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# Design of Soil Mapping Monitoring System using Computer Vision and Deep Learning

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# Approval Sheet

This design project entitled **“Design of Soil Mapping Monitoring System Using Computer Vision and Deep Learning.”** prepared by Eugene G. Betita, John Lloyd Renzo R. Castillo, Jonnel M. Esponilla, and Neal Barton James J. Matira of the Computer Engineering Department was examined and evaluated by the members of the Student Design Evaluation Panel and is hereby recommended for approval.

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# Major (Capstone) Design Experience Information

**CPE029 DESIGN PROJECT 1**

**1st Semester, SY 2023-2024**

|  |  |
| --- | --- |
| **Students/Team**  **Team 21** | Eugene G. Betita  John Lloyd Renzo R. Castillo  Jonnel M. Esponilla  Neal Barton James J. Matira |
| **Project Title** | Design of Soil Mapping Monitoring System using Computer Vision and Deep Learning |
| **Project Concentration Area** | Deep Learning |
| **Design Project Objectives** | **General Objective:**  The general objective of this project is to design a … Therefore, the following are the project’s specific objectives:  **Specific Objectives:**   * To… * To test and evaluate the accuracy of the system. |
| **Constraints** |  |
| **Economic (-)** | Economic constraint refers to |
| **Safety (-)** | Safety constraint refers to |
| **Risk (-)** | Risk constraint refers to |
| **Environmental (-)** | Environmental constraint refers to |
| **Sustainability (-)** | Sustainability constraint refers to |
| **Public Health** | Public health |
| **Public Welfare** | Public welfare |
| **Social** | Social constraints |
| **Global** | Global constraints. |
| **Cultural** | Cultural constraints |
| **Standards** |  |
| **IEEE Enhancement Proposal Index (PEP 8) – Style Guide for Python Coding** |  |
| **Standard for Accuracy of Measuring Devices ISO 5725-1:1994 (en)** |  |
| **Soil Test Kit - Bureau of Soils and Water Management** |  |

# Abstract

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# List of Abbreviations

|  |  |
| --- | --- |
| **SDG** | Sustainable Development Goals |
| **UN** | United Nations |

# Definitions of Terms

Listed below are definitions of the terms used in the documents.

**Algorithm**

An algorithm is a series of instructions or a methodical process that needs to be followed to execute or complete a task or to solve problems.

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# **CHAPTER 1: THE PROJECT AND ITS BACKGROUND**

This chapter discusses

## 1.1 The Problem

## 1.2 The Client

## 1.3 The Project

## 1.4 Project Objectives

## 1.5 Scope and Delimitation

## 1.6 Design Constraints

**Economic (-)**

**Safety (-)**

**Risk (-)**

**Environmental (-)**

**Sustainability (-)**

**Public Health**

**Public Welfare**

**Social**

**Global**

**Cultural**

## 1.7 Engineering Standards

## 1.8 Engineering Design Process

The engineering design process consists of seven steps: ask, research, imagine, plan, create, test, and improve. It guides engineers through the steps necessary to address a problem. In addition, the steps can be repeated as often as required during the design process, making adjustments along the way and discovering new design possibilities.

**Diagram

Description automatically generated**

Figure 1.1 Engineering Design Process.

(Image Source: www.teachengineering.org)

### 1.8.1 Ask to Identify the Need and Constraints

### 1.8.2 Research the Problem

### 1.8.3 Imagine Possible Solutions

### 1.8.4 Plan by Selecting a Promising Solution

### 1.8.5 Create a Prototype

### 1.8.6 Test and Evaluate the Prototype

### 1.8.7 Improve and Redesign as Needed

# CHAPTER 2: PROJECT DESIGN

## 2.1 Description of the Design Solution

### 2.1.1 Design Description

### 2.1.2 Engineering Principles Involved

### 2.1.3 Prior Art Analysis

### 2.1.4 Standards Involved in the Design

## 2.2 General System Architecture

### 2.2.1 Hardware Elements

#### 2.2.1.1 Hardware Design

#### 2.2.1.2 Physical/Mechanical Components

### 2.2.2 Software Elements

#### 2.2.2.1 Embedded Software

#### 2.2.2.2 Application Software

#### 2.2.2.3 Key Algorithms Used

### 2.2.3 Data, Datasets, and Processing

#### 2.2.3.1 Datasets

#### 2.2.3.2 Data Processing Scheme and Algorithms

#### 2.2.3.3 Other Data Utilized in the Design

## 2.3 Design Alternatives

### 2.3.1 Rationale for Design Alternatives

### 2.3.2 Design Constraints

### 2.3.3 Design Alternatives

#### 2.3.3.1 Design Alternative A

##### 2.3.3.1.1 Engineering Principle Alternative

##### 2.3.3.1.2 Architecture of Design Alternative

##### 2.3.3.1.3 Evaluation of Constraints

###### 2.3.3.1.3.1 Constraint A

###### 2.3.3.1.3.2 Constraint B

###### 2.3.3.1.3.3 Constraint C

###### 2.3.3.1.3.4 Constraint D

###### 2.3.3.1.3.5 Constraint E

#### 2.3.3.2 Design Alternative B

##### 2.3.3.2.1 Engineering Principle Alternative

##### 2.3.3.2.2 Architecture of Design Alternative

##### 2.3.3.2.3 Evaluation of Constraints

###### 2.3.3.2.3.1 Constraint A

###### 2.3.3.2.3.2 Constraint B

###### 2.3.3.2.3.3 Constraint C

###### 2.3.3.2.3.4 Constraint D

###### 2.3.3.2.3.5 Constraint E

#### 2.3.3.3 Design Alternative C

##### 2.3.3.3.1 Engineering Principle Alternative

##### 2.3.3.3.2 Architecture of Design Alternative

##### 2.3.3.3.3 Evaluation of Constraints

###### 2.3.3.3.3.1 Constraint A

###### 2.3.3.3.3.2 Constraint B

###### 2.3.3.3.3.3 Constraint C

###### 2.3.3.3.3.4 Constraint D

###### 2.3.3.3.3.5 Constraint E

### 2.3.4 Summary of Design Constraints

# **CHAPTER 3: DESIGN TRADE-OFFS**

## 3.1 Summary of Constraints

## 3.2 Trade-offs

### 3.2.1 Tradeoff 1: Economics (-)

#### 3.2.1.1 Design 1: Normalization of Economic (-)

#### 3.2.1.2 Design 2: Normalization of Economic (-)

#### 3.2.1.3 Design 3: Normalization of Economic (-)

### 3.2.2 Tradeoff 2: Safety (-)

#### 3.2.2.1 Design 1: Normalization of Safety (-)

#### 3.2.2.2 Design 2: Normalization of Safety (-)

#### 3.2.2.3 Design 3: Normalization of Safety (-)

### 3.2.3 Tradeoff 3: Risk (-)

#### 3.2.3.1 Design 1: Normalization of Risk (-)

#### 3.2.3.2 Design 2: Normalization of Risk (-)

#### 3.2.3.3 Design 3: Normalization of Risk (-)

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#### 3.2.3.1 Design 1: Normalization of Environmental (-)

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## 3.6 Influence of Design Tradeoffs in the Final Design

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**Appendix A: ---**

Appending A sentence.