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INTERNET OF THINGS (IOT): SMART FARMING TECHNOLOGY

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Abstract:

Agriculture business assumes essential part in the improvement of nation that depends on it for it national revenue. Issues concerning agriculture have been continually obstructing. There has always been problem regarding the weather, fire, insects affecting the fertility of the soil and even humans deteriorating the crops. The only answer to such problems is by modernizing the traditional methods of agriculture. IOT (Internet of Things) provides a very good scope to all this problems. Internet of Things (lOT) is an innovation that permits things to impart and associate with each other. With the use of IOT, we propose a Smart Faming Technology (SFT) to enhance the production and safeguard the fields from external sources and also give a clear idea to the farmers as to how to move ahead with the farming process. The highlighting feature of the proposed system is that it consists of three parts one which is the Arduino boards, which will act as the heart of the system connecting with all the sensors, which is the second part, the system will consist of various kinds of sensors for detecting object nearby the fields, checking the humidity/fertility of the soil, an alarm for detecting the fire or any human who has come to spoil the crops. The system if detects any kind of abnormality will send a message through the GSM Model to the concerned person. Together they will have the capacity to give required data alongside the thought of lessening in cost which will be advantageous to agriculturists.

1. Introduction:

Agriculture business is the establishment of national economy, just the farming improvement is great, the whole national economy can relentlessly move forward. The monetary improvement of a nation proposes that, exclusive given an incredible advancement of agriculture business and provincial economy, the entire national economy can go to success. In the meantime, just horticultural creation can give the second and third industry with crude materials and budgetary

assets, establishing the framework for the modernization of society. The advancement and administrative of agriculture method for generation are straight forwardly related with the creation of sustenance, farmer's salary and the demand of market. It assumes a crucial part in guaranteeing the quality and amount of farming items.

Smart Farming Technology (SFT) will be a device in used by the farmers to ease the work flow in their day to day labor. The SFT will based on the properties of Internet Of Things(IOT) in which a couple of sensors will be used which will be connected to the Arduino board and resulting to the sensors an automated message will be sent wirelessly to the farmer's phone using the GSM Model. In the previous system, all these devices were not available in single unit and as result handling all the devices altogether becomes hectic and confusing which totally deviates for from the ultimate plan of making the plan user-friendly. In this paper, the proposed system consists of three parts the Arduino board, the various kinds of sensors and the GSM Model.

The Arduino Boards act as the heart of the system in which all the various kinds of sensors will be attached and according to the criteria set explicitly by the user for various sensors the Arduino will come in action and through the GSM Model will send an automated message into the farmer's phone. The proposed system will be attached with many sensors to detect various things for the better outcome for the farmers like a smoke sensor to detect any kind of fire or smoke that may harm the crops, a potentiometer to keep track of the weather and inform the farmers as to how to cultivate the crops for the following day, a pir motion sensor to keep track if any other trespassers come to destroy the crops or to infertile the soil, an ultrasonic sensor that will keep track of any nearby objects be it like any insect that might harms the crops, and an sand moister sensor [IR-3000] to check the moister of the sand and accordingly inform the farmer as to how much water is required for the crops. The proposed system will also have GSM Module with antenna that will keep track of the IMEI Number of the concerned person's phone and according to the limitation kept explicitly by the user send an automated message in the registered phone. The process of how the SFT will work is that it will be kept in the center of the cultivated crops and according to the diameter of the cultivated crops, the sensors in the system will keep track of the concerned things and keeping in track with the limitation stored explicitly by the user in the Arduino Board accordingly send an automated wireless message to the concerned person about the problem. The system can be powered by two ways one is through directly connecting it to the power point and the other is through a LiPo Battery.

2. Literature Survey:

SNo	Title	Year Published	Research Gap Analysis	Proposed Method
1	Internet of Things and Cloud Computing for Agriculture in India	2015	It just stores the data which can be used for future work but doesn't provide any services to the present work day.	The proposed demonstrate utilizes IoT to gather required data of various objects situated in various parts which is not practical without the utilization of sensor system. Here, utilization of cloud computing storage server is proposed.
2	IoT based Smart Agriculture	2016	The proposed system works basically only on the fertility of the soil.	The highlighting features of this project includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc.
3	Application of IOT Based System for AdvanceAgriculture in India	2015	The proposed methods suggest that all the information retrieved from the sensors will first be uploaded into a particular website through which the farmers can grant their access from their cell-phones or computers which is a very complicated	This paper proposes Internet of Things based sensor organization for agribusiness utilize. This sensor comprise of Soil moisture sensor, soil temperature sensor, and ph sensor for soil. This all sensor associated with each other by remote sensor organize xbee and will pass on information to a station computer in the control room. From control room it will be transferred to site where farmers can get to every one of the information on his cell phone and tablet. This framework likewise controls water prerequisite and composts necessities from the sensor

				method in terms of the end users.	information for various kind of yield in various time of year.

3. Existing System:

The following are the existing system in agriculture using IOT:

1. The Phenonet Project is intended to help agriculturists screen vital vitals like humidity, air temperature and soil quality utilizing remote sensors. This venture helps agriculturists to enhance the yield, arrange water system and additionally make gather conjectures. It is likewise useful for scholars to contemplate the impact of genome and microclimate on yield generation.

