ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering
(IJARMATE) Vol. 3, Special Issue 12, March 2017

The Application of Infrared Image Analysis to Diabetic Foot Diagnosis

M.Vetrivel[1], S.Selvaraju[2]
PG Student[1], Associate Professor[2]
Department of Electronics &Communication Engineering
V.M.K.V Engineering College
Vinayaka Mission University,Salem,India

Abstract

Venous blood accumulation, or high levels of deoxygenated blood within a tissue, can indicate poor blood circulation and increased risk of ulceration. This condition is associated with Peripheral Arterial Occlusive Disease, or diabetic foot ulceration, which is classified as the most common cause for lower extremity amputation in the modern, industrialized world. Neuropathy, associated with lack of protective sensation allows patient to apply repetitive stress leading to the formation of ulcers without their knowledge. Regular inspection of the afflicted area by a physician is the best prevention method for this condition. This process requires increased scrutiny by physicians **and** more frequent visits by the patients. To simplify and reduce the costs of the process of examination, a low cost system for skin self-monitoring by patients was developed. A near infrared camera was built utilizing a Raspberry Pi 2.0 System in conjunction with optical filters, and image analysis tools to detect venous blood in tissues using differences in optical spectra of oxygenated versus deoxygenated blood in the near infrared (NIR) region. Tests to optimize the best wavelength of light and the best imaging conditions are being conducted to determine. Image analysis will be used to more accurately measure the amounts of inflammation. Further development also includes the development of an interface to allow for data sharing between patients and physicians of the images and the results.

I Introduction

Diabetic Ulcers are the most common foot injuries relating to lower extremity amputation Diabetic patients are at high risk of foot ulceration due to conditions of neuropathy. Diabetic neuropathy is a condition that is onset by chronic high blood sugar which causes nerve damage in the lower leg and feet. While early symptoms involve pain, more advanced symptoms include numbness and lack of sensation leading to ulceration and eventually the amputation of body parts such as toes, thumbs or feet. Patients lose the ability to depend on sensation to find any early signs of ulceration making examination by a physician crucial. While family physicians hold a primary role in the prevention of such conditions, doctor visits can become sporadic or non-existent for many patients. Therefore, providing a method for the earliest possible detection method is crucial for the patient's best health.

II LITERATURE SURVAY

Thermal Image Processing For Quantitative Determination Of Temperature Variations In Plantar Angiosomes

Thermal image analysis has been extended to a wide variety of application in the medicine field. Thermography and image processing are useful tools because they facilitate a noninvasive and fast diagnostic. In the study of the diabetic foot, it is important the early detection of ulceration risks. Such detection becomes difficult, due to the lack of symptoms in the early phase. A late detection may lead to an extremity

amputation. In the literature it has been established a relation between temperature and ulceration regions and, in recent works, some qualitative solutions for risk ulceration diagnostic based on a thermal analysis of the plantar foot have been proposed. In this work, an analysis and quantitative comparison of the temperature between the

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering
(IJARMATE) Vol. 3, Special Issue 12, March 2017

feet by using the concept of angiosome on diabetic patients is proposed. The goal of this study is to provide useful information in the early foot ulcers detection in patients with diabetic neuropathy.

2.Non-Invasive Imaging Techniques To Assess Diabetic Foot Ulcers: A State Of The Art Review

The present article is a summary of noninvasive imaging

techniques, which aim is to assess feet and legs' ulcer formation and development. The objective is to early detect if an ulcer is about to develop to apply prompt treatment and reverse the process or at least lessen it. Hyperspectral imaging, plantar pressure imaging, photographic imaging and thermic imaging techniques are presented as a recapitulation of the state of the art of imaging techniques and their results.

3.An Early Detection System For Foot Ulceration In Diabetic Patients

Ulcer formation and proliferation in diabetic patients is a result of said patients' inability to sense the precursors of wound development in the extremities. This loss of a sensation is a result of peripheral neuropathy which is a complication of diabetes. This article presents the research, design, and testing protocol of a device intended to act as an early detection system for foot ulcerformation. The device monitors high-risk areas on the soles of the feet for symptoms indicating ulceration. Pressure and temperature sensors placed at the targeted high risk areas of an insole are used in conjunction with a data acquisition system to read the necessary data from the soles of patients' feet. Pressure values were taken from the big toe, the ball of plantar, and the heel of a 75kg healthy male while the subject was standing and walking. The data gathered indicates areas of the plantar that experience the most localized pressure and therefore are at the highest risk for ulceration.

4.Anthropometric ProfileAnd Diabetic Foot Risk:A Cross- Sectional Study Using Thermography

Diabetes is one of the greatest todays public health problems with enormous social and economic implications for society. Diabetic foot disorders represent a substantial economic burden with detrimental effects on quality of life with special impairment in physical domain. Early detection strategies of these complications should be implemented in order to avoid possible wounds, ulcerations and amputations.

WORKING PRINCIPLE

The project successfully enabled the team to take images that show venous structures through the skin as predicted in the hypothesis. To further improve the visibility, comparative processing of multiple images will be conducted by programming the light sequence in accordance with the imaging, producing multiple images at all of the wavelengths. These images could then be subtracted from each other producing a final product

EXISTING SYSTEM

- Here human concentrate is needed to drive
- Its fully depends on man power source

DRAWBACKS OF EXISTING SYSTEM:

- Manual health checkup is needed.
- Human intervention is needed to monitor and manual reading had been taken.

