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RESEARCH ARTICLE

A Study on Data Analysis and Electronic Application for the Growth of Smart Farming

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ABSTRACT

This paper proposed the system development especially for watering the agricultural crops depend upon the WSN. This paper focused to develop and model a control process by joint radars in the agricultural crop along with information management through web and smartphone application. The 3 elements are application of mobile, web and hardware. The first element i.e. hardware was executed and designed in manage box hardware linked to gather information about the crops. Soil humidity radars are used to detect the agricultural field linked to the control box. The 2nd element i.e. web method was web depend method which was executed and modeled to handle the details of field and crop information. This element applied information mining to examine the information for finding perfect soil humidity, moisture level and temperature. The last element i.e. mobile method was used mainly to manage field watering by a mobile method in a phone. This allows manual or automatic control by the controller. An automatic control uses information from soil humidity radars for watering the crops. The user may choose the manual method for watering the field in the system control method. The method may send notifications by LINE API for the line app. The method was tested and executed in Northeast India. The outputs displayed the executions to be helpful in the field of agriculture. The humidity level of the soil was appropriately maintained for improving manufacturing in agriculture, growth of vegetables and decreasing cost. Therefore, this paper displays the driving agriculture field by digital creativity.

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Introduction

IoT for Agriculture

The IoT expresses the things connection along with different methods of interconnecting that may be found by sensing gadgets, automatic control through communication device, RFID, big data, data transmission and other devices to succeed control, analysis of mass information and remote sensing. Mit talks about the idea of the IoT that called as the EPC method in 1997[1].

The ITU reported "2006 ITU INTERNET REPORT: Iot" that marked to the initiation of the IoT era in 2006. Agricultural IoT was a type of IoT handled by latest technology and give the scientific idea for modern type of agriculture and understand the aim of increasing advantages, optimizing elements and improving yield [20-24].

Farming in a Smart Way

Agriculture in a smart method was a latest level of agricultural manufacturing. It is an important element of

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concrete embodiment and perfect economy in the field of agriculture [2]. It was benefit to eradicate the poverty in the countries like India, capturing the strategy and analyze the benefits of delay growth [25-28]. Agriculture in the smart method was the application of latest information technology, incorporating computer, internet, IoT, 4s technology and wireless network for communication, to execute visual diagnosis in a remote areas, detecting and detecting the agricultural manufacturing, the entire method of agricultural manufacturing for perfect efficient, sustainable growth in the economy of agriculture and scientific method to have healthy life.[3]

Literature Survey

(Costa et al. 2013) proposed one-dimension codes that are printed on associating the barcode to a similar food types, plants or batch and package of food. This method was very cheap, simple to handle and it may be controlled by data technology process. therefore, it do not control the one food or plant and barcodes do not work properly as radars and display a certain limit for information transmission inside the application of IoT. Other tools for electronic finding like RFID are applied for food-agriculture supply chain.

(Hobbs et al. 2005; Giraud and Amblard 2003) examined a small amount of researches that have been organized on consumers' ideology of traceability especially of one thing that was meat. (van Rijswijk and Frewer 2006) who do not have beliefs about the traceability.

Hobbs et al. (2005) proposed that some customers denoted an interest to pay for an easy assurance of traceability like beef. So the outputs of customer research recommend that joining traceability with another assurance for quality especially about the manufacturing of farm products and processing system can be feasible things variation strategy in the meat items. Therefore, these eminences require being credible in the strategy of things variation.

(Giraud and Amblard 2003) talks that the current research highlights those consumers have small idea about traceability. It seems that customers are not interested in the field of technology linked with traceability. The terms associated to traceability fields from methodical to common skills and decrease the income of household customers. (Etxeberria et al. 2006; Sood et al. 2008) proposed about the citrus fruits tagging with the energetic to give a paperless pointed system in the manufacturing of horticultural things.

Marx et al. (2013) proposed an approach of laser method. This was examined by 2D patters in the surface of rhododendron breaking and apple with various laser methods. This method of labeling may be performed successfully on low surfaces 4X4mm and denote a sudden and low cost method in fruits and plants. A protective electronic finding method involved inside tagging and the unification of tags inside the products. The execution of IT to track the plant to food process by inside tags refers to be probable in fruits like grapes because of the complexities in tracking and labeling the plants. (Schroeder and Tonsor 2012) proposed thee importance of labeling method and analyzed farm has low kind of system because of the expense and absence of urgency to move to a depth place. (Luvisi et al. 2012a). Research methodology.

Original Investigation

This paper shows that real examples at three point. The 3 illustration villages are placed very far from each other and have variation in farming [6]. The 1st illustration village has the cultivation of lime and vegetables grow from house [29-35]. The 2nd village has a farm for salad and vegetable from house. The last village has a unified farming process with the farm of herbal, salad, chicken and mushroom[36-40]. Figure 1 to 3 shows the three types of different farming.

