UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Smart Sensor System for Agricultural

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Telecommunications) (Hons.)

by

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APPROVAL

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ABSTRAK

Peningkatan mendadak dalam perkembangan teknologi dan inovasi saintifik telah memberi tamparan yang hebat dalam sektor pertanian. Kerja-kerja pertanian yang dilakukan oleh petani adalah sukar dan melibatkan tenaga fizikal yang besar dari segi bercucuk tanam. Dengan menggunakan pelbagai jenis sensor merupakan satu cara yang berkesan bagi memudahkan kerja penanaman. Seterusnya ia dapat meningkatkan hasil pertanian, pengurangan penggunaan racun perosak dan baja oleh itu keuntungan para petani dapat ditingkatkan. Di sini telah mengambil kira beberapa masalah dari segi pembaziran. Bagi masalah yang dikenal pasti, beberapa cadangan serta idea berkaitan dengan sensor yang berkesan supaya boleh mendapatkan maklumat mengenai suhu, kelembapan udara dan kelembapan tanah dalam bidang pertanian. Selain itu dapat membincangkan tentang rekaan untuk rangkaian sensor ini, bersama-sama dengan spesifikasi komponen yang boleh digunakan dan dengan mengambil kira ciri-ciri mikro-pengawal yang berbeza untuk memperolehi maklumat sensor dalam masa sebenar, pemprosesan, menghantar dan menerima maklumat dari sensor kepada petani melalui komputer. Dengan adanya keputusan ini dapat mengoptimumkan penggunaan air dan elektrik, meningkatkan kualiti hasil tanaman, pengurangan penggunaan racun perosak dan baja, dan dengan itu mengurangkan pencemaran alam sekitar di samping memudahkan kerja petani.

ABSTRACT

The upsurge in the expansion of technology and new scientific give a big impact even in farming. The agricultural practices followed by the farmers are arduous, involving a great physical effort from the side of farmers. The usage of different kinds of sensors and their efficient way of networking in the agricultural fields eases the work of farmers in the cultivation. This turn can increase crop yields, reduced use of pesticides and fertilizers by farmers that profitability can be improved. Here we are taking into account some of the problems like wastage of the natural resources, power management in the wireless sensor networking (WSN). For the identified problems, we are thereby proposing some of the ideas concerning the sensors that could effectively procure the information regarding temperature, humidity and soil moisture. In addition, this project will discuss about the design for this sensor network, together with the specification of components that can be used and taking into account the characteristics of different micro-controllers to obtain sensor information in real time, processing, transmitting and receiving information from the sensor to farmers through the computer. The expected results of this paper will reflect the optimal use of water and electricity, increased quality of food grains, reduced usage of pesticides and fertilizers, and thus reduced environmental pollution besides easing the work of farmers.

DEDICATION

Dedicated with much love and affection to my beloved mom, dad and all family who always teach me and guide me during my project, Pn. Eliyana Binti Ruslan who always gives me supports and encouragement, all of my fellow friends.

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CHAPTER 1
INTRODUCTION

1.1 Background of Study

In this modern age, there are various types of technology between one of them is telecommunications. Telecommunications is one technology that is growing very rapidly. With used this global system for the System for Mobile communication (GSM) communication with wireless and Short Message Service (SMS) is a very good alternative in the field of agriculture. After completion of several studies in the field of agriculture, most farmers farming based on the experience and advice of many people. The farmers do not do research before starting a crop. Therefore most of the crops they planted did not get a satisfactory result. It is caused by improper care plants, overuse of pesticides and fertilizers is among one of the causes. Because of this problem, this system was being created by using a variety of sensors and efficient way of networking in the field of agriculture; facilitate the work of the farmers in the cultivation. This in turn can increase crop yields, reduced use of pesticides and fertilizers by farmers that profitability can be improved. Some issues have been taken into consideration as wastage of the natural resources, power management in the wireless sensor networking. After the problems identified, some suggestions and ideas concerning the sensors that could effectively procure the information regarding temperature, humidity and soil moisture. Innovation is designed based on advances in biotechnology and electronics that could be used in biological measurements. Device innovation combines two technological applications of molecular recognition and reinforcement of biochemical reactions.

