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A CASE STUDY ON SMART AGRICULTURE SYSTEM IN SIVAKASI USING IoT

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Abstract - *Sivakasi are often a dry zones of poor groundwater provide, irrigation involves be robust. Despite the agricultural land in Sivakasi, the increase of temperature and water deficit reduces agricultural growth. Labors are engaged in crackers, match works and printer jobs due to cost of agriculture is high. In this project improves irrigation system, decrease crop wastage and increase crop productivity. Smart Agriculture reduces wastage of water, fertilizers and increases the crop yield. Here a system is proposed to monitor crop field using sensors for Soil moisture, DHT11 Temperature and LDR light attached with Arduino. By monitoring these parameters the irrigation system can be automated if the moisture and temperature of the field falls below the brink. The light source will increase the plant growth even in the night time. The notifications will send to the farmer's mobile automatically and they can able to monitor the field conditions from anywhere, by using GSM modem attached with the Arduino. This system will be more useful in areas where the water is scarce. By this beneficiary method plants provide good results to grow faster and healthier.*

***Key Words*: Arduino UNO, DHT11 Temperature Sensor, Soil Moisture Sensor, LDR Light Sensor, Fluorescent Light, GSM SIM 900A Module, 3 Pin 1 Output, Crops.**

1. INTRODUCTION

Sivakasi could be a dry and hot region settled in Virudhunagar district of Tamilnadu state is an highly Industrious nature and was given the nickname kutty Japan (Little Japan). Sivakasi is located to the east of Western Ghats and it has the soil types are black and red that are conducive to cotton, chillies, millets and etc. These crops are predominant because of poor groundwater supply and soil type. Sivakasi experiences hot and dry weather throughout the year. The temperature ranges from a maximum of 34°C to a minimum of 26°C. Sivakasi receives scanty rainfall with an average of 136mm annually, which is lesser than the state average. The humidity of the town varies between 65% to 71%. Due to the poor groundwater supply agriculture work and workers is less in Sivakasi. Agriculture expenditure is high. Sivakasi is famous for crackers, match works and printing industries. The soils of the sivakasi are of poor productivity and are mainly black loamy soil (locally known as Karisal). Cotton, pulses, oilseeds and millets, which do not require much irrigation, are the main crops grown. In order to get the extreme yield in agricultural process, it is necessary to supply the peak quantity of water, and it should be supplied periodically. This is achieved only through a logical irrigation system. Irrigation is the knowledge of estimating and planning a well-organized, low-cost, profitable irrigation system intended in such a method to fit normal situations. Automation has been achieved; This paper provides the information related to previous work hard been done in the field of agriculture using the wireless sensor network over a period of past few years as well as the proposed system which is useful in monitoring as well as controlling the data which provides the flexibility. The Internet of Things (IoT) implies the use of cleverly related devices and structures to utilize data collected by embedded sensors and actuators in machines. Availability of these articles is critical in light of the fact that basic protest level collaborations contribute towards aggregate insight in IoT organize. The IoT wouldn't be conceivable without sensors which will identify or measure any adjustments in the earth to produce information that can give an account of their status or even connect with nature. In this framework, we utilize different sensors for estimating the field condition. Agriculture plays major role in the economy of the country.

2. RELATED WORKS

In Smart Agricultural monitoring system, various wireless sensors are used. This framework permits information examination and customized through an application or by the page data. The mechanical advancement in Wireless sensor systems made it conceivable to use in checking and control of field parameters. In view of the current review, it is discovered that yield of agriculture is been decreasing step by step. Utilization of innovation in the field of horticulture assumes essential part in the expanding the creation, and additionally in diminishing the labor endeavors. This system wants to crop up to the used sensors at appropriate areas for checking parameters is executed. The sensor systems measure the parameters of temperature, soil moisture, LDR light and fluorescent light. The data collected from these sensors are connected to the microcontroller. The received information is confirmed with the threshold values. What's more, right away, instant alert messages are been sent to the farmer and consequently he can work the field conditions by checking outcomes and description of the values in detail. In the proposed framework, correspondence signals from the sensor system and water system controlling were effectively interfaced progressively. The obtained results can be figured out using Thing Speak app which shows to which extent the crop conditions are been functioning. Through this technology, agriculture production can be developed and simultaneously it reduces the labor power.