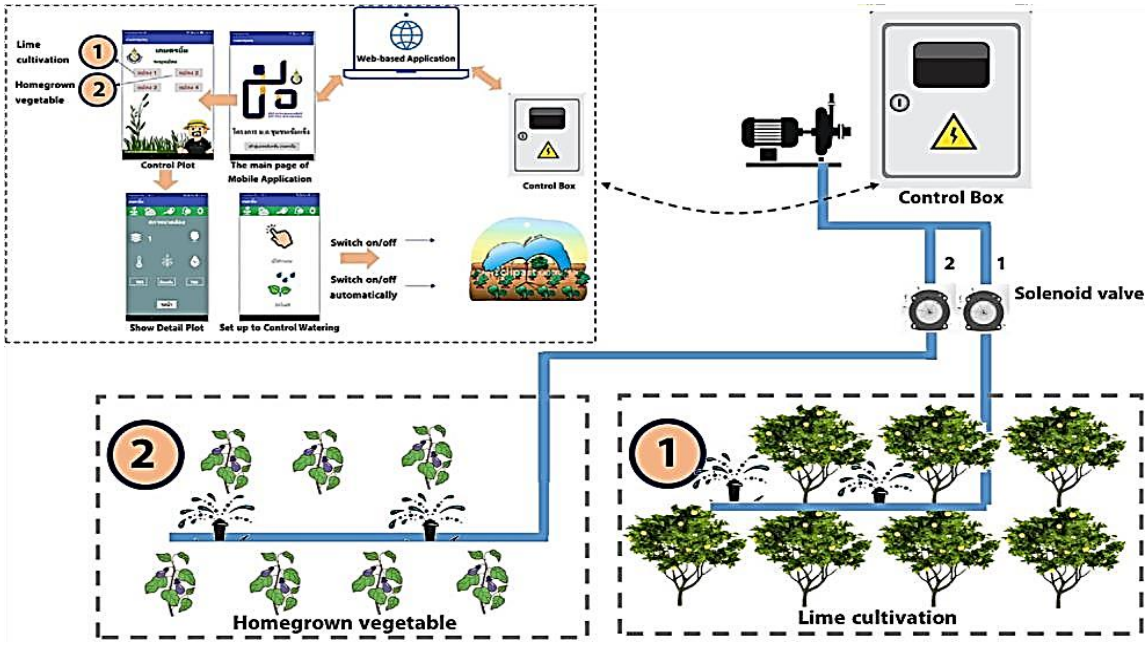

Figure 1. The sematic diagram for 1st sample Village

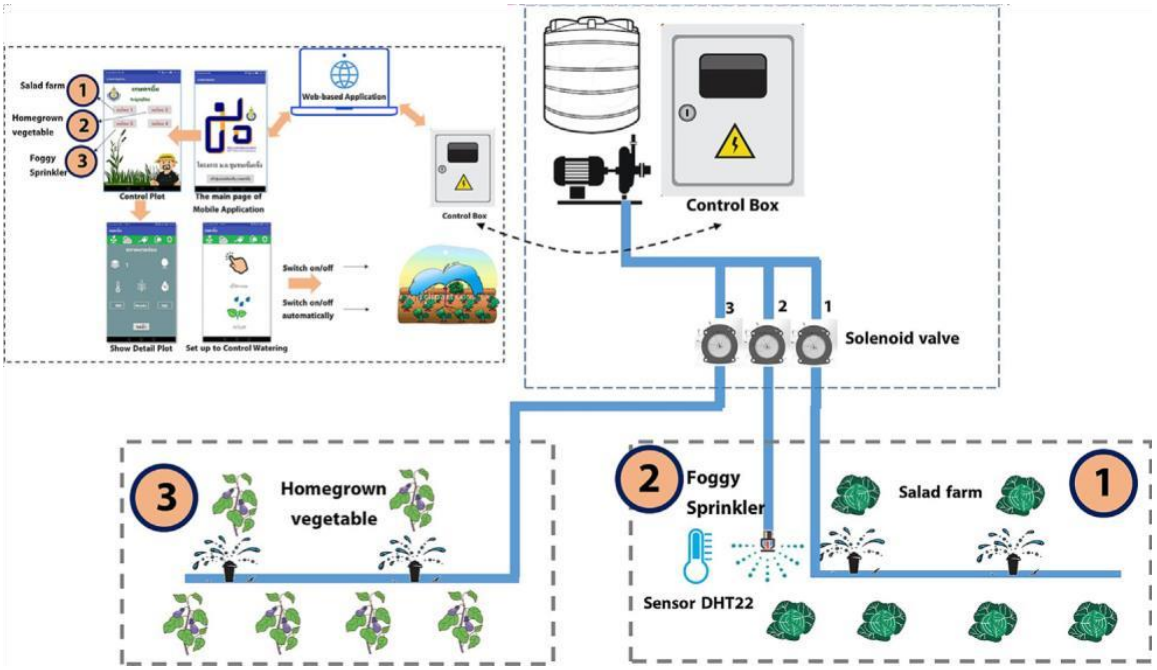

Figure 2. The sematic diagram for 2nd sample Village

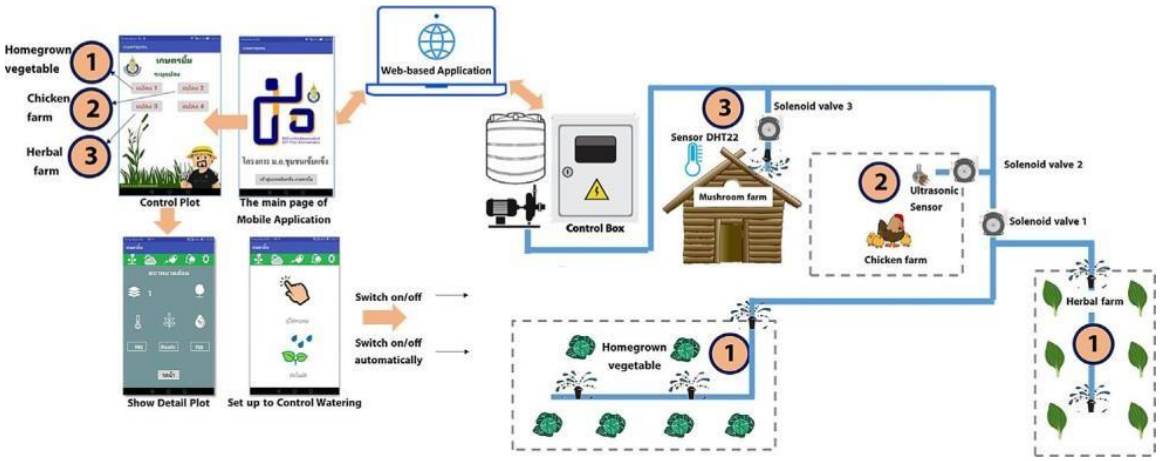

Figure 3. The sematic diagram for Final sample Village

Plan and Outline of the System

This section focuses to execute and model methods with radars in the information management and crop sector through a smartphone along with network process[8]. The 3 elements are mobile, web and hardware process. This was shown in the figure 4.

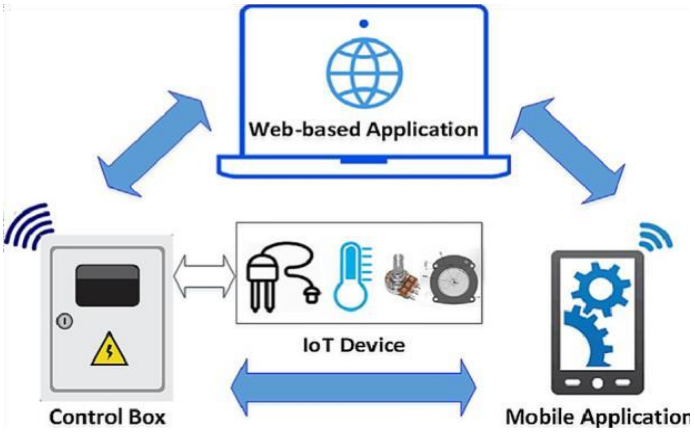

Figure 4. The web and hardware process

The 1st element was developed and modeled in the form of control box. This box was modeled to handle the gadgets of internet of things and existed information from the agricultural crops [41-45]. The internet of things gadgets and box are used in this section that was shown in the table 1. The 2nd element analyzed in the web depend application [46-49]. This element involves controlling the original data from the gadgets of internet of things in every village [9]. This element permits an operator to operate the techniques for water require for every crops. The information details form IOT gadgets may be seen by an operator to control every type of agriculture crop [10]. These information are examined to judge the water require crops in the future research. The last element was used by farmer on a smartphone [12]. The mobile process was modeled to manage watering after the information was investigated. This element gives 2 modes, they are examined process can automatically off and on watering depend on IOT data and farmers may handle watering by themselves [50-55]. Figure 5 shows the web and mobile depend application clearly.

Table 1. Distribution factors

Factors	Solenoid regulator	Architecture	Relay unit x 6	Temp and Moisture level	Node MCU
Voltage	1.5mA	-	6.9 Ma	2.8mA	155 - 235 ampere
Rate	Plastic 1/6	Crop	One channel	DHT24	-

