DESIGN AND DEVELOPMENT OF A DEVICE TO MONITOR DIABETIC FOOT PRESSURE

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Keywords:

Plantar, foot pressure, diabetic, device

Introduction:

Diabetes Mellitus, a prevalent metabolic disorder, poses significant health risks, notably diabetic foot complications stemming from neuropathy and poor blood circulation. With an alarming 537 million affected adults globally, the threat of ulcers, infections, and amputations looms large. Traditional diagnosis relies on blood tests and clinical evaluations, but early detection remains pivotal.

To address this challenge, our project introduces a non-invasive solution leveraging innovative foot pressure monitoring techniques. By continuously measuring and analyzing foot pressure data, our device aims to revolutionize diabetic care. Incorporating Raspberry Pi, FSR sensors, and cloud computing, it offers a comprehensive approach to data acquisition, processing, and analysis.

The device's design prioritizes ease of use and real-time monitoring, empowering both patients and healthcare professionals. By detecting abnormal pressure patterns indicative of potential foot problems, it enables timely intervention, thus reducing the likelihood of severe complications like gangrene and amputation.

Ultimately, our goal is to enhance the quality of life for diabetic patients by promoting proactive foot care and preventing debilitating outcomes. With our innovative approach, we aspire to usher in a new era of diabetic foot management, where early detection and intervention become the norm, fostering better overall health outcomes for those living with diabetes.

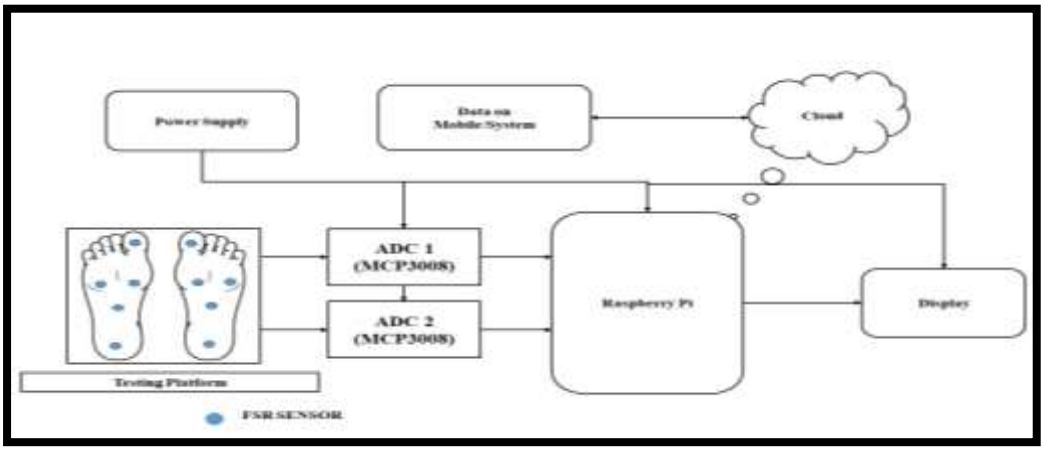
Objectives:

- To Design and create a cost-effective device for accurately measuring foot plantar pressure.
- To identify the Type of foot

- To identify diabetic foot

Methodology:

- Compare real-time data to baseline for abnormalities and set dynamic thresholds based on deviations.
- Consult professionals for guidance and implement alerts for abnormal pressure patterns.
- Test extensively with the target population, validating through studies or expert consultation.
- Implement mechanisms for dynamic threshold adjustment and integrate with healthcare solutions.
- To Ensure communication with apps or cloud platforms, validating accuracy in real-world scenarios.
- Seek input from professionals and users, iterating based on real-world usage.
- Address privacy concerns and comply with ethical and legal standards.
- Deploy on Raspberry Pi and cloud, monitoring and maintaining system performance



Conclusion:

The developed device offers a cost-effective solution for accurately measuring foot plantar pressure, identifying foot types, and detecting diabetic foot syndrome. Integrating Raspberry Pi 4B, MCP3008 ADCs, and FSR sensors, along with Python-based software, ensured efficient achievement of objectives. Detailed pressure distribution data and foot abnormality identification highlight its potential for biomechanics and healthcare research.

Python programming facilitated robust data processing and visualization, enhancing usability for researchers and healthcare professionals. Extensive testing validated the device's reliability and effectiveness, emphasizing its significance in advancing foot health monitoring. These findings underscore the importance of ongoing research in healthcare technology, with implications for improving foot health outcomes and overall quality of life.

Scope for future work:

Advancements in wearable technology and remote monitoring have revolutionized home healthcare for diabetic patients by seamlessly integrating foot pressure monitoring. Sensor-equipped footwear and portable monitoring devices allow regular tracking of foot health, offering insights into pressure distribution patterns. Designed for comfort and convenience, these devices enable real-time data transmission to patients and healthcare providers, facilitating timely interventions and personalized care plans.

Continuous monitoring and data analysis are pivotal in identifying potential issues, prompting timely medical attention. Advanced algorithms analyze data, generating alerts for areas of concern like high pressure or asymmetrical weight distribution. Empowering patients through remote monitoring fosters autonomy and responsibility for their foot health, supported by cloud-based platforms for seamless communication.

Integration with electronic health records ensures comprehensive patient care, providing clinicians with a detailed foot health history for informed decision-making. Ongoing research in sensor technology and data analytics drives innovation, aiming to enhance accuracy, reliability, and usability. Predictive analytics hold promise for early detection of foot complications, ultimately improving outcomes and reducing healthcare costs.

In summary, the integration of foot pressure monitoring technology into home healthcare promises to revolutionize foot health management, particularly for diabetic patients. Through wearable technology and remote monitoring, healthcare providers can enhance patient engagement, optimize treatment outcomes, and mitigate the risks associated with foot-related complications.