AI Emergency Decision Support

Presented by Team Inovra

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# The Challenge: A Real-Life Dilemma

Our project's inspiration stems from a critical incident faced by a friend's loved one.

- **Post-Surgery Complications:** After stent placement, the patient experienced bradycardia (abnormally slow heart rate).

- **Urgent Medical Need:** The doctor ordered an Atropine injection to stabilize the heart rhythm.

- **Critical Delay:** The nurse's search for Atropine in the medication cabinet resulted in a 5-10 minute delay, a precious window in an emergency.

This experience highlighted a critical gap in emergency response, where every second counts.
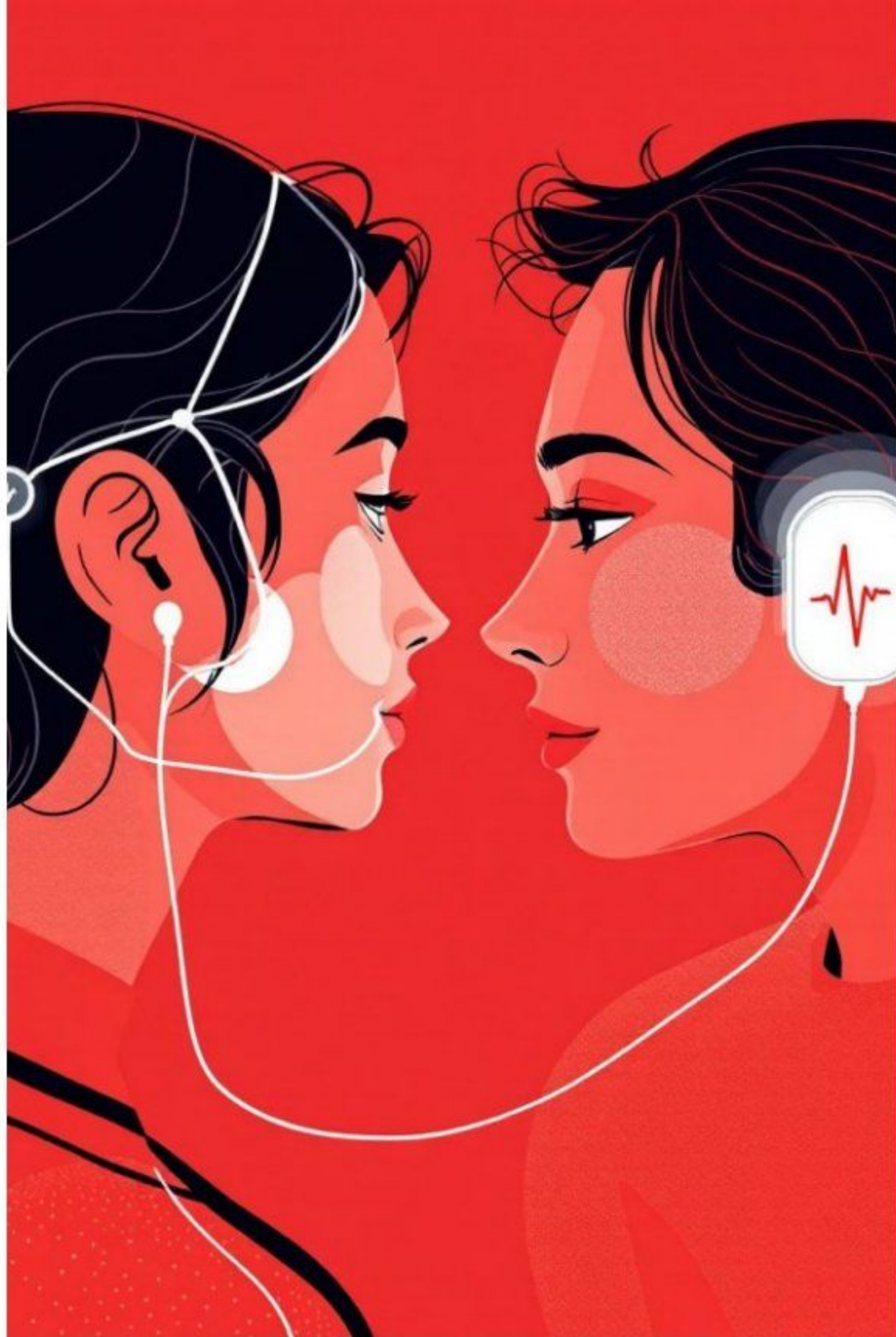
Introducing the AI Emergency Decision Support System

Our solution: an intelligent, automated system designed to eliminate delays and enhance patient safety during cardiac emergencies.

