TRIBHUWAN UNIVERSITY

INSTITUTE OF ENGINEERING

PASCHIMANCHAL CAMPUS

A

Minor Project on

“AGROTECHGUIDE”

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TABLE OF CONTENTS

ABSTRACT iii
1. INTRODUCTION 1
1.1 Introduction 1
1.2 Objectives 1
1.3 Background /Problem Statement 1
1.4 Motivation 2
1.5 Application / Scope 2
2. LITERATURE REVIEW 3
2.2 Component Used In The Project 3
2.2.2 Breadboard 3
2.2.3 Jumper wire 4
2.2.4 LM35 Temperature Sensor 4
2.2.5 Humidity Sensor 4
2.2.6 Soil Moisture Sensor 4
2.2.8 The ESP8266 WiFi Module 5
2.3 Software Used 5
2.3.1 Flutter 5
2.3.2 Dart 5
2.3.3 Arduino IDE platform for NODEMCU 6
3. METHODOLOGY 6
3.1 FLOW DIAGRAM 6
3.1.1 Documentation of flow diagram 7
4. COST ESTIMATION 7
REFERENCE: 8

ABSTRACT

This project leverages Arduino technology, sensors, Flutter, and Dart to revolutionize agriculture practices in Nepal. Recognizing the intrinsic connection of farming to the way of life for many in Nepal, the project aims to provide a comprehensive solution. Given Nepal's diverse landscapes and varying weather conditions, the project employs a robust system to collect data from agricultural lands. Arduino and sensors are utilized to gather crucial information, and Flutter along with Dart is employed to process and interpret this data. The ultimate objective is to generate meaningful insights for farmers, offering personalized suggestions for crop selection. The project addresses the nuanced challenges in Nepal's farming sector, emphasizing the need for careful solutions to optimize crop choices. By embracing smart technology, the project seeks to empower farmers with intelligent choices, supporting farming communities and fortifying Nepal's agricultural strength. The approach caters to different areas, benefiting both small and subsistence farmers. Drawing inspiration from global and local insights, the project endeavors to create a sophisticated system for suggesting crops. The overarching aim is to enhance farming practices, ensuring a happier and wealthier future for Nepal's agricultural communities.

1. INTRODUCTION

1.1 Introduction

In the agrarian landscape of Nepal, where agriculture is widespread but expert assistance remains scarce, a substantial number of farmers find themselves without the guidance needed for optimal crop cultivation. The 'Know Your Crop' project addresses this critical gap by leveraging technology to empower farmers. Operating in a region characterized by scattered agriculture, our initiative focuses on collecting essential land data encompassing crucial parameters like temperature, soil pH, moisture, and more. Through meticulous analysis of this data, our project aims to furnish farmers with insightful conclusions. These conclusions will not only simplify the complex process of crop selection but also enhance the efficiency and productivity of agriculture, thereby contributing to the sustainable development of Nepal's farming communities.

1.2 Objectives

Our main goal is to make a smart plan that helps Nepali farmers choose the best crops. We know that different areas in Nepal face different challenges, and we want to think about all of that. The plan aims to make farming better, promote good practices, and increase farmers' income. We want to share knowledge that fits each region in Nepal, especially helping smaller farmers. The plan is not just for now but for the future, making sure farming stays strong and brings benefits to all farmers across Nepal.

1.3 Background /Problem Statement

In Nepal, the agricultural sector faces a critical challenge marked by a lack of technical analysis of overall land and a deficit in technical expertise among farmers. This deficiency contributes to a declining rate of production and an increasing hunger index. To address this, our agriculture project integrates various sensors to collect comprehensive data on soil health, and crop conditions. Leveraging advanced data processing, we aim to derive actionable insights that empower farmers in decision making. By bridging the gap between inadequate land analysis and limited technical know-how, the project seeks to reverse the production decline and uplift the agricultural landscape in Nepal.

1.4 Motivation

The impetus behind this Project stems from a genuine concern for the welfare of farmers in Nepal. The primary objective is to equip them with the necessary resources and insights. Motivated by the aspiration to empower farmers with tools and knowledge, this project endeavors to facilitate informed decision-making, ultimately fostering increased agricultural productivity in Nepal. The underlying belief is that by providing robust support to farmers, a positive transformation can be instigated in their lives, concurrently contributing to the overall advancement of Nepal's agricultural landscape.

