International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 1 Volume No.7 January - February – 2023
DOI:10.46647/ijetms.2023.v07i01.005 ISSN: 2581-4621

SMART PREVENTIVE INSOLE FOR DIABETES

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ABSTRACT
Smart wearable gadgets are powerful in diabetic foot ulcer (DFU) prevention. However, elements figuring out their recognition are poorly understood. This systematic evaluation pursuits to observe the literature on affected person and issuer views of clever wearable gadgets in DFU prevention. The methodological pleasant of the research ranged from low to moderate. Two research hired a quantitative have a look at layout and centered at the affected person perspective, whereas three research blanketed a mixed, quantitative/qualitative layout and explored affected person or provider (podiatrist) perspectives. Four research targeted on an insole gadget and one covered a clever sock device. The quantitative research validated that gadgets had been comfortable, properly designed and beneficial in stopping DFU. One combined layout observe suggested that sufferers did now no longer intend to undertake an insole tool in its cutting-edge layout due to malfunctions, a loss of consolation and alert intrusiveness, regardless of the overall notion that the tool became a beneficial device for foot threat monitoring. Two mixed design studies found that performance expectancy was a predictor of a podiatrist's behavioral intention to recommend an insole device in clinical practice. Disappointing player studies negatively impacted the podiatrists' purpose to undertake a clever device. The modern proof approximately affected person and issuer views on clever wearable generation is restrained via way of means of scarce methodological best and conflicting results. It is, thus, now no longer viable to attract definitive conclusions concerning acceptability of those gadgets for the prevention of DFU in human beings with diabetes.

Keywords: Arduino Uno, Node Mcu, DHT11 Sensor, Max Sensor, Hall effect sensor, RTC, GPS, Vibrator.

1. INTRODUCTION

One of the major diseases of diabetic patients is peripheral neuropathy where diabetic patients develop pressure ulcers in their feet. A bad plantar pressure distribution, an excessive humidity and a high temperature are relying of the high-satisfactory of footwear that have an effect on ft and might motive sickness like ulcer.A hot and humid environment is factors for the development of virus and microbes. A high pressure in specific point of the insole increases the risk of these pathologies. There is a need to measure all these parameter simultaneously in a daily shoe for feet's disease prevention.. Currently, tests are underway for variable pressure applied in the required range and the same for variable size of foot sole. The developed system is flexible and portable for field studies and also advantageous due to large memory size, dynamic recording of pressure and no fear of foot step modification.

2. Literature survey

2.1 An Early Detection System for Foot Ulceration in Diabetic Patients

The patient likely suffers from some degree of peripheral neuropathy, the device must be able to sense the things that he or she cannot. There are numerous diffused caution symptoms and symptoms that precede ulcer formation. The two most notable of these warning signs are inflammation and

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dryness.The Diapetic insole will have components that measure this increase and alert the patient to the elevated risk. Dryness shows the cessation of autonomic apprehensive characteristics with in the affected area. As sweating ceases, the pores and skin will become dry and stiff inflicting it to end up extra brittle and consequently much more likely to crack.

2.2 Development of Wireless Insole Foot Pressure Data Acquisition Device

There is a need of a low cost device that falls in between these two methods and can provide quantitative and repetitive result. In addition, non-stop tracking of gait might be beneficial for actual time bodily rehabilitation. The load distribution method on the foot to floor interface remains the issue of superior investigations. Accurate analysis of planter force variations forms the basis for the characterizing of human walking strategies and provides useful data for modeling the dynamic equilibrium of the body. The distribution of load under the foot can be measured either by subject walking over the pressure sensitive surface or by introducing a thin transducer between the foot and the supporting surface.

2.3 Sensor Architectural Tradeoff for Diabetic Foot Ulcer Monitoring

Diabetic patients have problems with their feet mainly because of poor blood flow, poor sensation (diabetic neuropathy), decreased wound healing rate, and trouble fighting off infection. With diabetes, even a wound as small as a blister, e.g. due to a tight shoe, can cause considerable damage. In such patients, the injuries heal slowly because of decreased blood flow. The number one hints for stopping diabetic foot ulcers are every day foot inspections, temperature monitoring, and orthotic shoes. Educating patients to perform daily self examination and properly care for their feet is inexpensive and universally recommended.

2.4 A low Cost Smart Insole for Diabetic Foot Prevention

A bad plantar pressure distribution, an excessive humidity and a high temperature are factors depending of the quality of shoes that affect feet and may cause disease like ulcer. A hot and humid environment is factors for the development of virus and microbes. A high pressure in specific point of the insole increases the risk of these pathologies. There is a need to measure all these parameter simultaneously in a daily shoe for feet’s disease prevention.

2.5 Design of a Smart in-Sole to Model and Control the Pressure under DiabeticPatients' Feet

Diabetes is a disease that impairs the pancreas’ ability to provide adequate insulin levels into the blood stream, which results in other health complications such as renal failure, cardiovascular diseases and diabetic foot ulcers. Diabetic foot ulcer is one of the main concerns for diabetic patients; because their foot wounds, and cuts are hard to heal. Diabetic foot ulcers are of chronic and difficult-to-heal wounds, and pressure increases the progress of ulcer, leading to the need of amputation. The existing treatments for ulcer prevention require regular hospital visits and high costs. The proposed insole modulates the pressure under the patients' feet to help in offloading the foot ulcers.