Swift Detection

Real-time monitoring for abnormal heart rhythms.

Automated Alert

Instant notification to medical staff for critical events.

Rapid Intervention

Doctor-approved, on-demand medication delivery.

How Our Solution Works: The Smart Patch

At the core of our system is an innovative patch designed for immediate response.

01

Wearable & Discreet

The patch is comfortably attached to the patient's arm.

02

Microfluidic Atropine

It contains microfluidic reservoirs pre-filled with Atropine.

03

Continuous Monitoring

Embedded sensors constantly monitor the patient's heart rhythm.

Emergency Protocol: From Detection to Delivery

A seamless flow ensures timely and accurate medical intervention.

Bradycardia Detected

The patch identifies an abnormal heart rate.

Doctor Alert

An emergency alert, with sound, is sent directly to the doctor.

Approval & Injection

Upon doctor's "Yes" click, the patch auto-injects Atropine.

Automated Logging

All actions are recorded in a data log for compliance.

Nurse Notification

Information is immediately relayed to the nurse station.

The AI Behind the Action: Python Simulation

Our proof of concept demonstrates the core functionality of the AI Emergency Decision Support.

```python
import random
import time
import csv
from datetime import datetime

# --- Vitals Simulator ---
def generate_vitals():
 """Simulate patient vitals: HR (bpm), BP (systolic/diastolic)"""
 hr = random.randint(40, 120) # Heart Rate
 bp_sys = random.randint(80, 140) # Systolic BP
 bp_dia = random.randint(50, 90) # Diastolic BP
 return hr, bp_sys, bp_dia

# --- Emergency Detection ---
def check_emergency(hr):
 """Check if bradycardia emergency exists (HR < 80)."""
 if hr < 80:
 return True, "Bradycardia detected! Recommend Atropine."
 return False, ""

# --- Logging ---
def log_event(hr, bp_sys, bp_dia, action):
 """Log vitals and doctor decision into CSV."""
 with open("patient_log.csv", "a", newline="") as f:
 writer = csv.writer(f)
 writer.writerow([datetime.now(), hr, bp_sys, bp_dia, action])

# --- Main Monitoring ---
def run_monitoring(simulation_time=20, delay=5):
 print("Starting AI Emergency Decision Support Simulation...")
 print("Monitoring patient in Ward 1 (Name: ABC)...\n")

 start_time = time.time()
 while time.time() - start_time < simulation_time:
 hr, bp_sys, bp_dia = generate_vitals()
 print(f"Vitals → HR: {hr} bpm, BP: {bp_sys}/{bp_dia} mmHg")

 emergency, message = check_emergency(hr)
 if emergency:
 print(f"\n
```

Simulation Output: Real-Time Decisions

Observe the system in action as it identifies bradycardia and processes doctor approval.

Starting AI Emergency Decision Support Simulation...

Monitoring patient in Ward 1 (Name: ABC)...

Vitals → HR: 102 bpm, BP: 121/77 mmHg

(No emergency, normal condition logged)

Vitals → HR: 69 bpm, BP: 110/83 mmHg

⚠️ ALERT: Patient in Ward 1 (Name: ABC) has HR = 69 bpm

Bradycardia detected! Recommend Atropine.

Doctor Approval → Give Atropine? (Y/N): Y

✅ Nurse notified. Patch secreted 0.5 mg IV Atropine.

Vitals → HR: 94 bpm, BP: 100/75 mmHg

(No emergency, normal condition logged)

Vitals → HR: 73 bpm, BP: 131/82 mmHg

⚠️ ALERT: Patient in Ward 1 (Name: ABC) has HR = 73 bpm

Bradycardia detected! Recommend Atropine.

Doctor Approval → Give Atropine? (Y/N): N

❌ No drug secreted. Awaiting doctor input.

Vitals → HR: 116 bpm, BP: 122/78 mmHg

(No emergency, normal condition logged)

Monitoring session ended. Logs saved to patient_log.csv.

Impact & Future Vision

Our system aims to revolutionize emergency cardiac care, making it safer and more efficient.

