TEAM

0071

Multi-purpose Medical Support Robotic Arm (MpMSRA)

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EE ICS 4 ME COE

Problem Statement

The Multi-purpose Medical Support Robotic Arm (MpMSRA) measures the patient's the vital signs of temperature, heart rate, and blood pressure, to then ask for the patient's symptoms, then end with the patient's sorted emergency case .

Constraints

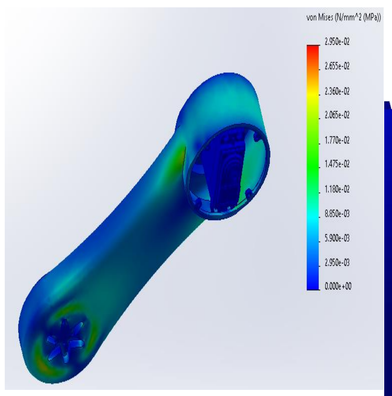
Factor of safety against stresses equals at least 2
The electric company should provide 24/7 power to the robotic arm
Limited microcontroller memory for data buffering
Lack of dedicated GPU for AI inference

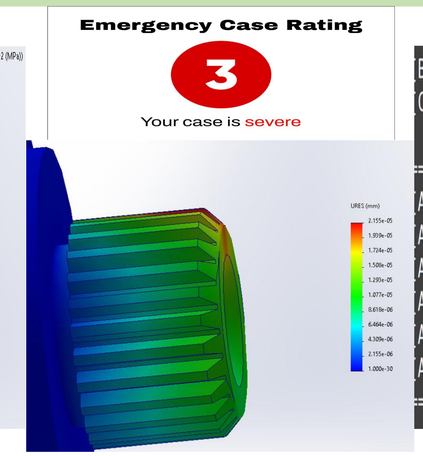
Specifications

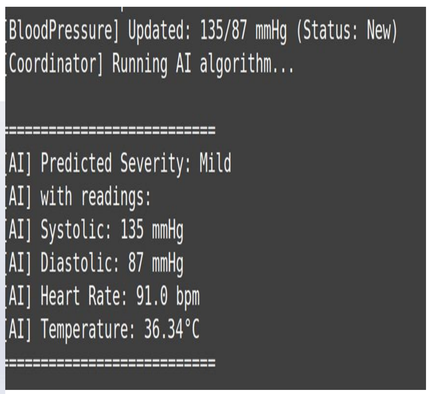
Operation Voltage	5V DC
Processing Time	UI & result ≤ 5 min
User Input	Select up to 3 symptoms
Arm parts	≤ 10
Stress	≤ 6 MPa
Servo Motors Stall	12 kg·cm
Communication Baud Rate	≥ 9600 bps
Secure Communication	AES-128 Encryption + SHA-256 HMAC Integrity Check
Infrared Detection Range	≤ 20 cm
Measurement time	< 5 min
Classifications	from 1-3 (severity)
Classification error	< 5%

Prototype Design

Validation







Conclusion

- MpMSRA is a 3D-printed, cost-effective, and low-maintenance device that measures vital signs and aids healthcare professionals in prioritizing cases, with 97% classification accuracy.