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Adapting New Generation Technologies in Smart Farming

Suhada Tasleem P[1], Dr. K R Rekha[2]
[1,2,] Department of ECE, SJB Institute of Technology

Abstract*: Modern challenges of the present situation of our country is to improve the plant growth with low cost because as the population of the country is increasing need for the vegetation is becoming a major criteria, with this modern challenges modern technologies is being invented which helps us to get automated irrigation system which consumes less resource and can produce healthy crops. Here we have used ARM7 LPC2148 microcontroller and few of the sensors which is adversely necessary for the protection of the field is connected to it. According to the sensed data the supply of water will be proceeded. In addition to this we have also provide the system with a GSM module which help the farmer to get the information of the farm periodically. Farmers are also experiencing the shortage of power supply to the fields so here in this system we have developed a prototype which work on the solar energy. In the designed system a canopy type of a structure is added so that the crops can be protected from the excessive rain. In addition to that even the weather information will be considered for watering of the crops. For the betterment and full support of farmer we have made to save the hazards which will be detected by the system like ruin of farm by entry of animal, fire hazard etc. which will be stored in a excel sheet using MATLAB. By this developed system farmer can gain profit and he can be burden free about his work to some extent.

Keywords— Automatic irrigation, GSM module, canopy structure, sensors, vegetation, data collection, MATLAB.

I. INTRODUCTION

Agriculture sector being an important factor of India needs attention and scope of improvement. All the working sectors of world in some or the other form needs water and utilises it, but in case of agricultural sector cent present of water will be used, water is becoming an extinct source and hence water being an important resource for all leaving beings requires attention so that the precious resources is not wasted. And hence automatic irrigation system is used to stabilize the use of water. The demand for vegetation is increasing as the population of the country is increasing day by day therefore the concentration of the electronics scope should also be diverted to the food sector even.

II. LITERATURE SURVEY

Authors of the paper [2], to manage the greenhouse environment have designed a low cost and environment friendly greenhouse management system where they have used a soil moisture sensor which reads the wetness of the soil, and have also used a temperature sensor which will sense the temperature of the greenhouse and automatically decide the switch ON and switch OFF of the pump etc. In the olden days the farming was done by flood or were fully dependent on the rain. Author in paper [3] tell that the manual irrigation was not effective and many of the nutrients were leaching off from the soil surface. Authors of [4] have not only concentrated on the irrigation but also on the security of the agricultural area. In the paper [5] author have designed and implemented greenhouse monitoring system using zig-bee, the data will be read by the control nodes, all the data will be sent to PC through a serial port. Author here aims at improvising the efficiency of the room management and reduce the human intervention.

III.METHODOLOGY

The proposed system is as shown in the block diagram. Here sensors which are essential for the observing the farm is utilized like soil moisture sensor, temperature sensor, fire sensor. These sensors are connected to the arm board and the output action will be done according to the sensed data. Soil moisture sensor will sense the wetness of the soil and indicate its output by high and low according to that switching on and switching off of the motor will be authorized. In addition to that farmer can do it manually by giving a missed call to the field GSM module, turning off the motor will be a call away. The temperature sensor, senses the temperature of the field, if the temperature will be high a message will be sent to farmer stating the temperature of the field. Farmer can also know the temperature of the field by sending a message and in reply farmer will get a message stating the current temperature of the field. The other main misfortune which will be faced by the farmer is catching up of fire in or around the fields

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and hence a fire sensor is placed to rescue farmer from that regard, by initiating the buzzer, switching on the water pump and by sending a message to farmer. Fencing is also added in the proposed system to avoid theft and trespassing of animals in the field. To avoid excess water to be accumulated in the fields we have designed a canopy structure to the field, this canopy can be operated by the farmer by sending a message. The canopy can either be opened or closed by sending a message. The power supply for the system is by the solar energy.

