Manipal Academy of Higher Education

Impressions@MAHE

Manipal School of Life Sciences, Manipal Theses and Dissertations

MAHE Student Work

5-2019

Development of a cost-effective, portable and easy-to-use device for disease detection

Soumyabrata Banik

Follow this and additional works at: https://impressions.manipal.edu/mlsc

 Part of the Life Sciences Commons

SCHOOL OF LIFE SCIENCES
MANIPAL
(A constituent unit of MAHE, Manipal)

Development of a cost-effective, portable and easy-to-use device for disease detection

Dissertation submitted in partial fulfillment of the requirements for the degree of

Bachelor of Science
in
Biotechnology

Submitted by:

Mr. Soumyabrata Banik

Roll Number: 161701094

6th Semester B.Sc. Biotechnology

School of Life Sciences

Manipal Academy of Higher Education, Manipal

Project Advisor

Thesis guide

Dr. Nirmal Mazumder
Assistant Professor
Department of Biophysics
Manipal School of Life Sciences,
Manipal Academy of Higher Education,
Manipal--576104, India

Thesis co-guide

Dr. K K Mahato
Professor & Head
Department of Biophysics
Manipal School of Life Sciences,
Manipal Academy of Higher Education,
Manipal--576104, India

May 2019

Abstract: Most of the diseases in remote rural areas as well as in developing countries are detected late at some advanced stages and, hence causing higher fatalities. Therefore, early detection and diagnosis of diseases is a key area of research for controlling disease progression. The main problem being targeted in this study is the delay of disease detection in remote rural areas and developing countries. A new age optical microscope for low cost, high sensitivity diagnosis is essential, particularly in remote areas around the world could revolutionize the process of disease diagnosis. The portable optical microscope using optics and smartphone interface with an attached lens is developed to bridge the gap in diagnosis. The device was built using acrylic sheets to make it less bulky & customizable and 3D printed mechanical parts to increase stability. The study included fabrication of the device, testing with diseased samples along with controls to determine its diagnostic capability. Images were acquired using the Ultra-BLIPS lens integrated to smartphones and were compared with a traditional optical microscope. It was observed that the images from the smartphone were comparable. We achieved single cell resolution using the developed device. To further increase the efficiency of the proposed smartphone-based microscope, deep learning-based image analysis can be integrated.