

STSM report

STSM Application number: COST-STSM-BM1205-20180

STSM Grantee: COST-STSM-ECOST-STSM-BM1205-250514-044880

STSM title: Study of laser light photoplethysmogram for skin cancer detection

Home Institution: Institute of Atomic Physics and Spectroscopy, University of Latvia

Host institution: Technomedicum of Tallin University of Technology

STSM period: 25.05.2014 – 31.05.2014.

STSM purpose: Foster collaboration between home laboratory and host institution; study of new technologies for optical skin assessment and skin cancer diagnostics, using instruments and methods not available in home laboratory.

Description of the work carried out during STSM:

A cancerous tumour needs oxygen and nutrients, so the tumor needs its own blood supply (angiogenesis). The cancer cells may be able to stimulate normal cells to produce angiogenic factors to help produce new blood vessels. Once a cancer can stimulate blood vessel growth, it can grow bigger and bigger. This is very dangerous because cancer cells could get into the bloodstream and spread around the body.

In this work photoplethysmography imaging (PPGI) technique was used for highlighting of blood supply on the skin surface around the malignant tissue. Cardiac activity leads to blood volume pulsations in skin. PPGI this technique allows visualize skin areas with higher blood circulation where malignant tissue grows.

25.05.2014. Arrival to Tallin.

26.05.2014. Meeting with Director of Technomedicum of Tallin University of technology Kalju Meigas and his team. Introducing by technical equipment in laboratory and novel methods for photoplethysmography assesment of skin blood perfusion.

27.05.2014. Discuss about several methods of non-contact asesment of cancerous skin by photoplethysmography imaging. It was decided that the best results for skin blood circulation assesment would be in the case of use two laser diodes as light sources (red 685 nm and green 532 nm).

28.05.2014. Experimental setup for non-contact ppg measurements of cancerous skin was built in the laboratory. Image acquisition software was adapted to experiment.

29.05.2014. Presenting of the main scientific topics of Biophotonics laboratory, home institution. Discussing about the bio-signal acquisition methods and algorithms for photoplethysmographic signal processing and hemodynamic parameter estimation. Discussing about how to get skin cancer assessment using laser light by photoplethysmography imaging method.

30.05.2014. Meeting together with the team of Technomedicum and discussing about the future collaboration between institutions.

31.05.2014. Departure from Tallin to Riga.

Description of the main results obtained:

During this STSM we found solution for optical skin assessment for skin cancer detection. We found that non-contact photoplethysmography imaging technique with bi-chromatic laser light is suitable for monitoring blood circulation in malignant skin tissue.

I am agree.
Kalju Meigas
Tallinn University
of Technology

Klun

30.05.2014