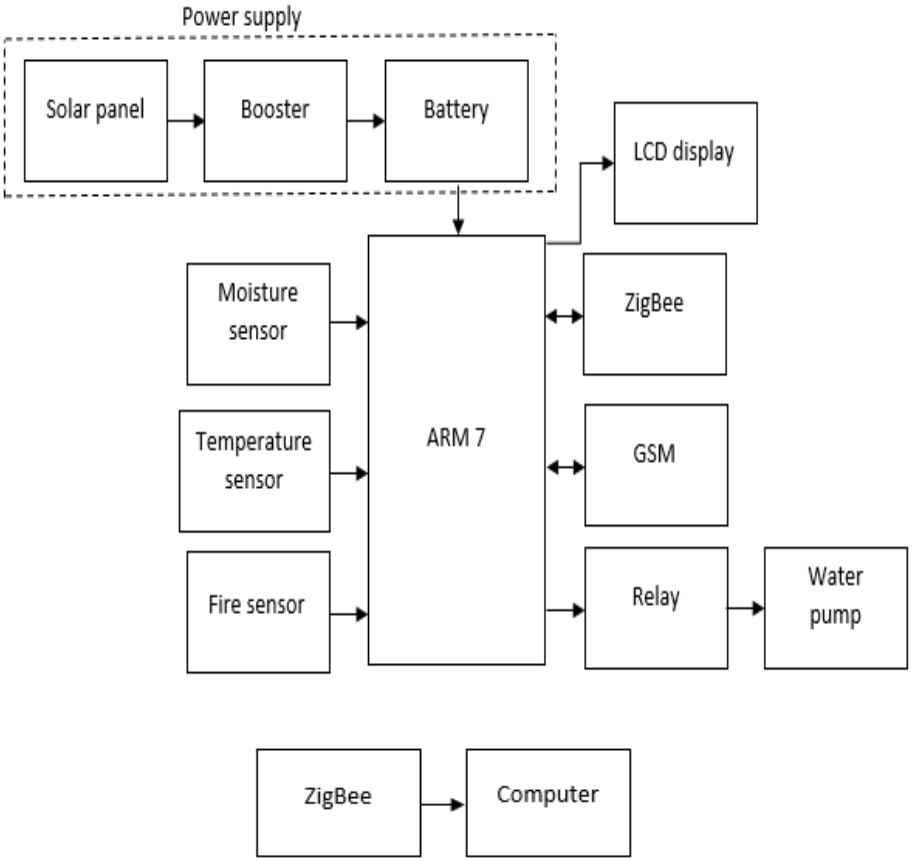

Fig. 1: Block diagram of proposed system

A. The components which are used in this system is

1) ARM 7 LPC2148
2) Soil moisture sensor
3) Fire sensor
4) Temperature sensor
5) DC motor
6) Water pump
7) Relay
8) Solar panel
9) Buzzer
10) Zig-bee
11) GSM Module

The flow chart of the system can be drawn as shown in fig 2. The main condition which will be checked in this flow diagram is the moisture content of the soil and the temperature, the fire detection can also be included which in case of fire detection the water pump should be switched on till the fire is extinguished. The water pump will be switched ON when the wetness of the soil is below the threshold level and will be switched OFF when it attains the threshold value.

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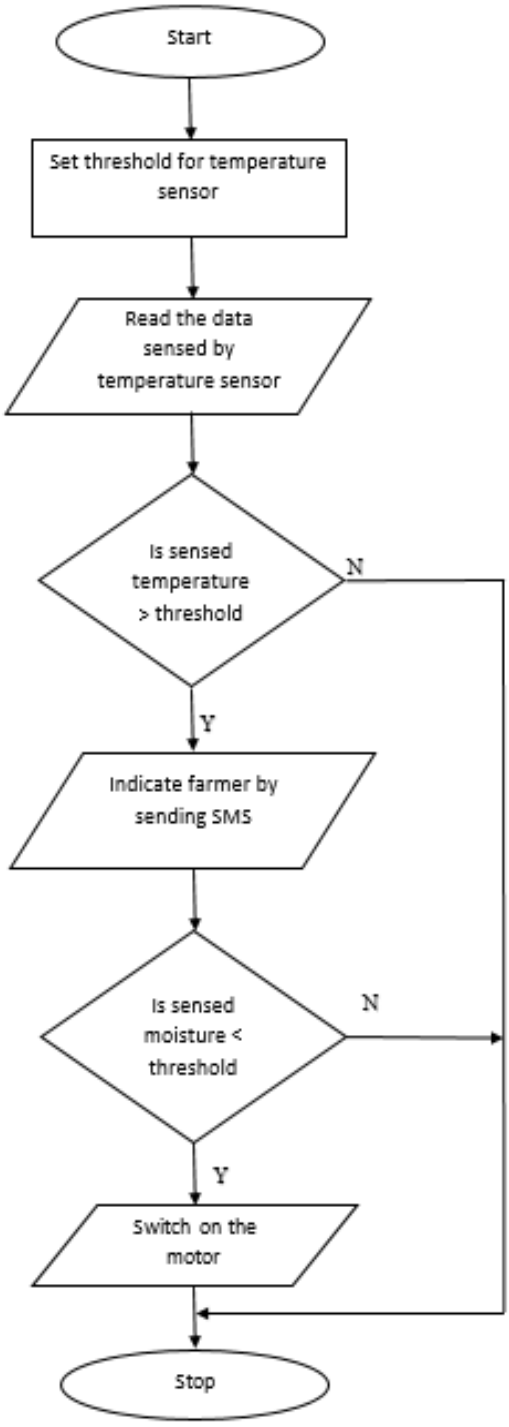