TITLE	TECHNOLOGY	DISADVANTAGES
An Early Detection System for Foot Ulceration in Diabetic Patients	Web of Things Interface (WTI) technique is that users that connect to IoT devices using various types of web browser.	When the irrigation system is faulty if we use fustigation and it is suitable for readily soluble or liquid Fertilizers.
Development of Wireless Insole Foot Pressure Data Acquisition Device	The advanced technology of IIOT.	There are more cyber security risks because of the usage of IIOT.

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Sensor Architectural Tradeoff for Diabetic Foot Ulcer Monitoring	Zig Bee technology is usedto communication in bidirectional.	Zigbee requires k nowledge of the system for the owner to Operate zigbee compliant devices
A low Cost Smart Insole for Diabetic Foot Prevention	Ground potential rise(GPR) at the source substation as it transitions from the soil into the grounding grid.	GPR requires more intensive training thanEM locating.
Design of a Smart in-Sole to Model and Control the Pressure under Diabetic Patients' Feet	Dual modular redundancy is a way of achieving highdegrees of reliability in a less costly solution.	The programming inFPGA is not as simple as C programming used in processor based hardware.

3. Proposed Methodology and Future Work

An instrumented insole with specified sensors has been developed for monitoring foot pressure distribution. For variable pressure applied in the required range and the same for variable size of foot sole. The developed system is flexible and portable for field studies. In the proposed method as we mentioned in the block diagram below, we are using a material such as a DHT11 sensor, Max Sensor, RTC to monitor and check the level of pressures of the patient.

4. Block Diagram

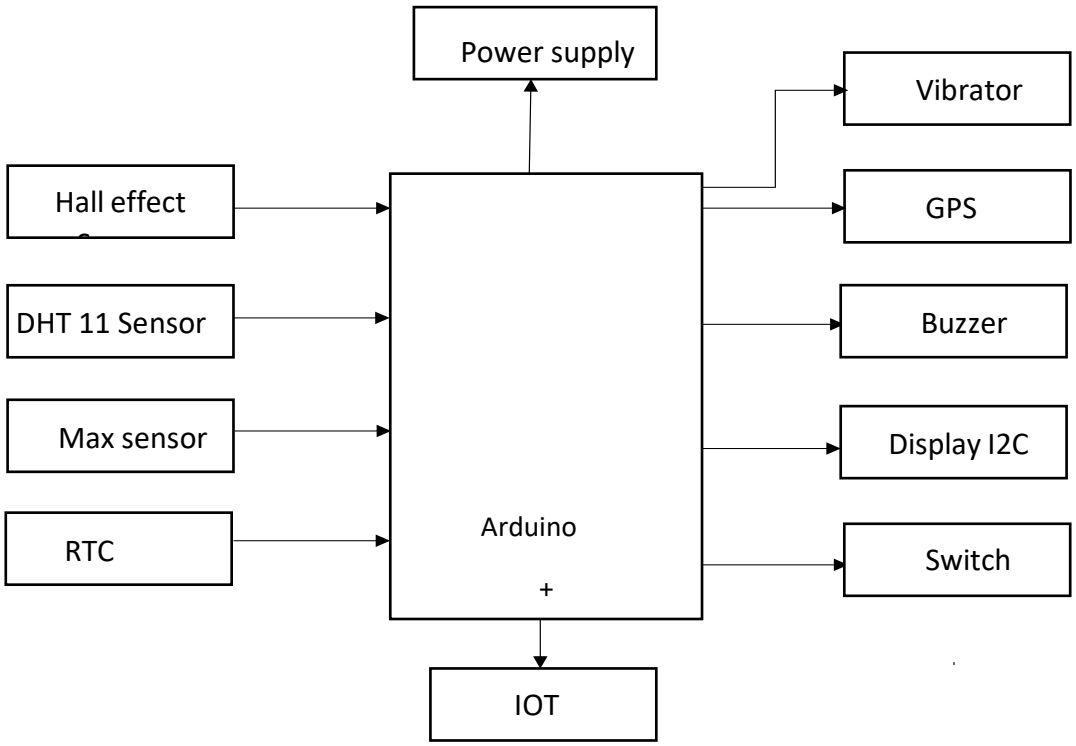

Fig 1 Block diagram of Proposed System

5. Result and Discussion

In the presented work a smart insole system for foot ulcerations prevention in diabetes patients was described. Temperature and pressure parameters were acquired from eight different points on the foot plantar. The preliminary laboratory tests validate high accuracy level in temperature data acquisition.

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Moreover good performance was obtained for the foot load distribution evaluation by using minimally invasive and calibrated pressure sensors. Ongoing studies are focused on the integration of a low-power elaboration and transmission unit to allow the final coupling with antibacterial socks.

Fig 2 Diagram of Model

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