Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X
IMPACT FACTOR: 6.017

IJCSMC, Vol. 6, Issue. 6, June 2017, pg.315 – 317

DATA STORAGE ON FINGERNAIL

Afnan Naqshbandi[1], Tahira Mushtaq[2], Khalid Makhdoomi[3]

[1]Student, SSM College of Engineering & Technology, Kashmir, India
[2]Student, SSM College of Engineering & Technology, Kashmir, India
[3]Assistant Professor, SSM College of Engineering & Technology, Kashmir, India

afnaan.naqshbandi@gmail.com; tpukhta.10@gmail.com; makhdoomikhalid@gmail.com

Abstract*— Storing data on a fingernail comes under the field of study of Data Recording on Biological Tissues using Pulsed Laser or more appropriately known as a femtosecond laser. These tissues include human fingernails, dental memory, DNA, hair, etc. All these undergo adaptive focusing and target surface detection using a processing system. This paper focusses on data storage on human fingernails. In order write data on the nail, a laser pulse of wavelength 800 nanometers is used. The diameter of a data bit is about 0.003 millimeters and the spacing between the bits is 0.005mm in three layers at depths of 0.04, 0.06, and 0.08 mm within the nail.

I. INTRODUCTION

Data storage is defined as the recording of information. It is achieved virtually by any energy form. Nowadays, there are many issues that are encountered during the storage of data. The data needs to be generated first and then stored. Transferring of data without any loss or damage is also one of the major issues. All of this generation, storage, and transfer of data should be done while assuring its security. The use of a femtosecond laser pulse has reduced these threats to a large extent. The laser approach saves time and also reduces chances of thermal damage as there is an extremely short interaction time between the laser and the material. To achieve a successful data storage on fingernails, a femtosecond laser processing system is used which provides adaptive focusing and high throughput.

The main aim of storing data on human fingernails is the secured transportation of data without the issues of theft, imitation or any sort of data loss. The data is written onto a fingernail by exposing it to the femtosecond laser pulse which causes structural changes in the fingernail. A data of about 5 megabits can be stored for a period of six months. Same time is taken by a nail to get replaced fully.

II. BASIC APPROACH

The storing of data on a human fingernail is done using a system which consists of two main components:

- A femtosecond laser processing system.
- A fluorescence microscope.

The first one is used to write the data onto the nail whereas, in order to read out the data from a fingernail, a fluorescence microscope is used.

The writing system has two basic functions. First is the adaptive focusing. This results in structural changes in the nail due to ionization of molecules in the nail. The changed portions face an increase in their fluorescence and the data is written onto them. Adaptive focusing is achieved by target surface detection. The second function is that of achieving high throughput. High throughput is achieved by parallel laser processing which is based on a hologram that is produced using a computer on a spatial light modulator.

Reading of data from the fingernail is done by visualizing the luminance or fluorescence of the fingernail. At the target points, the luminance is increased due to the exposure to the laser pulse. This fluorescence is different from the original fluorescence spectrum of the fingernail. This difference lets the users detect the data and read it out. This is done using a microscope that consists of a filtered xenon arc lamp. This lamp excites the fluorescence of the target points and data from the different depths is read out.

III. ADVANTAGES

As already discussed, the storage of data faces major issues while generating, storing and even the transferring of data. There are also threats of theft, imitation or forgery, data loss, data damage etc. The main aim of using human fingernails for data storage, as mentioned before, was to reduce the above-listed threats.
Nevertheless, the advantages of data storage on fingernails can be enlisted as follows:

- Firstly, it is a safe process. The use of femtosecond laser pulse on nails is not harmful and doesn't cause any side effects on the human body.
- The security of data is ensured. There is no threat such as theft, copy or damage (thermal mostly).
- It expires on its own after a span of six months.

IV. CONCLUSIONS

Since the structural changes cause an increase in the luminance, this helps in various ways. The structure with high fluorescence helps in reading the three – dimensional data inside the nail. The data on a nail is recorded in three-bit planes. These can be read out with minimum crosstalk by the use of a fluorescence microscope.

Also, the luminance can be visualized for a duration of six months. This is same as the time required for nail growth from root to tip. A red=cording density of about 2 gigabit/cm^3 is achieved under such conditions which are commendable.

ACKNOWLEDGEMENT

We would like to thank our HOD Mrs. Yasmeen and our guide Mr. Khalid Makhdoomi for providing us with useful and valuable comments on the study. This study would not have been possible without the undivided and dedicated support of these two people.

BIOGRAPHIES

[1]**Afnan Naqshbandi** is pursuing B.E Degree from SSM College of Engineering & Technology in Computer Science Engineering from the University of Kashmir, J&K, India. Her field of interest is Data Storage in Biological Tissues

[2]**Tahira Mushtaq** is pursuing B.E Degree from SSM College of Engineering & Technology in Computer Science Engineering from the University of Kashmir, J&K, India. Her field of interest is Data Storage in Biological Tissues

[3]**Khalid Makhdoomi** is the Assistant Professor at SSM College of Engineering & Technology in Department of Computer Science Engineering, J&K, India. His field of interest is Operating Systems.

REFERENCES

[1]. www.google.com

[2].Y.Hayasaki, "Holographic Femtosecond Laser Processing and Three-dimensional Recording in Biological Tissues", Progress in Electromagnetics Research Letters, Vol. 2, 115–123, 2008.

[3]. www.studymafia.org

[4]. www.howstuffworks.com

[5]. www.opticexpress.org