1.5 Application / Scope

The application of this project holds profound implications for agricultural lands in Nepal, particularly offering substantial benefits to grassroots farmers. By delivering realtime insights into crop suitability, the project becomes an indispensable tool for farmers operating at the ground level. This application addresses the immediate challenges faced by grassroots farmers, providing them with specific, localized information crucial for effective decision-making. It equips farmers with guidance on suitable crops, empowering them to make choices that optimize yields and enhance profitability. Additionally, the potential integration of this project into the Prime Minister Agriculture Modernization Project (PMAMP) in Nepal holds significant promise, offering a pathway to more informed decision-making, sustainable agricultural practices, and contributing to the broader goals of modernizing and advancing Nepal's agriculture sector.

2. LITERATURE REVIEW

The integration of technology in Nepalese agriculture has witnessed notable advancements, as evidenced by pioneering applications like GeoKRISHI, Krishi Guru, and Smart Krishi. These platforms leverage satellite data, crowd-sourced information, and mobile applications to empower farmers with real-time insights, crop suitability evaluations, and valuable market information. However, amidst these strides, there remains a crucial gap in the precise collection of land data. The existing literature points to the lack of comprehensive and accurate data on agricultural land, with challenges ranging from inadequate agricultural labor and rising production costs to the increased fragmentation of fertile land. Despite the transformative potential of technology, these limitations underscore the need for concerted efforts in improving data collection methods to truly harness the benefits of technological interventions in Nepal's agricultural sector. Ongoing research in this domain, while acknowledging the progress made, emphasizes the necessity for more robust and precise data collection mechanisms to address the unique challenges faced by Nepalese farmers.

2.2 Component Used In The Project

2.2.2 Breadboard

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

2.2.3 Jumper wire

Jumper Wires are electrical wires with connector pins at each end. They are used to connect two points in a circuit without Soldering. You can use jumper wires to modify a circuit or diagnose problems in a circuit

2.2.4 LM35 Temperature Sensor

The LM35 is a temperature sensor integrated circuit that is commonly used to measure the ambient temperature of its surroundings. The primary task of the LM35 is to sense the temperature of its environment. It converts the surrounding temperature into a proportional analog voltage. The sensor has a linear output, with a 10 mV change in voltage per degree Celsius change in temperature.

2.2.5 Humidity Sensor

A humidity sensor(DHT11) is like a small gadget that helps us understand how much moisture is in the air around us. It measures humidity, which is how much water vapor is in the air. Imagine it as a tiny device that can feel and tell us whether the air is dry or damp. It does this by sensing changes in the air that happen when it gets wet or dry. Humidity sensors are handy in various places, like in weather stations to predict rain, or in our homes to make sure the air isn't too humid or too dry, creating a more comfortable environment for us.

2.2.6 Soil Moisture Sensor

A soil moisture sensor is like a tiny helper for plants. It tells us if the soil where plants grow is too dry or just right. Imagine it as a small gadget you put in the soil like a plant detective. When the soil gets dry, the sensor notices it and lets us know. This way, we can give water to the plants at the perfect time, so they're always happy. It's like having a friend for the plants, making sure they get just the right amount of water to grow big and strong. So, the soil moisture sensor is like a plant buddy, helping us take care of our green friends in the garden.

2.2.8 The ESP8266 WiFi Module

The ESP8266 WiFi Module is a small electronic device that adds Wi-Fi capability to other electronics. It's like a magic chip that gives ordinary things, like lights or sensors, the power to connect to the internet. With this chip, gadgets can send and receive information over Wi-Fi, allowing them to communicate with each other or with you through your phone. It's commonly used in projects where you want devices to be connected and smart. The ESP8266 is like a tiny Wi-Fi superhero that makes everyday things smarter and able to share information wirelessly.

2.3 Software Used

2.3.1 Flutter

In the context of mobile app development, "Flutter" is an open-source UI software development toolkit created by Google. It enables developers to build natively compiled applications for mobile, web, and desktop platforms using a single codebase written in the Dart programming language. Flutter is known for its expressive and flexible user interface, allowing developers to create visually appealing and high-performance applications across various devices. The framework has gained popularity for its ease of use, hot reload feature for rapid development, and the ability to produce aesthetically consistent designs across different platforms. Flutter Consists Of Two Important Parts.

