DECLARATION

I, hereby, declare that the thesis entitled ***"Design and implementation of an inexpensive, handheld microscopic imaging and analytical system for biomedical and laboratory applications"***, submitted to the School of Sciences, Tezpur University (TU), in partial fulfillment of the requirements for the award of the Doctor of Philosophy in Physics, has been carried out by me at the Department of Physics, TU, Assam, India-784028, under the supervision of ***Prof. Pabitra Nath*** (Supervisor). The contents of this work is original except where specific reference is made to the works of others and has not been submitted in whole or in part for consideration for any other degree or qualification in this or any other university or institute.

Diganta Rabha

Date

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CERTIFICATE OF THE PRINCIPAL SUPERVISOR

This is to certify that the thesis entitled ***"Design and implementation of an inexpensive, handheld microscopic imaging and analytical system for biomedical and laboratory applications"***, submitted to the School of Sciences, Tezpur University in partial fulfillment for the award of degree of Doctor of Philosophy in Physics, is a record of research work carried out by **Mr. Diganta Rabha** under my guidance and supervision.

All help received by him from various sources have been duly acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

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CERTIFICATE OF EXTERNAL EXAMINER AND ODEC

This is to certify that the thesis entitled ***"Design and implementation of an inexpensive, handheld microscopic imaging and analytical system for biomedical and laboratory applications"***, submitted by **Mr. Diganta Rabha** to Tezpur University in the Department of Physics under the School of Sciences in partial fulfillment of the requirement for the award of degree of Doctor of Philosophy in Physics has been examined by us on ..... and found satisfactory.

The committee recommends for the award of the degree of Doctor of Philosophy.

Principal Supervisor
Date:

External Examiner
Date:

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(Diganta Rabha)

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List of abbreviations

ALS	Ambient Light Sensor
BF	Bright-field
CAD	Computer-aided Design
CFA	Color Filter Array
cmLM	color-multiplexed Laboratory Microscope
CMOS	Complementary Metal-Oxide Semiconductor
cmSM	color-multiplexed Smartphone Microscope
CPU	Central Processing Unit
DF	Dark-field
DIY	Do-it-Yourself
DPC	Differential Phase Contrast
FDM	Fused Deposition Modeling
FI	Fluorescence Imaging
FWHM	Full Width Half Maximum
GPU	Graphics Processing Unit
GUI	Graphical User Interface
HECC	Human Epithelial Cheek Cell
IDE	Integrated Development Environment
IF	Infrared Filter
LED	Light Emitting Diode
LSPR	Localized Surface Plasmon Resonance
MTF	Modulation Transfer Function
NA	Numerical Aperture
NFC	Near-field Communication
OI	Oblique Illumination
OIDF	Oblique Illumination Dark-field
OLED	Organic Light Emitting Diode
OS	Operating System
OTG	On-The-Go
PISM	Programmable Illumination Smartphone Microscopy
PoCT	Point-of-Care Tool
PSF	Point-Spread-Function
RI	Rheinberg Illumination
SLM	Spatial Light Modulator
SNR	Signal-to-Noise Ratio
SPR	Surface Plasmon Resonance

STL	Standard Tessellation Language
TIRDF	Total Internal Reflection Dark-field
USAF	United State Air Force
USB	Universal Serial Bus
WHO	World Health Organization

Dedicated to Maa-Deuta
(Charu Rabha & Deva Kanta Rabha)