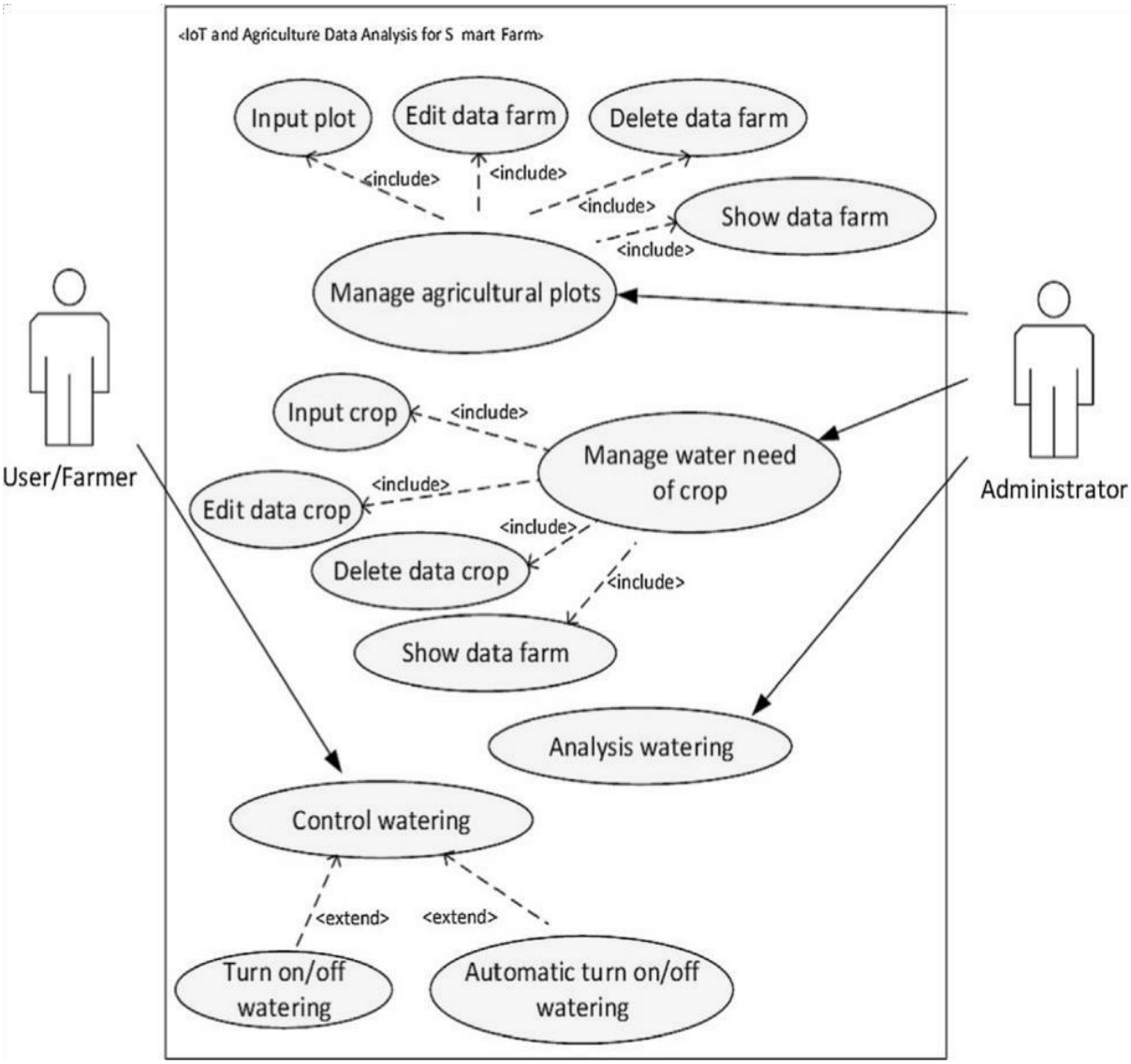

Figure 5. Use diagram show process with Web based applications

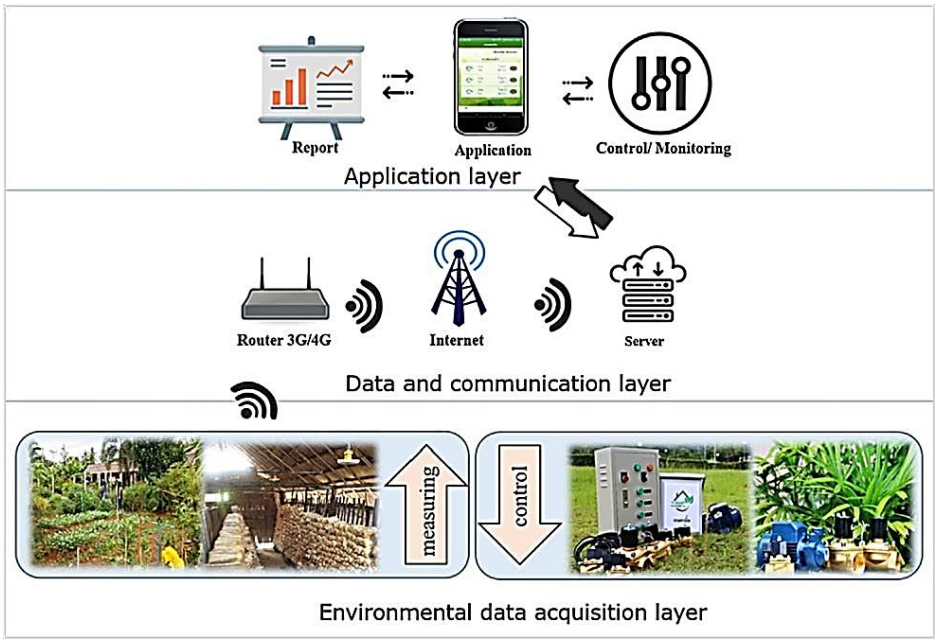

Figure 6. The architecture pf system control

Figure 6 shows the formal process of the control system. This architecture process contains three elements that was information, layer of application, environment information acquisition and communication [11]. The environmental information was modeled to gather information on environmental features from the gadgets and radars control. The data transports all the collected radar information to gather into the server. The application level uses the collected information to detect and handle the crop [13].

