Protection of Crops from Weather Calamities Using GSM and Wireless Sensor Network

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ABSTRACT: Agriculture is the back bone of Indian Economy. About 70 per cent of the population is living in rural India. Agriculture is the unique supplier of food to the entire country. In addition to this it is the supplier of labour and investment and consumer of the products of the two sectors namely industrial and tertiary. Though agriculture plays a vital role, it affects frequently by heavy rains which leads to huge damage of crops and resulted heavy loss of farmers property. In order to avoid this sought of problem this project is designed. This project helps farmers a lot not only in protection crops from heavy rains and it harvests water too. The saved water can be used to meet the needs of animals to feed, cooking, washing etc. It can also be reused for fields effectively through sprinklers and drip technology that are available in the present market. This system runs in automatic and manual mode as well it is also incalculated with automatic roof that works by getting signals from rain and soil moisture sensors. If both sensors are ‘ON’ the information is passed to the microcontroller. Then controller indicates the DC motors to run, therefore the opened roof which consists of solar panels will cover the entire field automatically, it is also provided with field security system that protects the field from animals. The amount of the production of agriculture depends on weather and natural conditions this system helps to know them better and thereby lead to good quality production and very minimal losses.

Introduction:

Agriculture is the back bone of Indian Economy. About 70 per cent of the population is living in rural India. Agriculture is the unique supplier of food to the entire country. In addition to this it is the supplier of labour and investment and consumer of the products of the two sectors namely industrial and tertiary. Though agriculture plays a vital role, it affects frequently by either heavy rains or droughts which leads to huge damage of crops and resulted heavy loss of farmers’ property.

Most of the lands particularly in southern India are rain fed. Indian agriculture is encountering water scarcity hence the available water should be utilized as minimum as possible. It can be possible by introducing technology.

A new era has been launched in the history of human world that is science & technology particularly electronics and communications that stimulates and enriches every bit of human life and it plays a vital role in the economic development of a country, the way of human life has been changed by the advert of EMBEDED SYSTEM which makes human life simple and more secure. Today the embedded system attracts the attention of many scientist across the world mainly in the fields of communication and agriculture. As the responsible young engineers of our country we have to develop the present system or invent a new system.

Being responsible engineers, we developed a system named “crop protection from weather calamities using GSM and wireless sensor network”. The main objective of this project is to protect the crops from heavy rains, proper and effective usage of rain water and solar energy and also to provide security from animals entering into the field. This system has the automatic irrigation system that provides right amount of water at time to the crops based on the soil condition and surrounding temperature which intern reduces the water wastage. To achieve this, we are interfacing bidirectional dc motor, sensor network, solar panels and GSM module with ARM7 LPC2148. By implementing this project, we can avoid crop damage against heavy rains and as well a good yield can be achieved in farming lands. This system is easy to implement and highly efficient, it also reduces man power thereby minimizes wastage of capital therefore there will a good chance higher profit rates.

1. Literature Review:

The majority of the grounds particularly in southern Asian nation are torrent bolstered. Indian business is experiencing water shortage consequently the accessible water must be used as least as may well be expected below the circumstances. It tends to be conceivable by presenting innovation.

Fan Tongke et al (2013): Issues concerning agribusiness, wide open and ranchers have been continually impeding China's improvement. The main answer for these three issues is horticultural modernization. Be that as it may, China's farming is a long way from modernized. The presentation of distributed computing and web of things into rural modernization will most likely tackle the issue. In view of significant highlights of distributed computing and key methods of web of things, distributed computing, representation and SOA advancements can manufacture enormous information associated with agrarian generation. Web of things and RFID advances can help fabricate plant processing plant and acknowledge programmed control creation of agribusiness. Distributed computing is firmly identified with web of things. An ideal mix of them can advance quick improvement of agrarian modernization, acknowledge shrewd agribusiness and adequately understand the issues concerning horticulture, wide open and ranchers.

Muhammad et al (2010) has projected a framework, it's easy thanks to cater to water system problems in agricultural fields utilizing faux neural system controller. This framework is nice with ON and OFF controller and also the ON/OFF controller terribly bombs thanks to its higher...
impediments. except the ANN primarily based frameworks are more and more adept and what is more it expends more vitality not in the slightest degree like our projected technique

Kalyan et al (2011) has projected a framework, the framework that provides the capability to spare the vital assets through remote device system and GSM module and promptly accessible advanced cells nonetheless can't face up to any aggravations like our framework

Prisilla et al (2012) has projected a framework, Water is one in every of the numerous assets, the increasing people nourishment necessity is in addition expanding. water assumes a vital job in farming, a definitive purpose is accomplished by utilizing the going ANN management framework.

