

DESIGN AND DEVELOPMENT OF MEDICAL DIAGNOSTICS SYSTEM

IOT Based Automated Paralysis Patient Healthcare System

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Abstract

A Design and Development of Medical Diagnostics System leverages Internet of Things (IoT) technology to provide real-time monitoring and assistance. This system integrates wearable sensors, smart devices, and cloud computing to continuously track vital signs such as heart rate, blood pressure, and body movements. Data is processed and analyzed to detect any critical health events or changes in the patient's condition, allowing for timely alerts to caregivers or healthcare professionals. The system also incorporates automated features such as voice-activated controls for environment management (lights, fans, doors) and emergency response mechanisms, improving the quality of life for patients with limited mobility. By enhancing remote monitoring and providing real-time assistance, this IoT-based system reduces hospital visits, ensures continuous care, and supports better management of paralysis conditions.

Index Terms — IoT, medical diagnostics, paralysis care, wearable sensors, remote monitoring, GSM/GPRS, fall detection, ECG, LM35, ADXL335, flex sensor

1. Introduction

Paralysis patients often have limited mobility and communication abilities, making continuous monitoring and timely assistance challenging. The proposed IoT-enabled diagnostics system integrates sensors, communication modules, and automation features to improve patient care, safety, and quality of life while providing clinicians with real-time data.

2. Problem Statement

There is a need for real-time, remote health monitoring for paralysis patients to track vital signs, detect abnormal patterns, and respond promptly to emergencies, reducing dependence on periodic check-ups and hospital visits.

3. Objectives

- Continuous monitoring of vital signs
- Early detection of emergencies
- Remote health data access
- Improved response time

- Assist in rehabilitation
- Enhance patient independence
- Reduce healthcare costs
- Data analytics for better care

4. Literature Survey

Prior work on IoT in healthcare highlights connected sensors for real-time monitoring and assistive systems for patients with limited mobility. Prototypes for paralysis care have used wearable sensors to track BP, SpO2, and heart rate with automated alerting.

5. Hardware Requirements

Sr. No	Material Requirement	Quantity
1	Atmega2560 – Arduino Board	01
2	5 volt DC power supply board	01
3	0-9v Adapter	01
4	GSM-GPRS Modem SIM900	01
5	ECG Module	01
6	LM35 – Body temp sensor	01
7	ADXL335 – Fall Detection	01
8	16×2 LCD Display	01
9	2.2” Flex Sensor	04
10	APR33A3 Voice Module	01
11	F–F Wires for Connections	01
12	8 Ohm Speaker	01

Research Through Innovation

6. Components Used (Summary)

Arduino Mega 2560: ATmega2560 MCU, 54 digital I/O (15 PWM), 16 analog inputs, 256KB flash, 16MHz.

5V Power Supply: Regulated 5V DC output with input/output capacitors and indicator LED. **SIM900A**

GSM/GPRS: Dual-band 900/1800MHz, supports voice/GPRS, typical TX peak ~2A. **ECG Module:** Measures electrical activity of heart; 3.3V operation.

LM35 Sensor: 10mV/°C scale factor, -55°C to 150°C range.

ADXL335: 3-axis analog accelerometer; ±3g range.

16×2 LCD: 4.7–5.3V, 16 characters ×2 rows, 4-bit/8-bit modes. **Flex Sensor 2.2"**: Resistance increases when bent; typical 25kΩ flat. **APR33A3:** Single-chip voice recording/playback; up to ~680s.

F–F Jumpers: Female-to-female jumper wires for breadboard connections.

8Ω Speaker: Impedance 8Ω, typical SPL ~85 dB @1kHz/1W.

7. Material Cost

Sr. No	Material Requirement	Price (₹)
1	Atmega2560 – Arduino Board	2220
2	5 volt DC power supply board	50
3	0-9v Adapter	150
4	GSM-GPRS Modem SIM900	1200
5	ECG Module	400
6	LM35 – Body temp sensor	150
7	ADXL335 – Fall Detection	350
8	16×2 LCD Display	400
9	2.2” Flex Sensor	400
10	APR33A3 Voice Module	300
11	F–F Wires for Connections	200
12	8 Ohm Speaker	150

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References

Farahani et al. (2018); Hossain and Muhammad (2016); Sharma et al. (2019).