3. LITERATURE REVIEW

B.V.Ashwini, "A study on smart irrigation system using IoT surveillance of crop-field" This paper deal The whole system is micro control based and can be operated from remote location through wireless transmission so there is no need to concern about irrigation timing as per or crop soil condition. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. The irrigation system helps the farmer by making his smarter. As the demand for water increases, along with the need to protect aquatic habitats, water conservation practices for irrigation need to be effective and affordable. As multiple sensors are used water can be provided only to the required area of land.This system reduces the water consumption to greater extent. The extension work is to make user interface much simpler by just using SMS messages for notification and to operate the switches[3].

T.Vineela, J.Nagaharini, et al., ,"IoT Based Agriculture and Smart Irrigation System Using Raspberry Pi" Internet Of Things is a shared network of objects where these objects interact through internet[5]. One of the important applications of IOT is smart agriculture. Smart Agriculture reduces wastage of water, fertilizers and increases the crop yield. Here a system is proposed to monitor crop field using sensors for Soil moisture, humidity and temperature. By monitoring these parameters the irrigation system can be automated if soil moisture is low. The system is manual processing of water flow control in the garden. The gardener will make a schedule and provide water flow in the particular data for a period of time. The water flow will be same for all season and for all temperature. The fluorescent light facility is not available in this manual technology. The sunlight is the only source for the plants to make starch. So the growth of plant is very slow. The required amount of water is not provided in the required time to the plants in this current system. By monitoring, the irrigation system can be automated if soil moisture is low and temperature is high. In this system using mobile phones can be monitor the water level and can be control from anywhere and anytime. This system is operated manually when there is necessity of water. The system will indicates the signal to provide water.

B.Kiran, H.N.Pramoth, et al., ,"Design and fabrication of multipurpose agricultural equipment." Agriculture is an art, when science and technology go together then Indian farmers no need to be in poverty forever[7]. By adopting scientific farming methods we can get maximum yield and good quality crops which can save a farmer from going bankrupt but majority of farmers still use primitive method of farming techniques due to lack of knowledge or lack of investment for utilizing modern equipment.

Mayuri R.Harde, "A Review paper on wireless sensor network and GPRS module for automated irrigation" In India 60-70% economy depends on the forming. Irrigation system in India has given a high priority in money making[9]. Many new technology are being urbanized to permit agricultural automation to increase and carry its complete potential. To get whole benefit of these technologies, we would not just think the suggestion of developing a new single technology but should appear at the wider issues for entire development of a system. In our country, crop growing are depends on the climatic condition which is not sufficient source of water. Use of excessive amount of water use there is damage of soil. In irrigation system, depending upon the soil strategy, water is provided to plant. An automated irrigation system was developed to optimize water use for agricultural crops. The system has a wireless distributed sensor network of soil-moisture, humidity and temperature sensors placed in the root of the plants. In previous, automatic irrigation system based on ARMS and RF module are used. The systems were powered by photovoltaic panels and have at a time transmitted and receive communication link base on a cellular-Internet boundary that allowed for data examination. The aim of our paper is to modernizing agriculture technology by programming components and built the necessary component for the system.

4. PROPOSED WORK

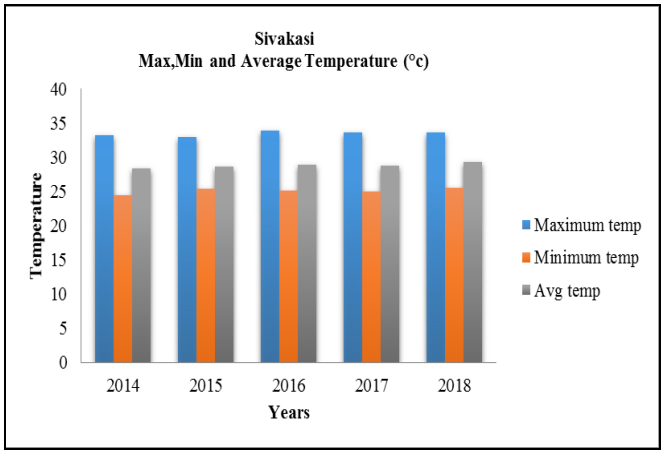
Sivakasi town is in Virudhunagar District of Tamilnadu, India is known for its fire crackers. Virudhunagar District is famous for its match industries, fireworks and printing industries. And it is known throughout the world for fireworks production. Sivakasi has the soil types are black and red that are conducive to cotton, chillies, millets and etc. These crops are predominant because of poor groundwater supply and soil type. Sivakasi experiences hot and dry weather throughout the year. About 90% of India's fireworks is produced here. During summer, the climate of Virudhunagar District is very hot and dry, which is suitable for manufacture of Crackers and Fire work, Match industries. Due to the poor groundwater supply agriculture work is less in Sivakasi. People are preferred to work in fireworks industries due to inadequate irrigation facilities and uncertain rainfall, the production of agriculture is less; Farmers find work a few months in the year. Their capacity of work cannot be properly utilized. In agriculture there is under employment as well as disguised unemployment. In this work explains about smart irrigation system and it can be utilized where the water is scarce. This irrigation system can be helpful to increase the yield of plants by monitoring the environmental condition and providing necessary information to the farmers.

