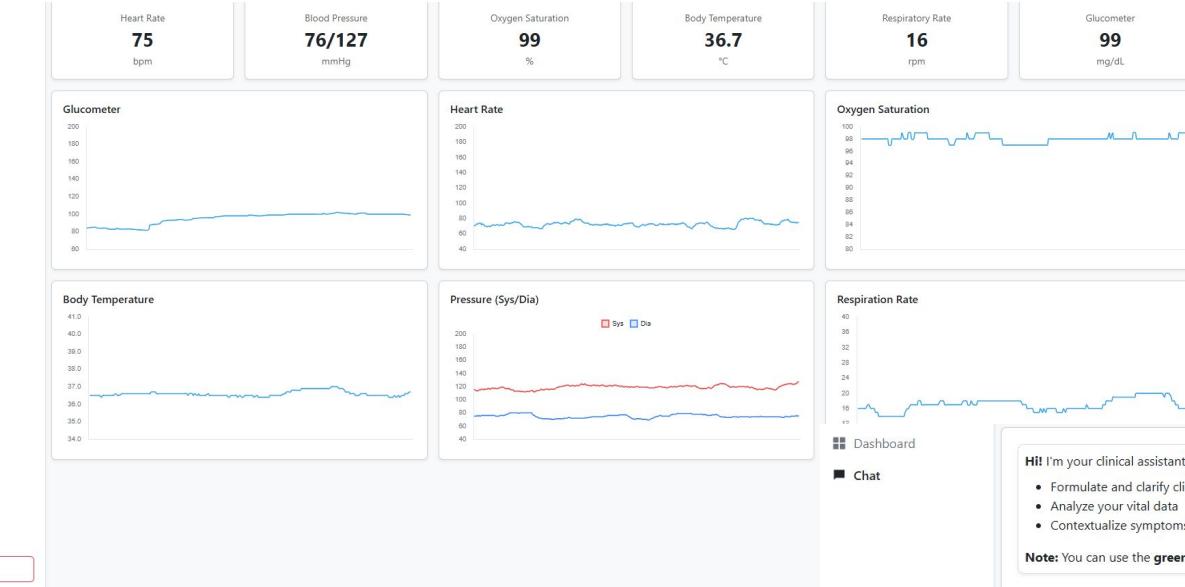


Simulation Scenario

Data Analysis Assistant - Healthy

Dashboard

Chat



x Close

Hi! I'm your clinical assistant. I can help you to:

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- Analyze your vital data
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Note: You can use the green button with the chart icon to enable or disable the analysis of your biological data for each query.

Could you analyze my vitals data and tell me if there is any problem?

Your vital signs are all within normal ranges and show consistent stability. Here's a clear breakdown:

- **Respiration Rate:** 17 breaths per minute (normal range: 12-20), with consistent breathing patterns.
- **Blood Glucose:** 93 mg/dL (normal fasting range: 70-99), showing stable levels.
- **Oxygen Saturation:** 97% (normal range: 95-100%), indicating excellent oxygen levels.
- **Blood Pressure:** 122/72 mmHg (normal: systolic <120, diastolic <80), with stable readings.
- **Heart Rate:** 74 bpm (normal resting range: 60-100), consistent with good cardiovascular function.
- **Body Temperature:** 36.6°C (normal range: 36.1-37.2°C), showing no signs of fever or hypothermia.

All measurements demonstrate low variability, confirming a stable physiological state. There are no indications of medical concerns based on these vitals.

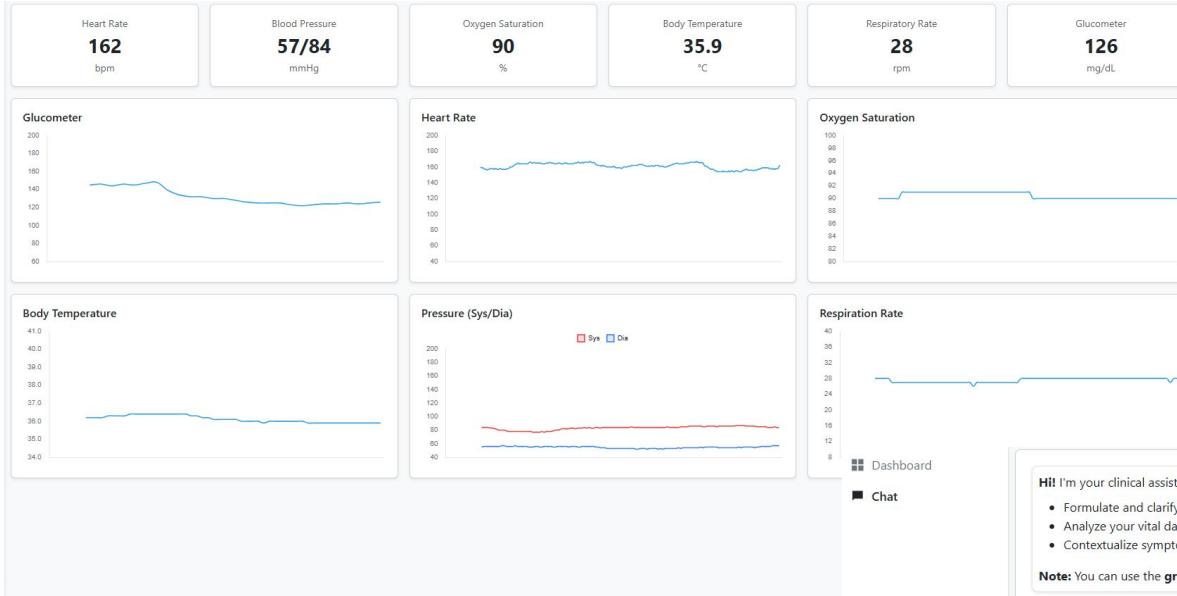
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Simulation Scenario

Data Analysis Assistant - Heart Attack

Dashboard
Chat



X Close

X Close

Hi! I'm your clinical assistant. I can help you to:

- Formulate and clarify clinical problems
- Analyze your vital data
- Contextualize symptoms and measurements

Note: You can use the green button with the chart icon to enable or disable the analysis of your biological data for each query.

Could you analyze my vitals data and tell me if there is any problem?

Your vital signs show several significant abnormalities that require immediate medical evaluation:

- Heart rate (160 bpm) is severely elevated (normal resting range: 60-100 bpm), indicating possible tachycardia.
- Systolic blood pressure (84 mmHg) is critically low (normal: 90-120 mmHg), suggesting hypotension.
- Oxygen saturation (91%) is below normal (normal: 95-100%), indicating potential oxygen deficiency.
- Respiratory rate (27 breaths/min) is elevated (normal resting: 12-20 breaths/min), reflecting increased breathing effort.

These combined findings—high heart rate, low blood pressure, low oxygen, and rapid breathing—are clinical indicators of a serious cardiovascular or respiratory emergency. They align with conditions such as heart attack (myocardial infarction) or life-threatening arrhythmias, as suggested by your algorithm diagnosis. Do not delay seeking emergency medical care.



Future Developments

LLM Fine Tuning

Advance RAG

Autonomous Agent

ML Driven Diagnosis

Security Improvement

Real Device & Data

Questions & Answers

Thank you for your attention.