- An SDK (Software Development Kit): A collection of tools that are going to help you develop your applications. This includes tools to compile your code into native machine code (code for iOS and Android).
- A Framework (UI Library based on widgets): A collection of reusable UI elements (buttons, text inputs, sliders, and so on) that you can personalize for your own needs.

2.3.2 Dart

Dart is an open-source, general-purpose, object-oriented programming language with Cstyle syntax developed by Google in 2011. The purpose of Dart programming is to create a frontend user interface for the web and mobile apps. It is under active development, compiled to native machine code for building mobile apps, inspired by other programming languages such as Java, JavaScript, C#. Since Dart is a compiled language so you cannot execute your code directly; instead, the compiler parses it and transfers it into machine code. It supports most of the common concepts of programming languages like classes, interfaces, functions, unlike other programming languages.

2.3.3 Arduino IDE platform for NODEMCU

Arduino IDE is a powerful platform for embedded platforms which is rich in libraries so that coding microcontrollers is easier. Similar to many other libraries, libraries for nodeMCU can also be imported in this IDE such that programming the device becomes easier and more efficient.

3. METHODOLOGY

3.1 FLOW DIAGRAM

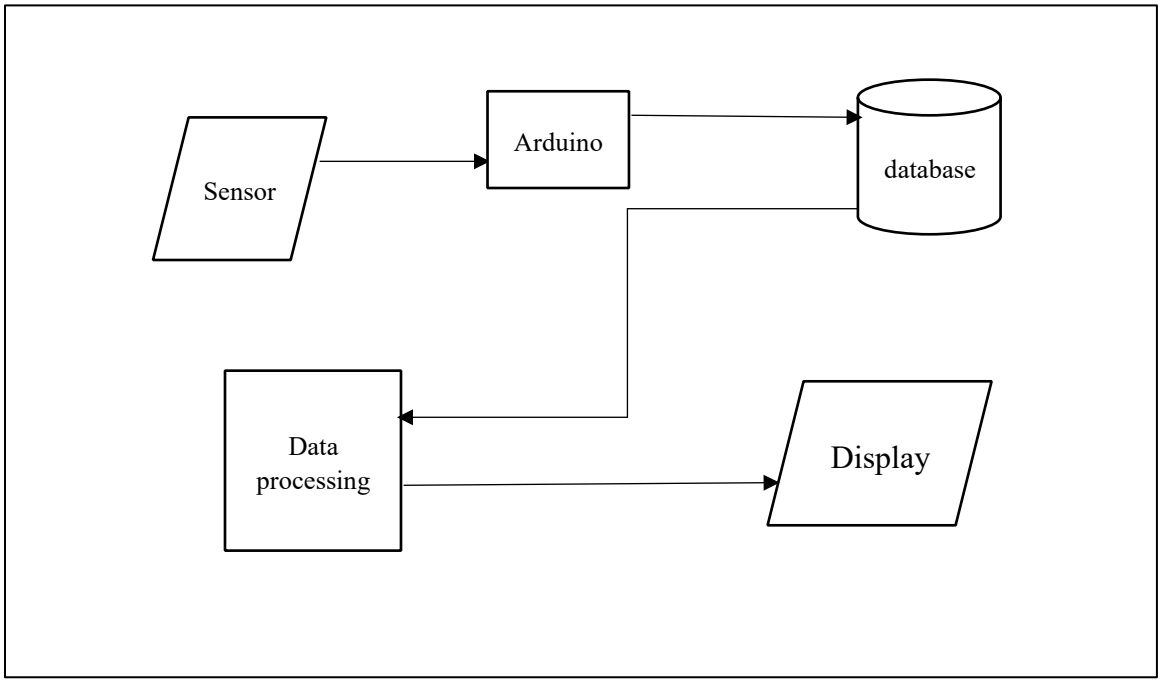

Figure 1: Flow Diagram

3.1.1 Documentation of flow diagram

Our system seamlessly operates through the collection, processing, and generation of insightful output. Various sensors meticulously gather data from the soil, transmitting it to the database via a microcontroller. Subsequently, a custom-made algorithm processes this data, unveiling valuable insights essential for farmers in making informed and strategic agricultural decisions.

4. COST ESTIMATION

Table 1: COST ESTIMATION

SN	Budget Headings	Cost(Rs.)
1	Breadboard	385
2	Humidity Sensor	272
3	LM35 Temperature Sensor	180
4	The ESP8266 WiFi	825
5	Jumper Wire	166
6	Soil Moisture Sensor	200
7	Total	2025

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