AI-Powered Neonatal Vital Monitoring System

TEAM MEMBERS

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INTRODUCTION

The need for an **AI-powered Neonatal Vital Monitoring System** stems from the critical care required in **NICUs** for premature and **high-risk newborns**. Traditional systems can be uncomfortable and may **not provide real-time, comprehensive monitoring**, **leading to delayed detection of health risks.** AI-driven solutions offer continuous, non-invasive monitoring and **real-time anomaly detection**, helping **reduce errors and improve response times**. By providing predictive insights, this system enhances **neonatal care**, ensuring timely **interventions** and better health outcomes for vulnerable **infants**.

ABSTRACT

The AI-Powered Neonatal Vital Monitoring System continuously tracks critical health indicators like **SpO2, heart rate, respiratory rate, temperature**, and **blood pressure** in NICUs using AI and machine learning. Integrated with **Apgar scores**, it enhances newborn assessments by utilizing **VIDEO FOOTAGE**, including remote **photoplethysmography (rPPG)** for **contactless monitoring**. AI models, such as **CNNs**, analyze time-series data for **real-time anomaly detection** and **predictive alerts**. Additionally, **sleep patterns** are tracked for early detection of health risks. The system leverages cloud and edge computing for data storage and real-time processing, **reducing human errors** and enabling timely medical interventions.

PROBLEM STATEMENT

1

DATA FRAGMENTATION

Vital signs and other health data from newborns are often scattered across different systems, making it hard for medical staff to access a comprehensive view of the infant’s health.

2

DELAYED DETECTION OF RISKS

Traditional monitoring systems may not provide real-time alerts, making it difficult for healthcare professionals to quickly identify life-threatening conditions or abnormalities in vital signs.

3

LACK OF PREDICTIVE INSIGHTS

Current systems do not adequately leverage predictive models, limiting the ability to forecast potential health risks and intervene proactively in critical situations.

PROPOSED SOLUTION

1

DATA FRAGMENTATION

The system consolidates data from various sources, including video, sensor readings, and Apgar scores, providing a comprehensive view of an infant's health for accurate monitoring.

2

Real-Time Analytics Dashboard

A dashboard delivers real-time vital sign updates and alerts, such as oxygen saturation, heart rate, and respiratory rate, offering medical staff actionable insights at a glance.

3

Predictive Modeling

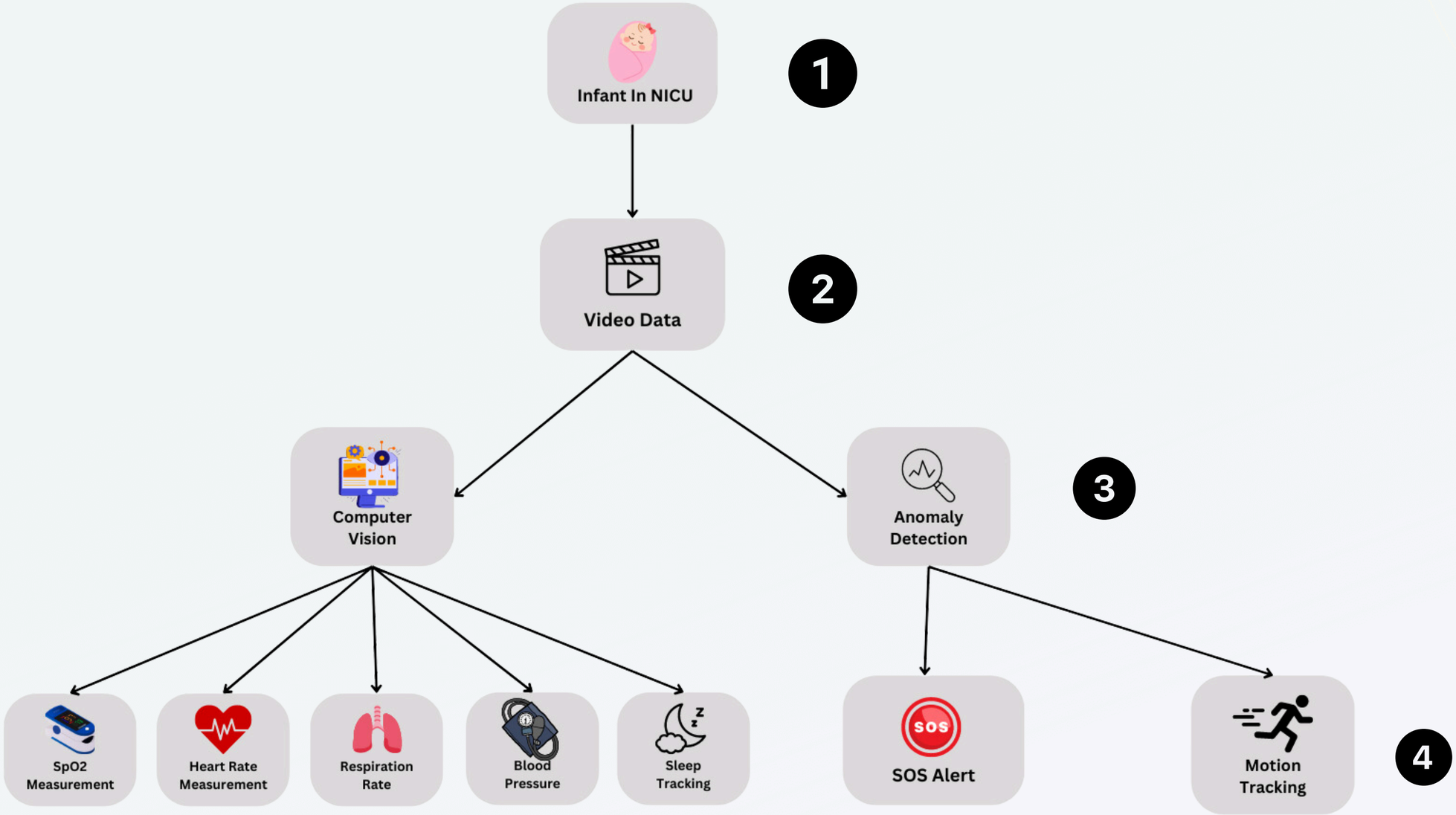
Leveraging AI models like CNNs and LSTMs, the system predicts potential health risks by analyzing time-series data, enabling early intervention for at-risk infants.