Fig. 2: Flow diagram of the system

IV. RESULT

The proposed work with ARM was seen to with beneficial results. Appropriate messages to farmer was sent through the GSM module present in the farm and the text was also been displayed on the LCD screen which would be helpful to the farmers who will be present in the farm. The canopy structure was developed to protect the crop form the natural calamities in the times of heavy rainfall which will sometime not be needed at that time of yield. In additional to these we have even saved the data in the excel sheet.

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Fig. 3: LCD screen shorts of the system

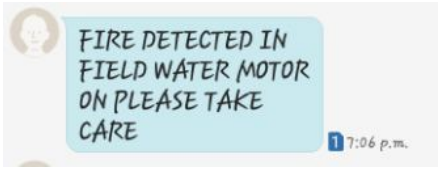

Fig. 4: When fire is detected

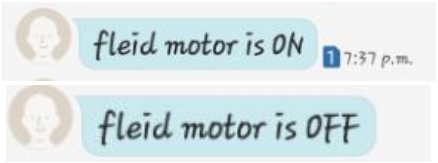

Fig. 5: conformation message when given a missed call (manual mode)

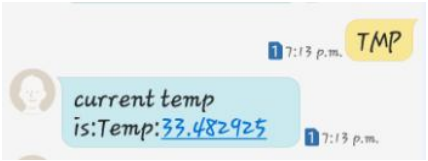

Fig. 6: When farmer sends a text to know temperature of field

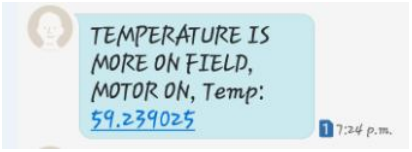

Fig. 7**:** When temperature is more than threshold

The appropriate judgement whether the motor should be switched on or not according to the conditions of the soil and temperature is done. The tabular column 1 shows us the motor status and the conditions of the field and even show about the SMS been sent.

Table 1: Operation of pump in different condition

Soil status	Temperature	Fire	Buzzer	Pump status	SMS
Wet	High	-	ON	OFF	Sent
Dry	High	-	ON	ON	Sent
Wet	Low	-	OFF	OFF	Not required
Dry	Low	-	OFF	ON	Sent
Any	Any	Detected	ON	ON	Sent

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TABLE 2: Message Conditions

Condition	Text sent	SMS sent from	SMS sent to
Soil dry	Motor on	GSM Module	Farmer
Soil wet	Motor off	GSM Module	Farmer
Temperature high	High temp	GSM Module	Farmer
Fire detected	Fire in field	GSM Module	Farmer
Invaded in farm	Animal entered	GSM Module	Farmer
To check field temp	TMP	Farmer	GSM Module

TABLE 3: In Automatic Mode

Condition	Action done	Sent from	Sent to
Switch on motor	Missed call	Farmer	GSM Module
Switch off motor	Missed call	Farmer	GSM Module

Tabular column 2 and 3 shows the automatic and manual mode of the work done with the SMS feature in it. If we send TMP to the GSM module present in the field then the temperature sensor in the field senses the temperature and sends back a text message stating the temperature fig 6. Switching ON and OFF of the motor can be done either by automatic mode or by manual mode. If we want to switch on the motor in the manual mode then farmer should give a missed call to the sim inserted in the GSM, and switch off the motor another missed call would be enough.