Application

An examined process was executed with 3 elements, they are mobile, web and control box. Figure 7 shows the box have electronic items in a waterproof product [14]. The box must be placed anywhere in the agricultural area and having the solenoid regulator, humidity soil radars and ultrasonic radars linked to the box. In this paper, internet of things was useful to the soil humidity radars to calculate the moisture level in soil and to handle the automatic on and off switch [15]. The DHR24 radar was used to handle the moisture level in mushroom farming. Ultrasonic radar was used to calculate the water level in chicken farming. Figure 8 gives an illustration about the web page in the needed crops and internet of things data from all downloading [16].

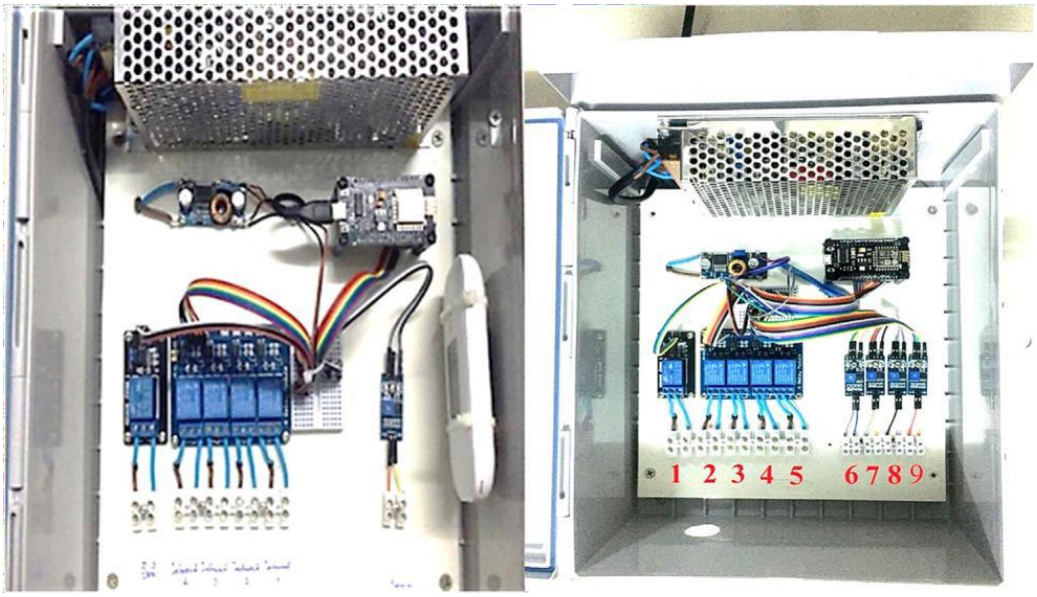

Figure 7. The design of control box

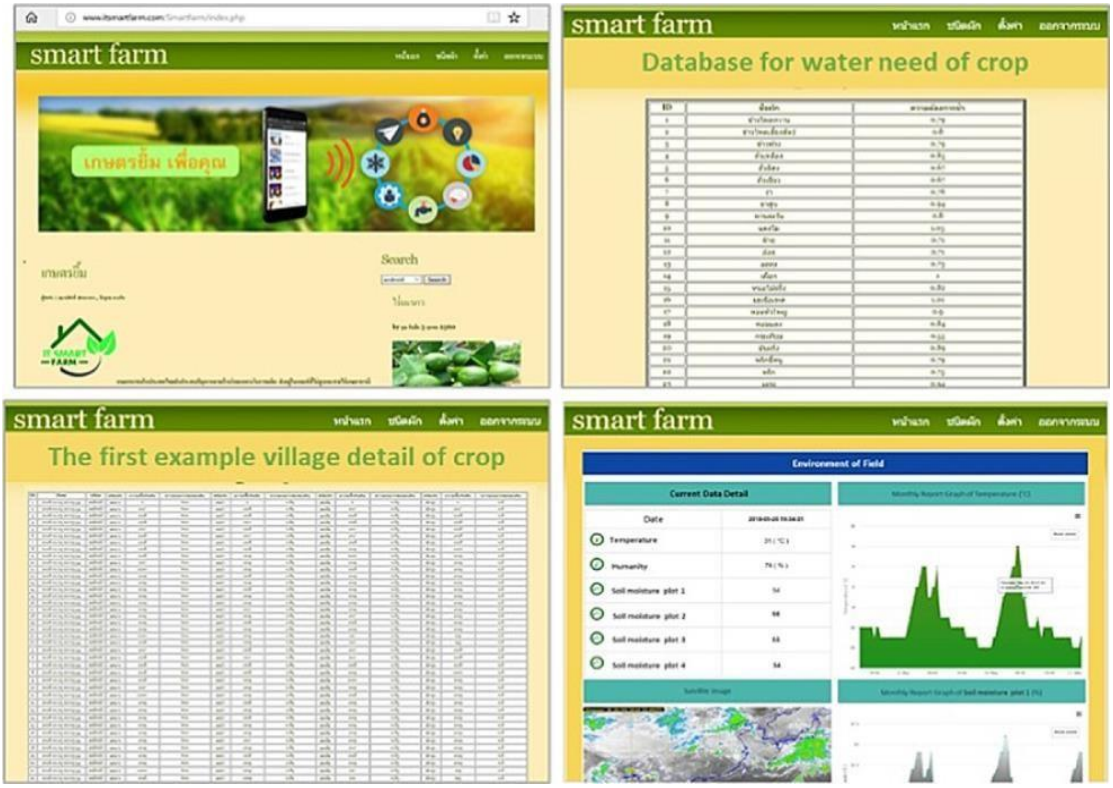

Figure 8. The portal web page Water and IOt installation

The last element was executed to plan with the farmer [17]. The mobile process was used to handle off and on switch by the farmer. It has two modes. They are manual and automatic. Figure 9 shows the mobile control system for watering the crops. The important process of this method is setup the details of crop in all mark, notifications through the line app and detecting the watering process [18].