Pranit et al (2014) has projected a framework, the paper simply spotlights on the new mechanization innovation during a more and more adept manner, the checking and dominant the tasks of nursery condition that once more has no insurance to the fields from ecological conditions

Suraj et al (2015) has projected a framework, this framework is lessens the water use since it offer water system consistent with the necessity of the harvest. 2. This framework is mechanized water system framework thus it decreases the human resources.3. This water system framework was determined to be accomplishable and savvy for enhancing water assets for rural generation. 4. The water system framework is modified in accordance with Associate in Nursing innovation of specific harvest wants and needs least support. Utilizing this framework we are able to screen the standing of the hefty variety of sensors (Soil-dampness, Temperature, Water level) and what is more the ON/OFF standing of the engine and Fan.

Rayala et al ,(2015): System was determined to be plausible and savvy for streamlining water plus for husbandry generation. These framework will acclimated to assortment of harvest and improve the support this framework is plausible for all kind of yield. we are able to toil these framework for huge rescale inexperienced house and open field.

Jayalal et al, (2015) has projected a framework, Zigbee primarily based farming checking framework as a dependable and productive framework for proficiently screen the natural Conditions. Remote checking of field decrease the human power, but it likewise permits consumer to determine precise changes in it. it's utilization of ease, Energy expends implies less power and might management 254 gadgets at any given moment, that so prompts the advancement of different new innovations like Home Automation, Health Care Automation utilizing zigbee

Katariya et al,(2015) has projected a framework the four noteworthy add husbandry field that is finished by a golem while not giving any human facilitate. For coming up with programmed framework we have a tendency to offer legitimate following through the reference point following golem plan within which the robot acknowledges white and dark or uninteresting surface and pursues simply white track. With relation to this idea we have a tendency to are visiting execute a reference point on a homestead wherever extremely we've got to figure and staying surface is treated as a dark surface thanks to the tanish shade of soil. we have a tendency to likewise offer deferral to golem at equivalent separation to try and do the business work like chemical spraying, water providing, stopping, dropping of seed, exactly and consequently and also the sun hopped-up plant offers the availability supply to entire golem that makes it reverberation well disposed.

Vidadala et al (2015) has projected a framework This task is to structure Associate in Nursingbd build up an inserted stage structure for farming mechanisation this venture create utilization of assorted sensors that we have a tendency to screen through net and GSM innovations. The information are seen at remote zones by utilizing GPRS innovation.

Bishnu deo kumar(2017) has projected a framework the purpose of this paper is mechanisation of water system instrument. the full framework is strained by utilizing microcontroller ATMEGA 328, the sensors are related to the controller by means that of comparator, once the amendment happens within the sensors they offer Associate in Nursing flag to the microcontroller and during this manner the engine is enacted and deactivated aboard a ringer demonstrating the engine is ON.

2. Existing Method:
The current framework in Indian rural cultivating is generally worked physically. It is additional tedious, it requires more labour. Farming is for the most part influenced by common whether catastrophes, for example, floods, rains which decrease the plant development thus it prompts decrease yield. The ranchers are alarmed by media and cannot provide any security from it.

This technique of irrigation proposes an financial as well as computerized irrigation gadget that is based on wi-fi sensors with bluetooth for control of irrigation & real-time monitoring of agriculture, the sensors that are hooked up for real time monitoring of plants are controlled via sms the usage of a gsm module, this sms is shared by using bluetooth technique interfaced with the main microcontroller chip, the above microcontroller controls the favored operation at the farmland, above gadget additionally informs about temp. upward push, conc. of co2 in soil, moisture content material of soil to the farmers mobile through sms thru bluetooth module & consequently the actions are taken by using the farmers. the above gadget consists of an 8-bit microcontroller chip (atmega64), a gsm and bluetooth module in addition to rs232 interface (fig 10). right here we are the usage of microcontroller which is interfaced with special sensors to screen the vegetation. the a/d converter converts the analog facts of sensors to digital statistics. .eeprom information the records supplied by way of sensors. this records is analyzed by means of microcontroller & in accordance a sms is sent to subscriber cellular thru gsm (for distance control) & bluetooth (for nearest manage). whilst a user sends an sms inquiring for the reputation of gadgets and measured cost by the sensors,
the gsm module sends the statistics saved in eeprom as a
reaction via smss.

Fig-a: Block diagram

3. Proposed Methodology:
The proposed system is designed to protect former crops
from natural disaster,. It consists of movable solar roof top
that is designed to protect agriculture field during rains and
other sudden weather changes, it is also inculcated with
automatic irrigation system that takes care proper and
effective usage of water. The sensor in the land detects
unauthorised entries into the field and intimation will be sent
to Farmer using GSM technology.

Fig-0: BLOCK DIAGRAM

4. Technology Required:
4.1. ARM7 LPC2148:
to make this machine the microcontroller is used so as to
process the incoming information. it has 16-bit/32-bit
arm7tdmi-s microcontroller in a tiny lqfp64 package deal.
• it has eight kb to 40 kb of on-chip static ram and 32
  kb to 512 kb of chip flash memory in it. the 128-bit huge interface or accelerator
  enables 60 mhz operation velocity
• further, the lpc2146/48 provides eight kb of on-chip
  ram accessible to usb via dma.
• as much as four.five to 5v tolerant rapid preferred
  cause i/o pins in a tiny lqfp64 package and upto 21 external
  interrupt pins available.
• 60 mhz most cpu clock is to be had from the programmable
  on-chip pll with settling time of one hundred s.
• unmarried electricity supply chip with por and bod circuits.

cpu operating voltage range of three.0v to three.6v (3.3 v ±
10 %) with 5v tolerant i/o ports.