Among its advantages is that it is cheaper, easy to use and can provide results quickly and accurately. In this project will discussed about building up of architecture for the networking of these sensors, along with the specifications of the components being used as a part of this smart sensor system. By considering the features of different micro-controllers for acquiring the sensor information in real time, processing, sending and receiving information from fields to the farmers through SMS. Using this method, the farmers will get information on the suitability of the soil for their plants. Farmer can improve crop quality and can enhance revenue. Besides, the farmers will be able to save costs in terms of the use of pesticides and fertilizers indirectly in this way it's possible to reduce environmental pollution while reducing farmers working right.

1.2 Problem Statement

The agricultural sector saw the integration of technology as a catalyst in the development of the industry. Thus, many new discoveries decomposed through studies and research carried out by scientists and researchers. This is to improve productivity in terms of quantity and quality can be produced through the application of new technology. So far, agricultural practices followed by farmers' difficulty, involving great physical effort from farmers' side.

Mostly farmers are not well versed in this growing sector. They only follow the dictates of other people as well their experiences without first reviewing the method of planting and sowing vegetable seedlings. Therefore, the indirectly effect the crops use of pesticides.

When the farmer use of pesticides and fertilizers in excess will cause damage to seedlings as well it invites negative effects and can harm the health of consumers as well as farmers and it will also cause the pH of the soil is uncertain, so it is not good for plants. Apart from that there are other effects that allow damage to the crop temperature factor Temperature factor is also one of the important role for the growth

of sapling and also moisture resistant so important for him to keep the plants can grow.

Farmers are encouraged to use the latest methods and technology to improve agriculture in order to increase their income. By using modern technology will not only increase revenue, but also an opportunity for the broader market when quality is also enhanced. Each change or transformation of agriculture that implemented will bring about positive change, particularly to improve productivity and product quality In addition it also stresses the importance of the use of appropriate technology and the latest in the agricultural industry for more results, quality and a higher quality and stable.

1.3 Project Objectives

The objective of the project is to:

(i) This system notifies about soil moisture levels, temperature and air humidity that influences fertility in plants.
(ii) The system focused on low power consumption for the new design architecture to cater the most important and critical issue nowadays in monitoring.
(iii) From the sensor node hardware to the management system, the whole system architecture is explained.

1.4 Scope / Limitation of the Project.

In this final year project the Smart Sensor System for Agricultural has been create by using the software and hardware. For the software for this project, the item like PIC, Turbo C++ and GSM coding has be used for run the Smart Sensor System for Agricultural. Equipment such as the GSM Module Compiler, Temperature Sensor, Humidity Sensor and Soil Moisture Sensor was used in the hardware. This

sensor will detect the Temperature, Humidity and Soil Moisture and then it well send the data to GSM. After that the GSM well sent SMS to the farmer.

1.5 Project Significance

By completing this project:

(i) This Smart Sensor System for Agricultural may assist farmers in agriculture.

(ii) Can improve the lifestyle of farmers.

(iii) By using this system, it can improve crop quality.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter discuss about the information about problems on the plants in improving crop yields and also a tool a tool used by farmers to help them improve crop yields. The different types of sensors such as Temperature Sensor, Humidity Sensor, pH Sensor and Soil Moisture Sensor GSM's possible assistance will be described in this chapter.

2.2 Information on the Disease of Chilli Plant

Chilli is a fruiting vegetable from the family Solanaceae. It is believed to have originated from Mexico and South America and has been widely cultivated throughout the world, especially the tropics. It consists of a variety of species and type. Its name comes from Nahuatl via the Spanish word issue Chile. It is also known as pepper in Malaysia East Coast and chilli in North Malaysia and "meriam lada secupak". Pepper name also forms the basis of the name of black pepper spice and white pepper for taste spiciness, even though it is a different species altogether. In Malaysia, most of the chilli is grown in the lowlands. Generally, there are three kinds of chilli grown in countries such as red chillies, Bengal and chillies, red chillies into a commodity but involving an area of 4,000 square acres.