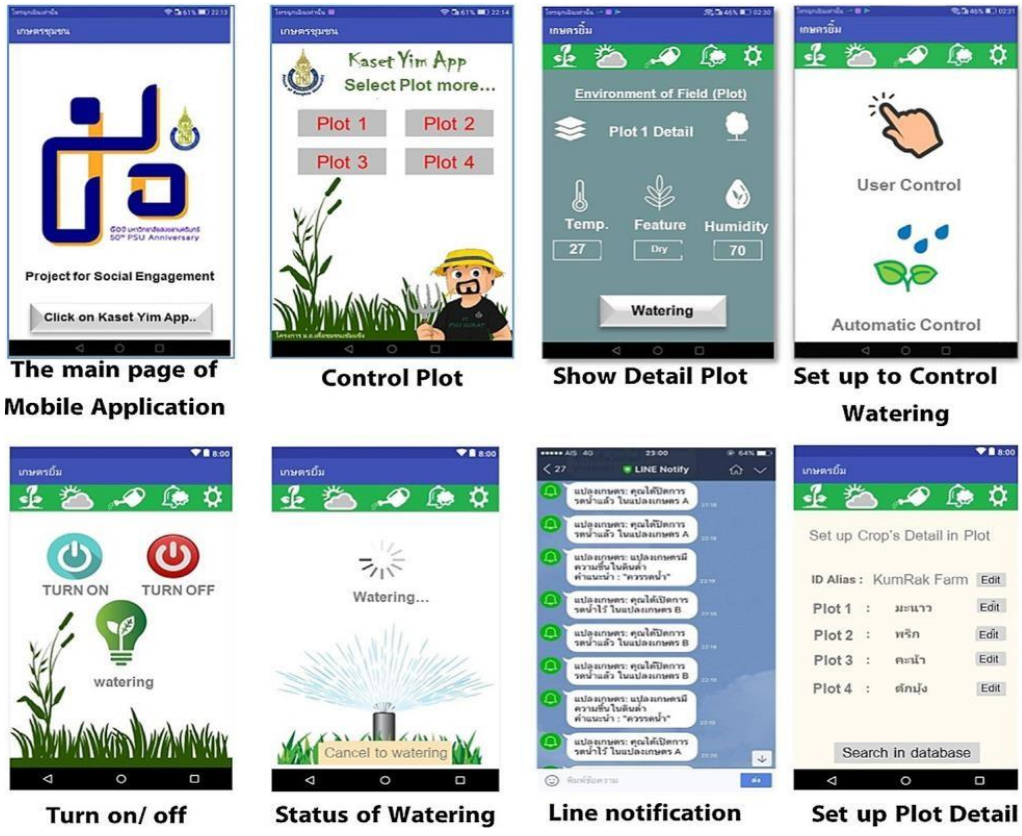

Figure 9. An example of application to control watering

Data Investigation of Agriculture

Mining of data was used to extract useful and significant knowledge from more information on crops, existed with internet of things. The discovery of knowledge process was analyzed in this section. It denotes to taking knowledge from more information. This section divides into two steps. They are data pre-processing and reduction of data [19].

1. Pre-processing: This was a main process in the discovery of knowledge because the knowledge quality based upon the data quality. Nowadays, information inclines to be inconsistent, dirty and incomplete. This process may support to increase the efficiency and accuracy of the following mining process. It also adds information transformation, cleaning and integration. This paper used more information from internet of things gadgets on judging the yields, temperature, humidity of soil and moisture level and information for the 1st illustration of the village. This was shown in the figure 10. The internet of things was converted to distinct design to help the data designing.