5. COMPARATIVE STUDY OF SIVAKASI AVERAGE WEATHER IN LAST FIVE YEARS

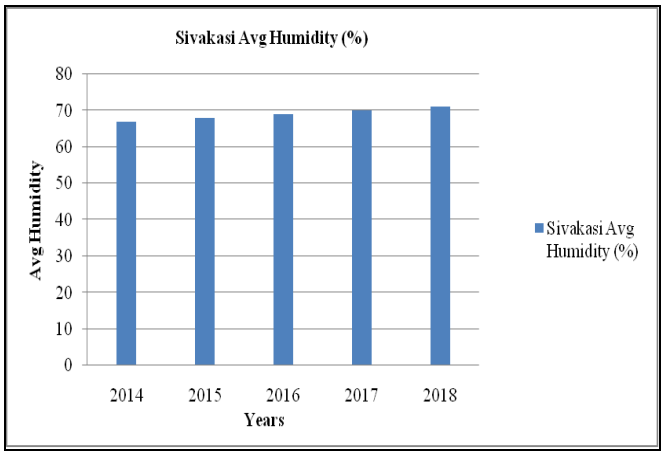
Table 1: Sivakasi Average Weather in Last Five Years

SIvakasi Last Five Years / Sivakasi Average Weather Forecast		2014	2015	2016	2017	2018
Temperature (°c)	Maximum	33.25°c	32.92°c	33.92°c	33.58°c	33.58°c
	Minimum	24.5°c	25.33°c	25.12°c	24.92°c	25.58°c
	Average	28.33°c	28.53°c	28.92°c	28.75°c	29.25°c
Humidity (%)	Average	67%	68%	69%	70%	71%
Rain Fall (mm)	Average	38.49mm	54.38mm	25.76mm	51.58mm	135.64mm

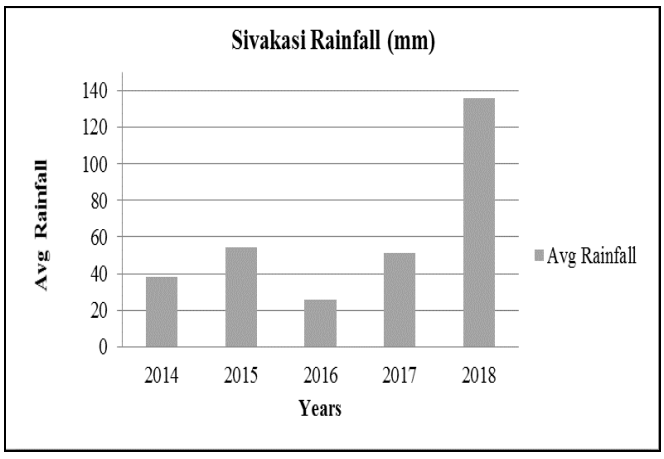
6. GRAP PLOTS



Histogram-1: Sivakasi Average Weather of Temperature Measurement



Histogam-2: Sivakasi Average Weather of Humidity Measurement



Histogram-3: Sivakasi Average Weather of Rainfall Measurement

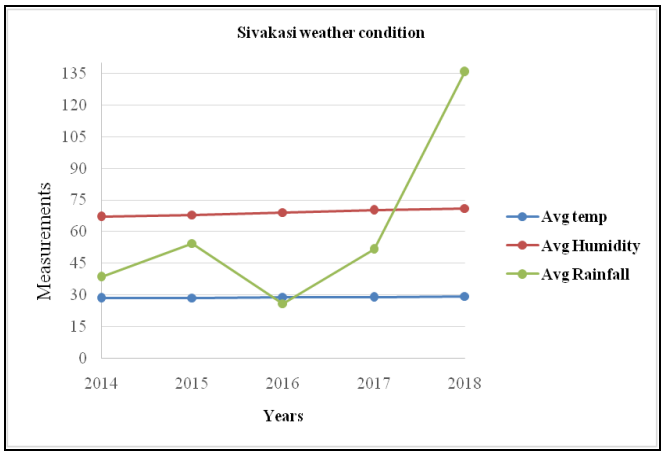


Chart1: Sivakasi Average Weather in last five years

The temperature ranges from a maximum of 34°C to a minimum of 26°C. Sivakasi receives scanty rainfall with an average of 136mm annually, which is lesser than the state average. The humidity of the town varies between 65% to 71%. This system monitoring, the irrigation system can be automated if soil moisture is low and temperature is high.