V. CONCLUSIONS

A smart farming system is proposed in this paper. Here in this prototype the sensors like rain drop sensor, soil moisture sensor and temperature sensor will be used to get accurate information of the field. Based on the sensed data, we have set up some threshold rules to switch ON and OFF the water pump so that the crop in the field won't get excess or less water. If the crops in the field get excess water then there may be problem like fungal infection to the roots etc. Message will be sent to the farmer when the motor will be switched ON and OFF. The switching ON and OFF of motor can be done by farmer even i.e. manual mode just by giving a missed call to the field GSM module. Canopy can be closed or opened when it is necessary because sometimes excess rain water will be harmful to the crops in the field, so we have here created a canopy structured for protection of the crops. The data of the field in the misfortune conditions will be recorded in excel sheets via GUI of MATLAB like entry of the animal, fire in the field etc.

VI. ACKNOWLEDGMENT

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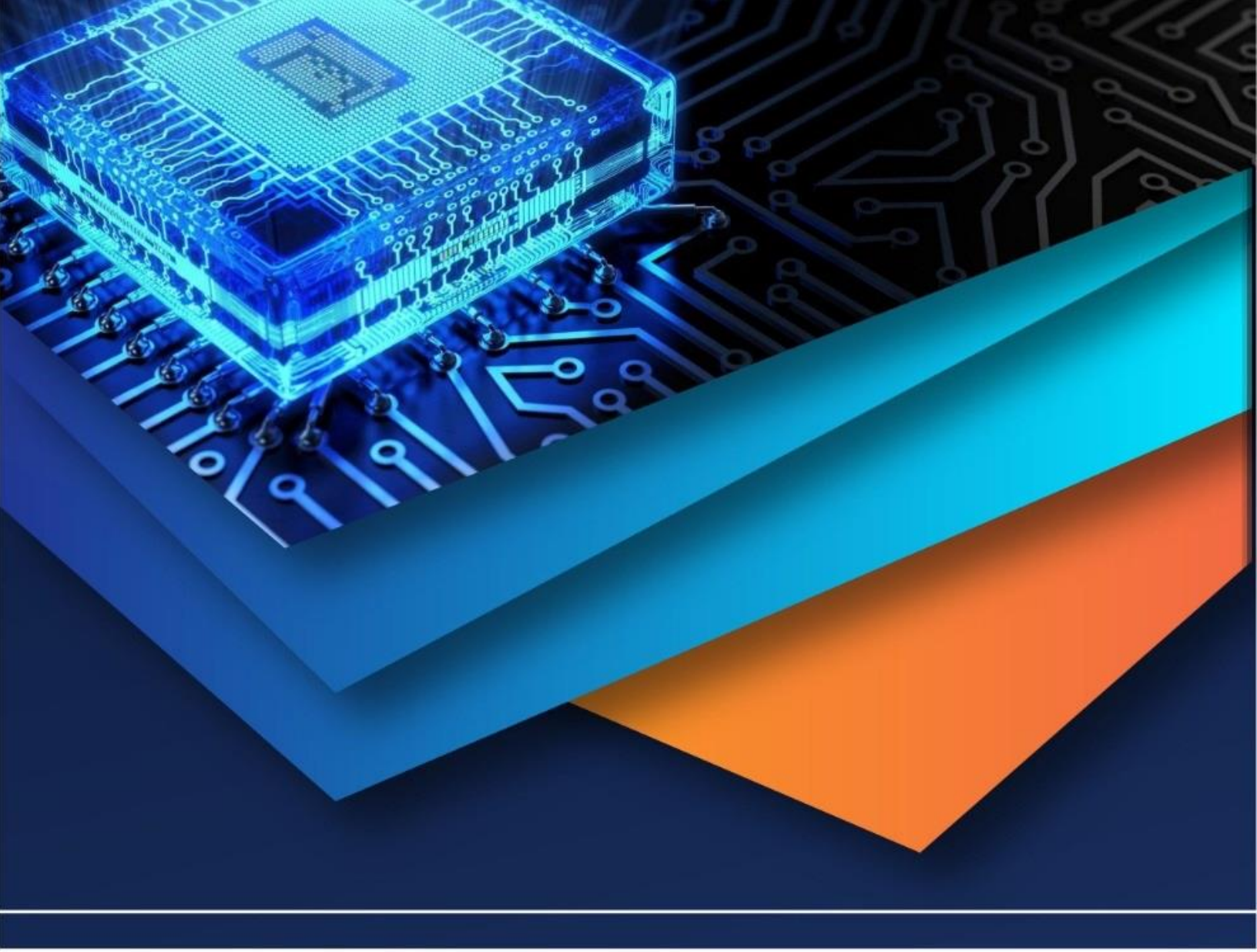

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