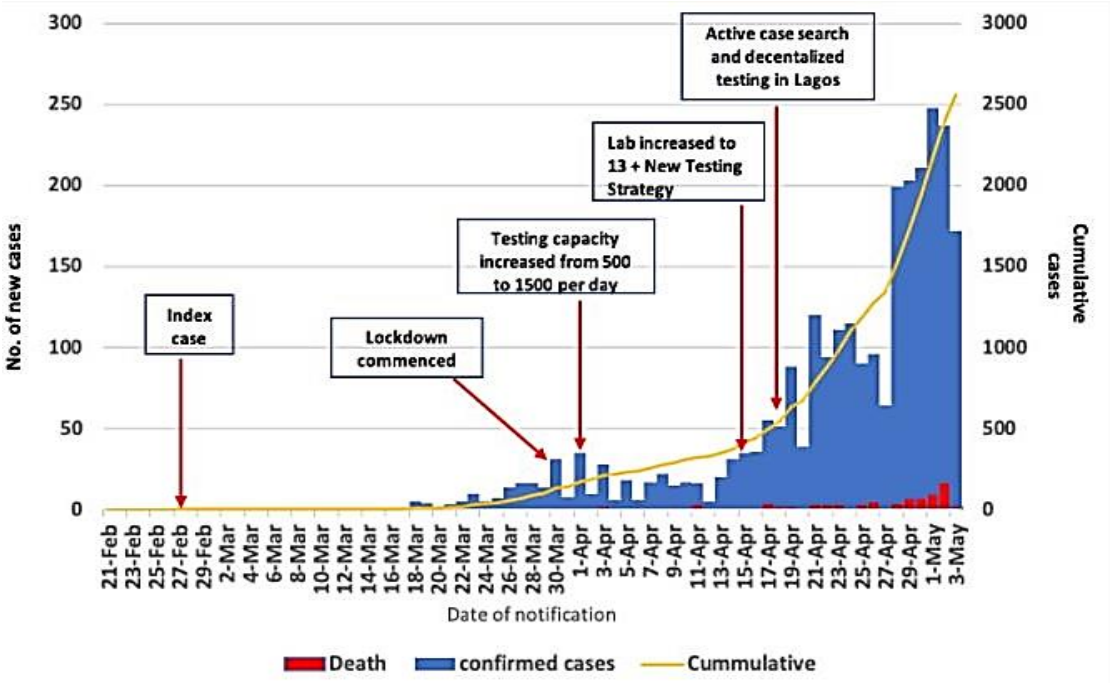

Figure 10. IOT information and products getting 1st village

2. Reduction of data: This section may encode the information to a small amount to decrease the data. The reliability of the original information was conserved that removing the data reduction must be more energetic to generate the identical results in the analysis process. This paper used numerical reduction where parameters processes for loading low representations of the information add histograms. This method used equal height histograms along with equal height buckets and 4 buckets for high, low and middle.

$$y = \beta_0 + \beta x_1 1 + \beta x_2 2 + \beta x_3 3 + - - - + \beta x_\rho \Omega \qquad (1)$$

The model type is shown in Eq. (1), where y is the outcome variable, x_i are the input variables, for $j = 1,2, \ldots -, \rho 1$ β_0 is the value of y when each x_j equals zero, β_j is the change in y based on a unit change in x_j for $j = 1,2, \ldots -, \rho 1$, and a random error term that represents the difference in the linear model and a particular observed value for y.Variables are elements of house vegetables and cultivation of lime. The input variables are humidity in soil, temperature and moisture level. An environment R was used to fix the designs at 97% level that was shown in the equation 2 and 3 for the components of vegetable (*Prod Vegetable_*) and lime (*Prod lime*)

$$\text{Prod Lemon\_} = 0.89 = \text{Temp} + 0.07 = DHT - 0.02 = \text{Humidity} - 25.87 \qquad (2)$$

$$\text{Prod Veg\_} = 0.16 = \text{Temp} + 0.10 = DHT - 0.04 = \text{Humidity} - 7.29. \qquad (3)$$

Results and Discussion

An examined process may use internet of things gadgets to gather information on moisture referred from the DHT24 radar, soil humidity from the soil humidity radar and temp from net service of the MDH. This data shows the mobile gadget to the framer and used by off and on control system for watering automatically. The farmer may also manually off and on the watering the crops. The status of off and on switching and time may be denoted through line app. An operator may operate the existed internet of things data and handle the information for every download. The operator can remove the information to find new knowledge. This was used to enhance the farming through different season. The knowledge outputs displayed that when the element of house vegetables was high (5 and above kilogram/day) and the

cultivation of lime was high (8 and above kilogram/ day), then the temp (between 30 °C and 35 °C) would be in the middle stage and when the product of the lemon was high (8 and above kilogram./day), then the moisture will be in the middle level(between 85% and 90%).. Figure 11 shows the discovery of knowledge from original information.