2.3 Chilli Disease

Chilli or scientific name capsicum annuum from the Solanaceae family is no exception receiving diseases and insect pests on fruit, leaves and roots. Chilli crop pests such as fruit fly, fruit borer, mites and rodents attack chillies included white flies and mites.

2.3.1 Type of Disease Chilli

(a) Tristeza Virus

Usually leaf curly because of bacterial Tristeza Virus. It is one of the problems in the cultivation of chilli when the attack began, the leaves will become curls on a branch or tree and it will quickly spread to other plants quickly if not controlled immediately. The studies and observations have been made on the offensive sign when seen active young leaves begin to curly it will look muddy and sometimes slightly yellowish started on a limb and multiply to other areas. As a result trees cannot photosynthesize efficiently and flower production will be interrupted or not bloom at all. Typically, new buds will not go out and if there were even a very small size.

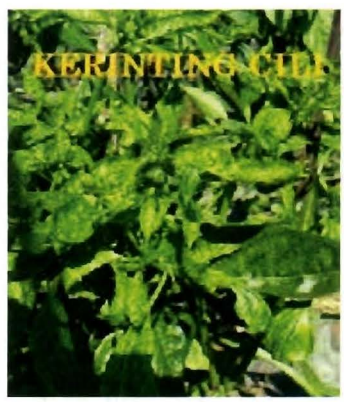

Figure 2.1: Tristeza Virus

(b) Leaf Spot Diseases

Firstly Leaf Spot Disease was attacked resulting leaf spots and reduces photosynthetic activity. However, the disease can be controlled by spraying with insecticides Binomial. Leaf spot attacks if not controlled will also reduce yield or lower quality chillies. The second attack is Kidney Disease Antraknos caused by fungi. These attacks will damage the quality of chilli. Typically pesticide control methods such as spraying Mancozeb at the rate recommended on the label. Important to disclose to farmers that once made cannot continue to spray poison fruit picked chillies and wait TDMH (Prohibited Period Revenue Collection) as written on the pesticide label.

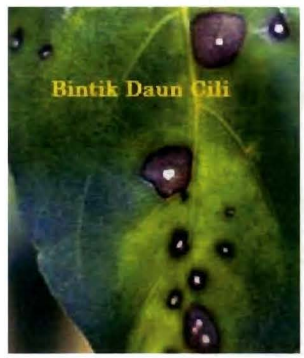

Figure 2.2: Leaf Spot Diseases

(c) Bacterial Wilt Disease

The most critical chillies disease will wither and may die if not controlled immediately. The disease is easily attacked chilli crop, especially if the area was planted with chilli or other crops of the Solanaceae family and somewhat moist soil. Attacks can occur from infancy to a mature tree to bear fruit.

Red Pest, Leaf Fleas, Aphids and Koya between crop pests. This insect is an agent for the spread of disease-carrying pathogens fungus, bacteria or virus on chilli. Koya which live under the leaves that have been wound which would normally produce a liquid dessert (secretion) that will cause the ants like sweets will snort, slimy and cause the existence of fungal Black Soot. Koya is also able to move the whole tree chillies, which is causing the rapid spread of the disease. To mitigate the problem of aphids can be used spraying with insecticides such as Chlorpyrifos

Imidachlorpid according to the directions on the label. Red pest attacks can be controlled by spraying pesticide Malathion or Dichlofo.

Figure 2.3: Anthracnose Kidney Disease

(d) Shoot Blight Disease

This disease usually attacks the buds and causes it to wither and black collared. The starting area is at the base to the tip. It looks like gray Choanephora is a fungus of the Zygomycetes. It forms an upright hyphae (aerial), gray fine thorn with dark end. The disease is usually carried by the wind and control by spraying fungicides appropriately and effectively is necessary.