Fig-1: ARM7 LPC2148 Microcontroller

4.2. GSM Module:
GSM stands for global system for mobile communication. it's
far a digital cellular era this is used for transmission of voice
and records offerings.GSM is the reliable and low cost in
telecommunication device that is implemented globally. GSM
is developed based on time division multiplexing (TDMA)
digitizes and compresses data, then sends it down via a
channel with other streams of consumer information, every in
its very own timeslot. The purpose of GSM in this project is
mainly to give intimation to the android phone

Fig-2: GSM Network along with added element

4.3. DC Motor:
A machine that converts the dc power into mechanical energy
is known as dc-motor. It has long life, it can operate nearly
3000 hours having higher output. It has High strength because
of sturdy construction, big diameter output shaft and ball
bearing, low noise and multiplied insulation because of new
resin brush holders and additionally available with magnetic
revolution sensor and noise clear out.

fig-three: dc motor
5.4 LCD (liquid crystal display):
Liquid crystal show which consists of an array of tiny segments called pixels that may be manipulated to offer records. It's far a flat panel show or electronically modulated optical tool that makes use of mild modulating residences of liquid crystals. Some of the most not unusual lcds linked to the microcontrollers are 16x2 and 20x2 presentations. This indicates sixteen characters in step with line by means of 2 strains and 20 characters consistent with line by means of 2 strains, respectively. Rain water sensor is one of the major components inside the circuit. It may be built by using taking the piece of bakelite or mica board and aluminium cord. Bakelite ought to be made absolutely flat and aluminium cord need to be pasted on the flat board which represents rain water sensor. Care must be taken in order that there are not any spaces among the wire and board.

Fig-5: Rain water sensor

4.6 Soil Moisture Sensor:
The soil moisture sensors will acquire the information about soil moisture stages in the floor based on that reading from soil moisture sensors, will decide to turn on/off the irrigation gadget. The soil moisture sensor will physically interface to the micro controller, that allows you to gather the analog inputs from the sensor. Model toogoo soil moisture sensor operating voltage three.3v-5v, it offers digital output and additionally has adjustable sensitivity.

Fig-6: Soil moisture sensor

4.7 IR Sensor:
An ir sensor is used to feel some thing, an ir sensor can degree the heat of an item in addition to detects the motion of the items. These sensors measures simplest the infrared radiation, commonly inside the infrared spectrum, all of the objects radiate some sought of thermal radiations which are invisible to our eyes and can be detected through the sensor. The emitter is actually an ir led and the detector is an ir photodiode that’s touchy to ir mild of the identical wavelength, whilst the mild falls on the photodiode, the resistances in addition to the output voltages, adjustments with the change in the magnitude of the ir mild obtained.

Fig-8: IR Sensor

4.8 Solar Pannels:
Solar panels consists of solar cells wired together. The cells are responsible for converting sunlight into electricity. The important point is how efficient this conversion process is. The best available solar cells in the market are still less than 25% efficient; it has 15% to 18% efficiency being much more common. Generally the mono-crystalline cells are much more efficient than the polycrystalline cells, and they are both much more efficient than other films such as amorphous silicon thin film cells.

Fig-8: Solar Pannel

4.9 Water Pump:
Micro dc three-6v micro submersible pump is low fee, small size submersible pump motor, it can perform from a 2.5 to 6v electricity deliver. It is able to pump up to a hundred and twenty litres according to hour with very less modern consumption of 220ma. It is easy to operate just by means of connecting the tube pipe to the motor outlet and submerge it in water and energy it on. However we must make certain that the water stage is continually better than the motor because dry run may harm the motor due to overheating.

Fig-9: WATER PUMP
5. Results:
This system protects crops from excess amount of rain water and also saves water from wastage. This system also saves the electricity, maximizes the productivity during both rainy season and sunny season and provides security to the field.

Fig-10: CROP PROTECTION SYSTEM

6. Comparison With Existing Methods:
The existing system in Indian agricultural farming is mostly operated manually, it is more time consuming and it requires more man power. Agriculture is mainly affected by natural whether calamities such as heavy rains, floods which reduce the plant growth in turn it leads to reduce yield. Though the farmers are alerted by media the existing system cannot protect crops from natural calamities which the proposed system can perform.

Fig-11: CIRCUIT

7. Conclusion And Future Scope:
This paper gives an idea of protecting the crops from natural calamities by making use of embedded system at the lowest price possible
By implementing digital image processing into the same project high security can be given to the field and by adding movable sprinklers the same project can be taken to another level.

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