PROPOSED SYSTEM

- In proposed system, we can design a new system to monitor the normal and abnormal condition.
- Depend upon the mat lab output image will show the Early Detection of Diabetic Ulcers.
- Only camera can be used to detect the diabetic.

ADVANTAGE OF PROPOSED SYSTEM:

- Human intervention is less
- Fast response

HARDWARE TOOLS

- Raspberry pi
- Power supply
- IR camera
- Display

RASPBERRY PI

The Raspberry Pi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

IJARMATE
International Journal of Advanced Research in Management, Architecture, Technology and Engineering
(IJARMATE) Vol. 3, Special Issue 12, March 2017

basic computer science in schools and developing countries. Several generations of Raspberry P is have been released. The first generation (Raspberry Pi 1 Model B) was released in February 2012. It was followed by a simpler and inexpensive model Model A. In 2014 the foundation released a board with an improved design in Raspberry Pi 1 Model B+. The model laid the current "mainline" form-factor. Improved A+ and B+ models were released a year later. A cut down "compute" model was released in April 2014, and a Raspberry Pi Zero with smaller size and limited input/output (I/O) and general- purpose input/output (GPIO) abilities was released in November 2015 for US$5. The Raspberry Pi 2 which added more RAM was released in February 2015. Raspberry Pi 3Model B released in February 2016 is bundled with on-board Wi-Fi and Bluetooth. As of 2016, Raspberry Pi 3 Model B is the newest mainline Raspberry Pi. These boards are priced between US $20–35.All models feature a Broadcomsystem on a chip (SoC), which includes an ARMcompatible central processing unit (CPU) and an on chip graphics processing unit (GPU, a VideoCore IV). CPU speed ranges from 700 MHz to
1.2 GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAM.

Performance

While operating at 700 MHz by default, the first generation Raspberry Pi provided a real-world performance roughly equivalent to 0.041 GFLOPS.[15][16] On the CPU level the performance is similar to a 300 MHz Pentium II of 1997–99. The GPU provides 1 Gpixel/s or 1.5Gpixels/s of graphics processing or 24 GFLOPS of general purpose computing performance. The graphical capability of the Raspberry Pi are roughly equivalent to the performance of the Xbox of 2001.

Overclocking

The first generation Raspberry Pi chip operated at 700 MHz by default, and did not become hot enough to need a heat sink or special cooling unless the chip was overclocked. The Raspberry Pi 2 runs at 900 MHz by default; it also does not become hot enough to need a heatsink or special cooling, although overclocking may heat up the SoC more than usual.

Most Raspberry Pi chips could be overclocked to 800 MHz, and some to 1000 MHz. There are reports the Raspberry Pi 2 can be similarly overclocked, in extreme cases, even to
1500 MHz (discarding all safety features and over-voltage limitations). In the RaspbianLinux distro the overclocking options on boot can be done by a software command running "sudoraspi-config" without voiding the warranty.[20] In those cases the Pi automatically shuts the overclocking down if the chip reaches 85 °C (185 °F), but it is possible to override automatic over-voltage and overclocking settings (voiding the warranty); an appropriately sized heatsink is needed to protect the chip from serious overheating.

Conclusion

The project successfully enabled the team to take images that show venous structures through the skin as predicted in the hypothesis. To further improve the visibility, comparative processing of multiple images will be conducted by programming the light sequence in accordance with the imaging, producing multiple images at all of the wavelengths. These images could then be subtracted from each other producing a final product.

SOFTWARE DESCRIPTION PIC C COMPILER

This integrated C development environment gives developers the capability to quickly produce very efficient code from an easily maintainable high level language. The compiler includes built in functions to access the PIC hardware such as READ_ADC to read a value from the A/D converter. Discrete I/O is handled by describing the port characteristics in a PRAGMA. Functions such as INPUT and OUTPUT_HIGH will properly maintain the tri-state registers. Variables including structures may be directly mapped to memory such as I/O ports to best represent the hardware structure in C. The microcontroller clock speed may be specified in a PRAGMA to permit built in functions to delay for a given number of microseconds or milliseconds. Serial I/O functions allow standard functions such as GETC and PRINTF to be used for RS-232 like I/O. The hardware serial transceiver is used for applicable parts when possible. For all other cases a software serial transceiver is generated by the compiler

REFERENCES

[1] S. Juric, “Towards a low-cost mobile subcutaneous vein detection solution using near-infrared spectroscopy National CenterforBiotechnology Information, 03-Aug-2013

[2] S. L. Jacques, “Optical properties of biological tissues: a review,” Physics in Medicine and Biology, 10-May-013. online]Availableat:http://iopscience.iop.org/article/10.1088/0 031-9155/58/11/r37/meta. [Accessed: Jan-2016]

[3] Internal Clinical Guidelines Team, “National Center for Biotechnology Information,” National Center for Biotechnology Information, Aug-2015. [Online]. Available at: http://www.ncbi.nlm.nih.gov/books/nbk338144/.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering
(IJARMATE) Vol. 3, Special Issue 12, March 2017

[Accessed:10-Feb-2016].

[4] A. Vinik, "Result Filters," National Center for Biotechnology Information, Dec-2013. [Online]. Available at: http://www.ncbi.nlm.nih.gov/pubmed/24286949. [Accessed:10-Feb- 2016].

-2016]

[5] A. Shahzad, M. N. Saad, N. Walter, A. S. Malik, and F. Meriaudeau, "Hyperspectral venous image quality assessment for optimum illumination range selection based on skin tone characteristics," BioMedical Engineering Online. [Online].Availableat: http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4132203/. [Accessed: 10- Feb