

DECLARATION

I, hereby, declare that the thesis entitled “*Development of compact, user-friendly smartphone sensing platform for detection and analysis of different environmental and agricultural parameters*”, 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.

Priyanka Das

Date



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(A central University established by an Act of Parliament)

DEPARTMENT OF PHYSICS

Tezpur-784028, Assam, India

CERTIFICATE OF THE PRINCIPAL SUPERVISOR

This is to certify that the thesis entitled “*Development of compact, user-friendly smartphone sensing platform for detection and analysis of different environmental and agricultural parameters*”, 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 **Ms. Priyanka Das** under my guidance and supervision.

All help received by her 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 THE EXTERNAL EXAMINER

This is to certify that the thesis entitled “*Development of compact, user-friendly smartphone sensing platform for detection and analysis of different environmental and agricultural parameters*”, submitted by Ms. **Priyanka Das** to the School of Sciences, Tezpur University in partial fulfillment for the award of degree of Doctor of Philosophy in Physics, has been examined by us on/...../..... and found to be satisfactory.

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(Priyanka Das)

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List of abbreviations

AAS	Atomic Absorption Spectroscopy
AE	Auto Exposure
AF	Auto Focus
ALS	Ambient Light Sensor
ANOVA	Analysis of Variance
Apps	Applications
AuNP	Gold Nanoparticle
CAD	Computer-aided Design
CDs	Carbon nanodots
CMOS	Complementary Metal-Oxide Semiconductor
CPU	Central Processing Unit
CQD	Carbon Quantum Dots
DIW	Directly Ink Writing
DVD	Digital Versatile Disc
ECL	Electro Chemiluminescence
FDM	Fused Deposition Modeling
FET	Field-Effect Transistor
FRET	Fluorescence Resonance Energy Transfer
GC-MS	Gas Chromatography Mass Spectrometry
GPS	Global Position System
HPLC	High Performance Liquid Chromatography
HSV	Hue Saturation Value
ICP	Inductive Coupled Plasma
IRS	Infrared Spectroscopy
ISE	Ion-Selective Electrode
ISFET	Ion-Selective Field-Effect Transistor
ITU	International Telecommunication Union
LAI	Leaf Area Index
LCC	Leaf Color Chart
LED	Light Emitting Diode
LSPR	Localized Surface Plasmon Resonance
MP	Megapixel
NFC	Near-field Communication
NIR	Near Infra Red
nm	Nanometer
NMR	Nuclear Magnetic Resonance

NPs	Nanoparticles
NR	Neutral Red
NTU	Nephelometric Turbidity Unit
OTG	On-The-Go
PC	Personal Computer
PDMS	Polydimethylsiloxane
PETG	Polyethylene Terephthalate
PLA	Polylactic Acid
PoCT	Point-of-Care Tool
RGB	Red Green Blue
RSD	Residual Standard Deviation
SD	Standard Deviation
SLA	Stereolithography
SoQM	Soil Quality Monitoring
SPAD	Soil Plant Analysis Development
SPR	Surface Plasmon Resonance
STL	Standard Tessellation Language
TEM	Transmission Electron Microscope
USB	Universal Serial Bus
USEPA	U.S. Environmental Protection Agency
UV-VIS	Ultraviolet-Visible
VOC	Volatile Organic Compound
WHO	World Health Organization
Wi-Fi	Wireless Fidelity

Dedicated to Maa-Papa
(Kalpana Das & Kesha Kanta Das)