UNDERGRADUATE THESIS

DESIGN AND CONSTRUCTION OF AN INFORMATION SYSTEM FOR MONITORING VEGETATION DENSITY AND CONDITION BASED ON GOOGLE EARTH ENGINE USING MULTI-SPECTRAL VEGETATION INDICES OF LANDSAT 8 COLLECTION 2 IMAGERY IN SURABAYA

M. MUSHTHAFAINAL AKHYAR MYZANDEO
NPM 19081010042

THESIS ADVISORS

Dr. I Gede Susrama Mas Diyasa, ST., MT
Dr. Intan Yuniar Purbasari, S.Kom., M.Sc

MINISTRY OF HIGHER EDUCATION, SCIENCE, AND TECHNOLOGY
UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN JAWA TIMUR
FACULTY OF COMPUTER SCIENCE
INFORMATICS STUDY PROGRAM
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APPROVAL SHEET

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By:
M. MUSHTHAFAINAL AKHYAR MYZANDEO
NPM. 19081010042

Has been defended before and accepted by the Board of Examiners of the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur, on June 17, 2026:

Approved,

Dr. I Gede Susrama Mas Diyasa, ST., MT **NIP. 19700619 2021211 009**	.....	**(Advisor I)**
Dr. Intan Yuniar Purbasari, S.Kom., M.Sc **NIP. 198006022 025212 029**	.....	**(Advisor II)**
Dr. Ir. Mohammad Idhom, S.P., S.Kom., MT **NPT. 19830310 2021211 006**	.....	**(Assessor 1)**
Dr. Firza Prima Aditiawan, S.Kom., M.T.I., M.C.F., M.O.S **NIP. 19860523 2021211 003**	.....	**(Assessor 2)**

Acknowledged by,
Dean of the Faculty of Computer Science

Prof. Dr. Ir. Novirina Hendrasarie, MT
NIP. 19681126 199403 2 001

APPROVAL SHEET

DESIGN AND CONSTRUCTION OF AN INFORMATION SYSTEM FOR MONITORING VEGETATION DENSITY AND CONDITION BASED ON GOOGLE EARTH ENGINE USING MULTI-SPECTRAL VEGETATION INDICES OF LANDSAT 8 COLLECTION 2 IMAGERY IN SURABAYA

By:
M. MUSHTHAFAINAL AKHYAR MYZANDEO
NPM. 19081010042

Has been approved to sit for the Thesis Examination

Approved by,

Coordinator of Informatics Study Program
Faculty of Computer Science

Dr. Intan Yuniar Purbasari, S.Kom. M.Sc
NIP. 198006022 025212 029

STATEMENT OF ORIGINALITY

I am undersigned:

Student Name	: M. Mushthafainal Akhyar Myzandeo
NPM	: 19081010042
Degree Program	: Undergraduate (S1)
Study Program	: Informatics
Faculty	: Faculty of Computer Science

Hereby declares that this thesis does not contain any part of another scholarly work that has been submitted to obtain an academic degree at any higher-education institution. Furthermore, this thesis does not contain any work or opinion previously written or published by another person, except where expressly cited within this thesis and fully listed in the bibliography.

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Surabaya, June 17, 2026
Declarant,

M. MUSHTHAFAINAL AKHYAR MYZANDEO
NPM. 19081010042

ABSTRACT

Student Name / NPM	:	M. Mushthafainal Akhyar Myzandeo/ 190810100042
Thesis Title	:	Design and Construction of an Information System for Monitoring Vegetation Density and Condition Based on Google Earth Engine Using Multi-Spectral Vegetation Indices of Landsat 8 Collection 2 Imagery in Surabaya
Thesis Advisors	:	1. Dr. I Gede Susrama Mas Diyasa, ST., MT 2. Dr. Intan Yuniar Purbasari, S.Kom., M.Sc

Green open spaces play an important role ecologically, socially, aesthetically, and economically in supporting the quality of the urban environment; however, monitoring their condition in the City of Surabaya still requires an efficient, spatial-data-driven approach. This study aims to design and develop a vegetation monitoring information system based on Google Earth Engine (GEE) capable of identifying the role and influence of vegetation indices on urban environmental conditions. The system was developed using the Waterfall method, leveraging Landsat 8 Collection 2 satellite imagery from the 2020–2025 period, which was processed through six spectral vegetation indices NDVI, EVI, MSAVI2, NDMI, GNDVI, and NBR to measure vegetation density, chlorophyll content, canopy moisture, and vegetation stress levels. The results show that the system successfully presents vegetation-index visualizations as a cloud-based interactive map equipped with layer selection, interpretation legends, and index-value information, classifying vegetation density into low, medium, and high categories across the City of Surabaya. This system can serve as a decision-support and evaluation tool for the management of urban green spaces in a more effective and efficient manner, without requiring high-specification hardware.

Keywords: Vegetation Index, Google Earth Engine, Landsat 8, NDVI, Remote Sensing, Vegetation Monitoring, Geographic Information System.

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Surabaya, June 30, 2026

M. Mushthafainal Akhyar Myzandeo

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