

THERMAL SENSITIVITY MAPPING OF DIABETIC FOOT



A PROJECT REPORT

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in partial fulfillment for the award of the degree of

**BACHELOR OF ENGINEERING
in
MEDICAL ELECTRONICS**

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BENGALURU-560019
MAY 2015**

ABSTRACT

Diabetes Mellitus is a condition which is the result of high glucose levels in the blood stream, commonly found in the South Asian region. With symptoms such as fatigue, dehydration. It can lead to a critical state where patients experience adverse effects such as loss of sight or/and sensation in their feet.

Diabetic Neuropathy is a condition which refers to the damage of nerve fibers resulting in the loss of sensation. This results in a heightened pain threshold making patients immune to physical pain. This may cause a patient to be unaware of injuries. These injuries can lead to the formation of ulcers which in turn when left untreated can cause severe infection. This often results in amputation of the limbs. Untreated Diabetic Neuropathy accounts for 50-75% non-traumatic amputation.

The traditional methods for diagnosing diabetic neuropathy have so far been based on the principle of pressure. Research has shown that the damage caused to non-myelinated neurons are most sensitive to temperature. Thus the negligence in using thermal principle to satisfactorily diagnose diabetic neuropathy is addressed in this project such that the early diagnosis of diabetic foot is conducted.

In this project, the thermal sensitivity mapping used to diagnose diabetic foot is proposed. This is an alternative to the pre-existing diabetic foot diagnostic method. The use of a heater probe is made, which is set to a specific temperature, we test the sensitivity of specific region of the foot. A patient response button is provided which is pressed by the patient when they are able to sense the heat stimulus. When the patient does not respond, we increase the temperature. This is done until the patient is able to successfully sense the heat stimulus provided by the heating probe. The specific temperature sensed by each region of the foot is mapped onto image of a foot making for easy diagnosis.

We propose an in depth analysis where the foot of the patient is divided into separate 32 regions. We determine the sensitivity threshold of each specific region and hence, determine the extent of the damage which has occurred. This is different from the pressure threshold diagnostic methods which only note the pressure sensitivity in a few specific regions.