

Real-Time Barefoot Thermal Mapping System for Preventive Foot Health Management

Mohamad Tarmizi Abu Seman

Senior Lecturer, School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Nibong Tebal, Penang, Malaysia

Mohd Izat Nordin

School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Nibong Tebal, Penang, Malaysia

Danial Aiman Zulkipli

School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Nibong Tebal, Penang, Malaysia

Abstract:

Monitoring foot conditions is vital for early detection of dehydration and circulatory issues. Current approaches mainly rely on footwear-based systems, while barefoot monitoring remains underexplored. This paper presents an IoT-enabled barefoot temperature monitoring solution that employs a custom insole embedded with five DHT22 sensors. Data is captured and processed via a Raspberry Pi, with real-time visualization and alerts provided through the Blynk platform. Unlike conventional systems, this design delivers a low-cost, accurate, and user-configurable method for thermal mapping of plantar regions. It is suitable for both medical and sports applications, offering practical insights into hydration status and foot health. Experimental results confirm the system's effectiveness in detecting dehydration through peripheral temperature variations, enabling early intervention and better management of foot-related complications. This study highlights the potential of barefoot IoT monitoring as a new direction in wearable health technologies. By emphasizing real-time mobile access and visualization, the system shifts attention toward practical, non-invasive solutions for proactive health monitoring.

Keywords:

IoT, barefoot monitoring, dehydration detection, plantar temperature, Blynk, Raspberry Pi, thermal mapping.