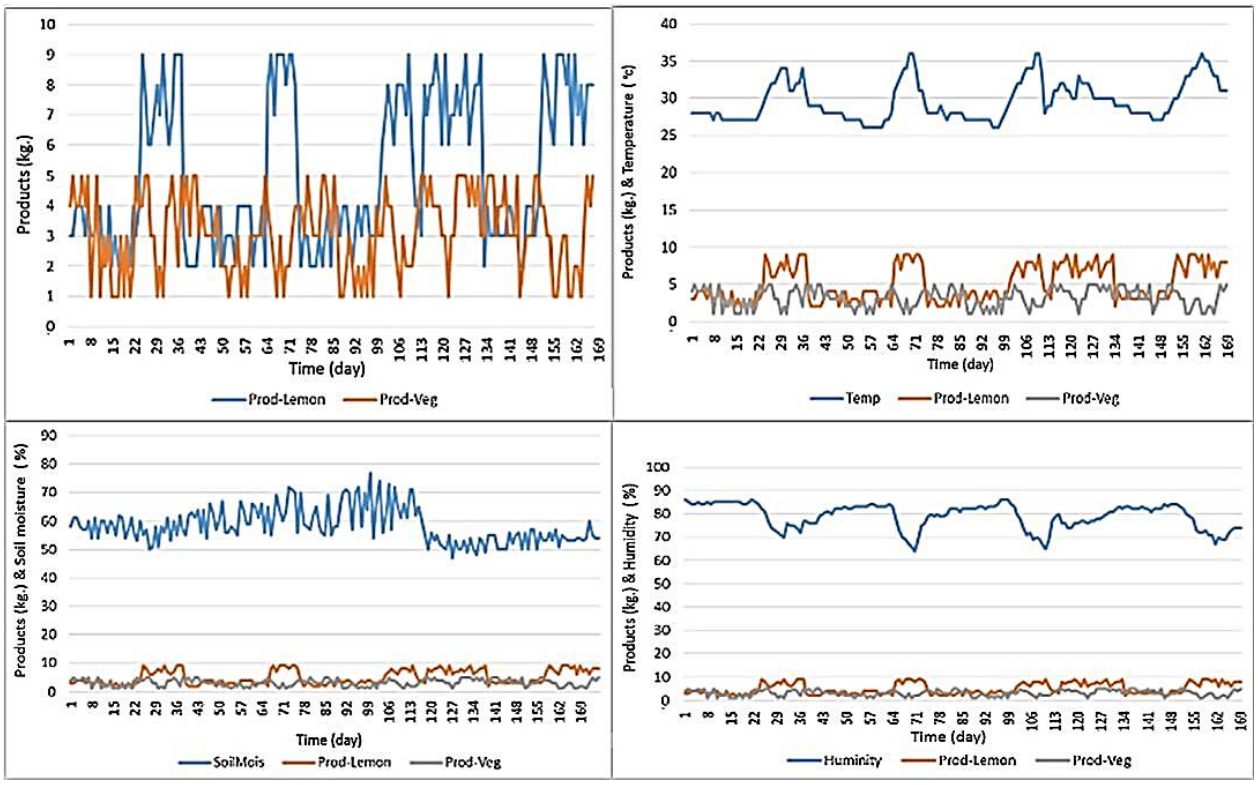

Figure 11. Compression of IOT Productivity system

Conclusion

This paper proposed the system development especially for watering the agricultural crops depend upon the WSN. This paper focused to develop and model a control process by joint radars in the agricultural crop along with information management through web and smartphone application. The 3 elements are application of mobile, web and hardware. The first element i.e. hardware was executed and designed in manage box hardware linked to gather information about the crops. Soil humidity radars are used to detect the agricultural field linked to the control boz. The 2nd element i.e. web method was web depend method which was executed and modeled to handle the details of field and crop information. This element applied information mining to examine the information for finding perfect soil humidity, moisture level and temperature. The last element i.e. mobile method was used mainly to manage field watering by a mobile method in a phone. This allows manual or automatic control by the controller. Agriculture in a smart method was a latest level of agricultural manufacturing. It is an important element of concrete embodiment and perfect economy in the field of agriculture. It was benefit to eradicate the poverty in the countries like India, capturing the strategy and analyze the benefits of delay growth. Agriculture in the smart method was the application of latest information technology, incorporating computer, internet, IoT, 4s technology and wireless network for communication, to execute visual diagnosis in a remote areas, detecting and detecting the agricultural manufacturing, the entire method of agricultural manufacturing for perfect efficient, sustainable growth in the economy of agriculture and scientific method to have healthy life. An automatic control uses information from soil humidity radars for watering the crops. The user may choose the manual method for watering the field in the system control method. The method may send notifications by LINE API for the line app. The method was tested and executed in Northeast India. The outputs displayed the executions to be helpful in the field of agriculture.

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