4

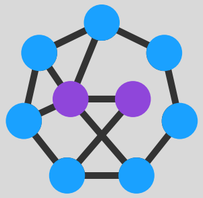
Non-Invasive Monitoring

Using computer vision remote photoplethysmography (rPPG), the system estimates vital signs without physical contact, improving comfort and accuracy in continuous monitoring.

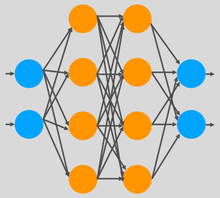
SYSTEM DESIGN OR LOGIC



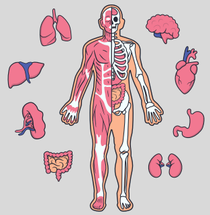
TECH STACK



CNN



DEEP LEARNING



MEDIA PIPE

OPEN CV

FLASK

FLUTTER

MONGO DB

TWILIO API

USE CASES

NON-CONTACT MONITORING

SPO2 MEASURE

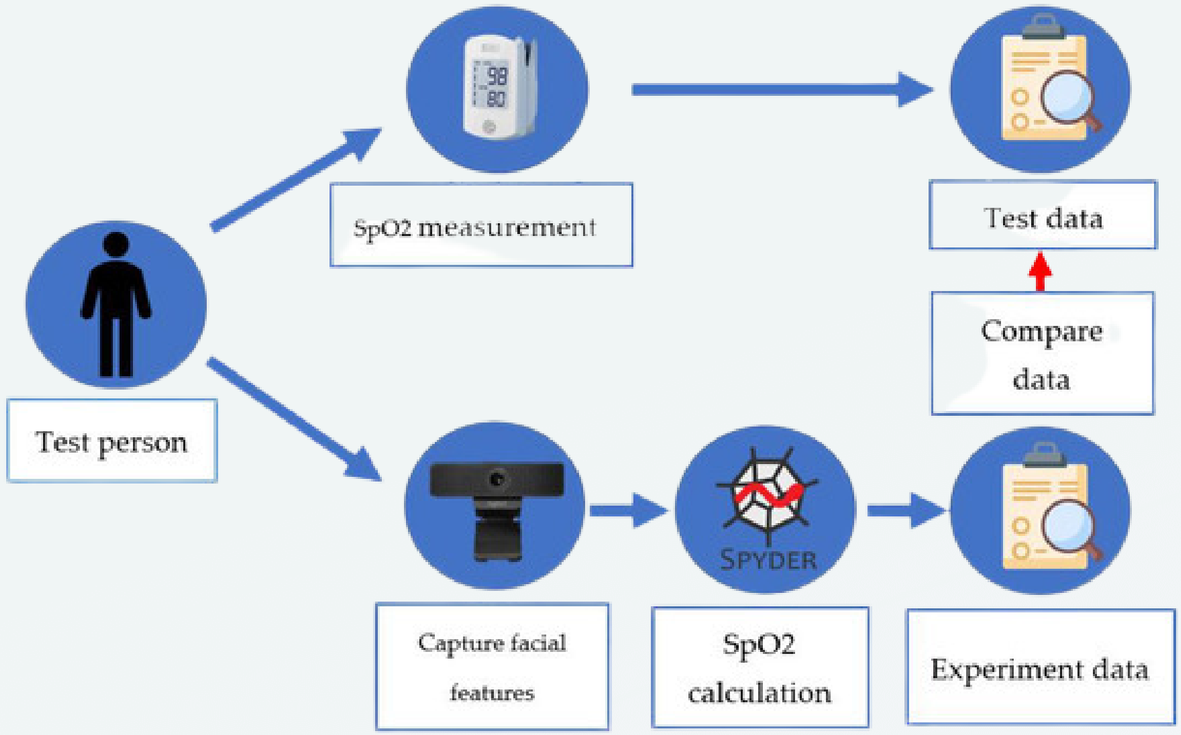
HEART RATE MEASURE

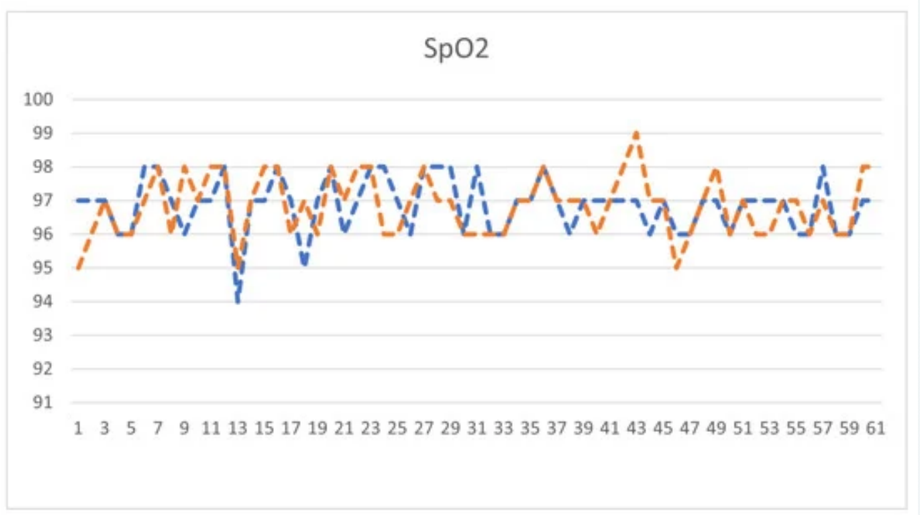
RESPERATORY RATE

BLOOD PRESSURE

SLEEP MONITORING

RESEARCH





- SpO2 measurement taken from a test person.
- Capture facial features using a camera.
- SpO2 calculation using Spyder software.
- Test data is collected for analysis.
- Experiment data is also gathered.
- Compare data between test and experiment data.

REFERENCE

Research Papers:

- https://www.mdpi.com/2306-5354/10/5/524
- https://www.sciencedirect.com/science/article/pii/S0169260722001572
- https://iopscience.iop.org/article/10.1088/1361-6579/ab1f1d/meta

Clinical Insights from Doctors:

- Dr. Anwar Ahamed MBBS Click here

BUSINESS MODEL CANVA

Key Partners

Whom will you work with as you run the business? Name your partners and the roles they will take on.

- Hospitals and NICUs
- Medical Device Manufacturers
- AI and Machine Learning Experts

Key Activities

What are the tasks and activities that must be done every day to keep the business running?

- Real-Time Monitoring and Anomaly Detection