10X
Faster Response
Reducing critical medication delivery time from minutes to seconds.
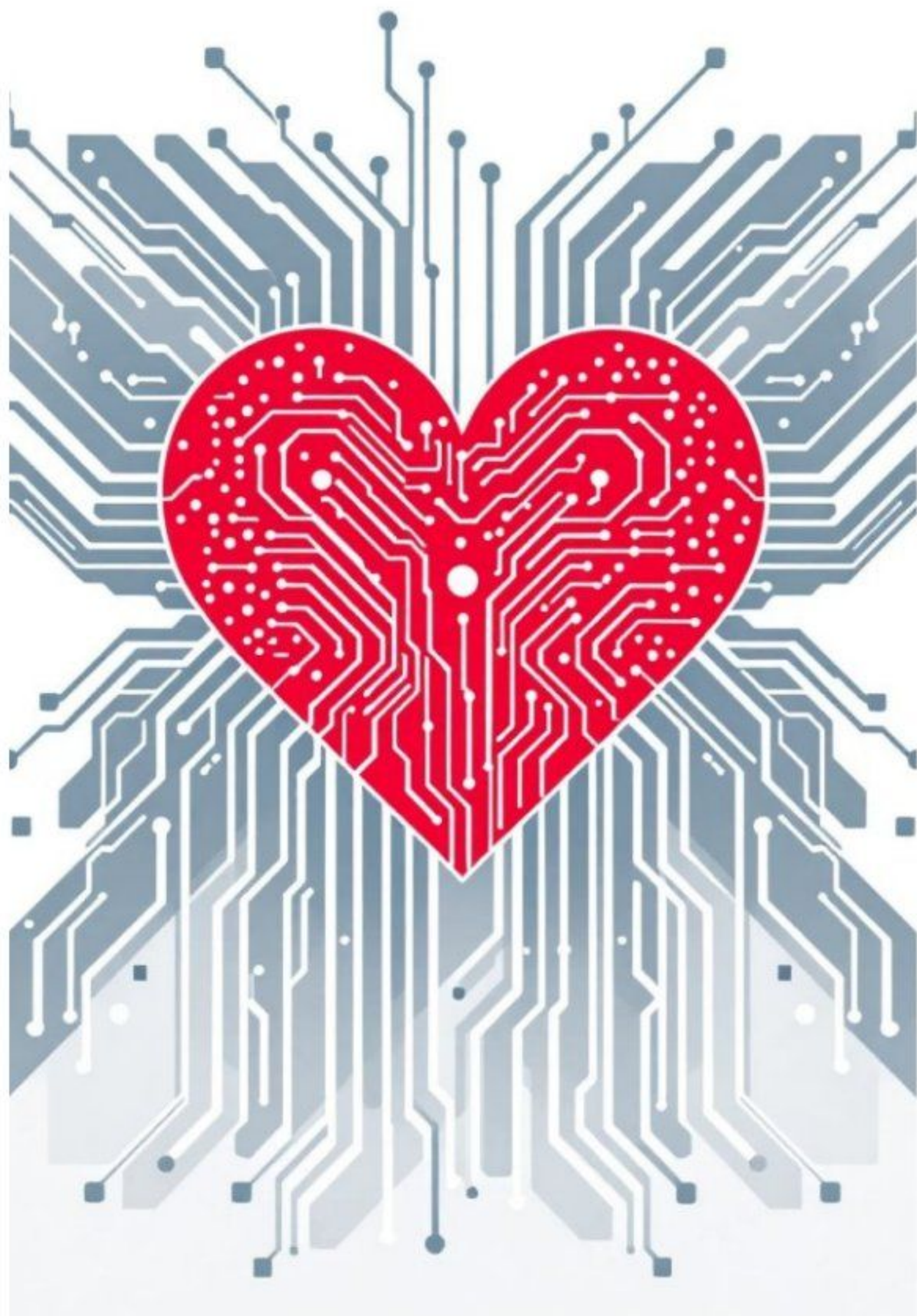
99%
Improved Safety
Minimizing human error and ensuring prompt intervention.

100%
Comprehensive Data
Automated logging for better patient care and legal compliance.

Thank You

Team Inovra: Pushing the Boundaries of Medical Innovation

We believe this AI Emergency Decision Support system can significantly enhance the outcomes for patients recovering from cardiac procedures.

Questions?