7. SYSTEM WORK

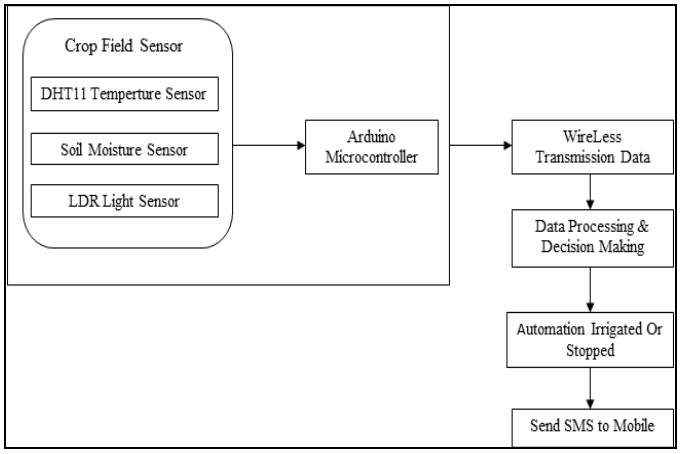


Fig 1: Basic Block Diagram of Proposed System Design

The proposed system is completely based on the Iot monitoring system. This system continuously monitors the sivakasi weather condition. It provides water resource and light resource according to the sivakasi weather. This system contains a soil moisture sensor, a temperature sensor and a light sensor which will sense the current humidity level of the soil and send the moisture level to the system, the temperature sensor will sense the current temperature and send the information about the temperature and the light sensor will send the current light level to the system. The system will process the data and take a decision according to the data captured and operate the devices to motor pump water and on or off the light. This system is efficient system compare to the existing manual system. The growth rate of plants is much faster than the current system. By using soil moisture, DHT11 temperature and LDR light sensor connected the Arduino.

Advantage:

1. Once the program uploaded in computer, no need to use computer for every time work. In that condition, power bank will be helpful to operate the system.

2. When the moisture and temperature value is low or high the message will send to the farmers through mobile.

3. Automatically water irrigate and the crop will grow faster.

The mobile application can be designed to analyze the data received and check with the values of moisture, temperature and humidity. The decision can be made either by the application automatically without user interruption manually through application with user interruption. If soil moisture is less than the threshold value the motor is switched ON and if the soil moisture exceeds the threshold value the motor is switched OFF. The sensors continuously send data regarding moisture content of the soil. Whichever sensor indicates low moisture content to that place motor is switched on and then water is pumped, if it indicates high moisture content pumping of water is stopped by switching of the motor. The values of sensors set and stored in the Arduino. The sensor value varies according to the climatic condition. The soil moisture will be different in summer and winter seasons and so the temperature and humidity values. The irrigation system is automated once the control received from the mobile application. The decision is sent to the arduino and accordingly the motor switches are operated. The sensor is used to monitor the water level in reservoir. Before the motor is switched on, the water level is checked to ensure that require amount of water available for irrigation. If required amount of water is not present the motor will not be switched on or only less amount of water is supplied. The notification will send to the farmer's mobile for further decision to be made. The farmer can also be able to switch on or off the motor from mobile application. Through the arduino, light sensor is switch on the light in night time. This method will increase the plant growth in the night time also. The proposed work is completely operated automatically. In the beneficiaries more efficient than the conventional approach. Then crop field provide good results to grow faster and healthier.

8. CONCLUSION

This system can be used in smart agriculture in and around sivakasi. The system helps to reducing the labor cost and act as an one time investment. Simultaneously, labor can work on crackers, match works and printing industries. They can remotely monitor their equipments. Ability to do realtime diagnostis of the health of the crops. The farmers expertise in the field with technology use everyday to make their life little easier. All observations and experimental tests prove that this project is complete solution for field activity irrigation problems. The prediction helps to supply the right amount of water to the crops. It reduces the water consumption to a greater extent and it requires minimal maintenance. The crop productivity increases and the maximum wastage of crops is reduced by using this irrigation system. The developed system is more helpful and gives more feasible results.

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