- System Development and Integration
- Data Analytics

Key Resources

What are the tangible and intangible things you need to create your product?

- AI and Data Science Teams
- Medical Experts and Advisors

Value Proposition

What is the need you are trying to address? What value will your product bring to the target audience?

- Continuous Monitoring
- AI-Powered Predictive Alerts
- Integration with Apgar Scores and Advanced Analytics

Customer Relationships

What relationships will you establish with each customer segment?

- Dedicated Technical Support
- Data-Driven Insights for Hospitals

Channels

Where will your product be available? List the ways you plan to reach your target audience

- Direct Sales to Hospitals and NICUs
- Medical Conferences and Trade Shows

Customer Segments

Who is your target market?
What are the characteristics of your early adopters?
List the personas that you expect to use your product.

- Hospitals and NICUs
- Government and Public Health Sectors
- Private Healthcare Facilities

Cost Structure

What are the fixed and variable costs for launching your product or service? Consider the cost at each stage - from setting up and hiring all the way to marketing and distribution.

- R&D Costs
- Cloud and Data Storage Costs
- Regulatory and Compliance Costs
- Marketing and Sales Costs

Revenue Streams

How will you generate income? Show a pricing model of your product or service and include other revenue sources, such as sales and subscription fees.

- Licensing Fees
- Service Fees for Maintenance and Support

THANK YOU