Figure 2.4: Shoot Blight Disease

(e) Burn Seedlings Diseases

The disease attacks a part of the stems of seedlings chilli. It is spread through water and soil use that exposed to the disease. The seedlings will be attacked at the base of the trunk. The part that had been attack will be watery and burn. After the attack, the seedlings will fall. To avoid this problem, the seeds should be treated with

an appropriate fungicide in advance. Before the seeds are planted, the nursery should be watered with the same fungicide.

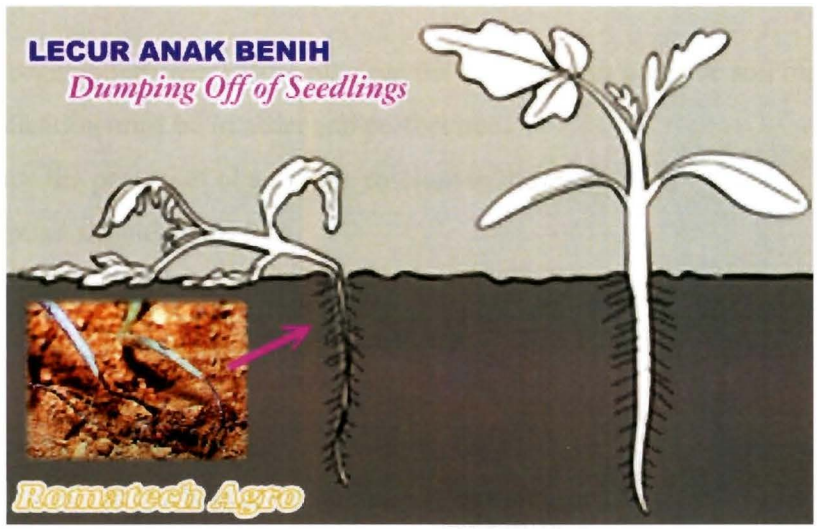

Figure 2.5: Burn Seedlings Diseases

(f) Sclerotium Wilt Disease

The disease attacks the part roots and stems of chilli and spread through the soil. Initially, the base of the stem is attacked will appear white colour; this is caused by the presence of mycelium (fungal threads that make up the thread). This situation will persist until the base and roots of attack changes colour to black. The disease can be controlled by burning trees attacked as soon as possible. It is perhaps the most economical way of control and need to be detected at an early stage of infection.

Figure 2.6: Sclerotium Wilt Disease

2.4 Control and Care of Chilli Seedlings

To control and care of chilli seedlings from disease are as follows:

(i) Use organic fertilizer before planting the sandy soil to improve soil moisture.
(ii) Application must be in order and perfect tree.
(iii) Ensure the provision of adequate calcium in the tree.
(iv) Irrigation should be perfect.
(v) Use mulch to retain soil moisture
(vi) Use of quality seeds and do seed treatment.

Soil Suitability / Weather

(i) Best grown in lowland areas, temperatures between 22-40 ° C
(ii) Moderate rainfall between 1500 - 2000 mm / year
(iii) The best climate is having a temperature of 28-32 ° C
(iv) Chile is suitable for planting in most types of soil including peat and sand
(v) The pH value of the soil available for cultivation is 5.5 - 6.8
(vi) Rainfall: 15000-2000 mm / year

2.5 Soil Type and Soil pH

Soil is fundamental to agriculture to undertake the cultivation of various plants either for food crops, industrial crops or other crops. Soils formed from the weathering since millions of years ago and there are many different types of soil forms on earth that has a variety of features to be learned. Soil Science experts have made various classifications of soil to be used as a guide for how to manage the soil for optimum yield in planting activities. There are three important aspects of agricultural soil are required of soil classification, soil and crop suitability classification and determination of the suitability of the crop. This information is important as a basis for the practice of agronomy and soil management for the types of plants that will be developed.