2. Situated in Ireland the CleanGrow's project assists with checking the product supplements making utilization of a carbon nanotube-based sensor framework. This data helps ranchers to adjust development rate or shade of the harvest creation. Rather than simple gadgets utilized expectedly the CleanGrow gadget utilizes a nanotube sensor that identifies amount and nearness of particular particle in the generation.

The drawbacks of such systems are it just focuses on a particular area in the betterment of the agriculture field and needs an expert in that particular field to even operate it, which become pretty useless to the common farmers as to they have no idea about the all these devices. One of the main disadvantages of these existing systems is that it doesn't notify the farmers immediately about the situation instead they store the data in the cloud for the analysis of future predictions.

4. Proposed System:

In this paper we propose a system called the Smart Farming Technology (SFT) that can be used by the farmers for their day to day work of cultivating crops which will result in their ease or work and produce more efficient way to produce higher amount of crops. The highlighting feature of the proposed system is that it will consists of three parts one which is the Arduino board, which will go about as the heart of the framework associating with every one of the sensors, which is the second part, the framework will comprise of different sorts of sensors for distinguishing object close-by the fields, checking the dampness/ripeness of the soil, a caution for recognizing the fire or any human who has come to ruin the yields, a sensor for detecting the temperature of the area and specifically notify the farmer. The system if recognizes any sort of variation from the normal will communicate a wireless message through the GSM Model to the concerned individual. The Arduino Board go about as the heart of the framework in which all the different sorts of sensors will be

connected and as indicated by the criteria set expressly by the client for different sensors the Arduino will come in real life and through the GSM Model will send a mechanized message into the individual's registered phone. The proposed system will be appended with numerous sensors to recognize different things for the better result for the farmers like a Smoke Sensor to identify any sort of flame or smoke that may harm the products, a Potentiometer to monitor the climate and illuminate the ranchers in the matter of how to develop the harvests for the next day, a Pir Movement Sensor to monitor any human movements, an Ultrasonic Sensor to monitor any objects living or dead be it like any creepy crawly that may hurt the yields, and a Sand Moister Sensor to check the moister of the sand and in like manner advise the agriculturist in the matter of how much water is required for the harvests. The proposed system will likewise have GSM Module with receiving wire that will monitor the IMEI Number of the concerned individual's telephone and as per the impediment kept unequivocally by the client send a mechanized message in the enrolled phone. The system can be powered by two ways one is through specifically interfacing it to the power point and the other is through a LiPo Battery. The procedure of how the SFT will function is that it will be kept in the midpoint point of the developed yields and as indicated by the measurement of the developed products, the sensors in the system will monitor the concerned things and keeping in track with the impediment put away unequivocally by the client in the Arduino Board in like manner send an automated remote message to the concerned individual about the issue.
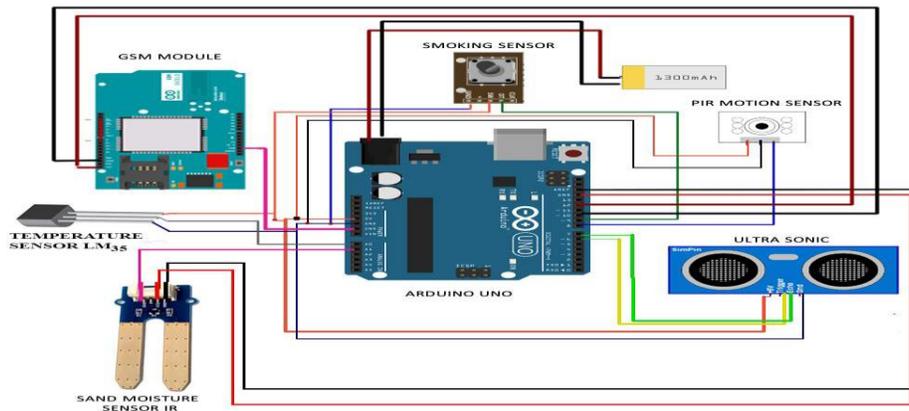
5. System Architecture:

Modules in the Proposed System:

1. Arduino Uno:

Arduino is an open-source stage utilized for building hardware ventures. Arduino comprises of both a physical programmable circuit board (often referred to as a microcontroller) and a piece programming, or IDE (Integrated

Development Environment) that runs on our PC, used to compose and transfer code to the physical board. Each Arduino board needs an approach to be associated with a power source. The Arduino UNO can be controlled from a USB link originating from your PC or a divider control supply (this way) that is ended in a barrel jack or be connected to a LiPo battery.

2. GSM Module:

A modem is a gadget that has a simple transporter flag to encode computerized data, furthermore demodulates such a bearer flag to interpret the transmitted data.

3. Smoke Sensor:

It is utilized to recognize fire or smoke. This sensor is delicate to smoke, as well as to combustible gas. The smoke sensor reports smoke by the voltage level that it yields. The more smoke there is, the more prominent the voltage that it yields. Then again, the less smoke that it is presented to, the less voltage it yields.

4. PIR Motion Sensor:

An infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light transmitting from items in its field of view. They are frequently utilized as a part of PIR-based movement indicators. A PIR-based movement identifier is utilized to detect development of people, animals/insects, or different objects. They are normally utilized as a part of thief alerts and naturally enacted lighting frameworks. They are ordinarily called just "PIR", or now and then "PID", for "Passive Infrared Detector". An individual PIR sensor recognizes changes in the measure of infrared radiation impinging upon it, which fluctuates relying upon the temperature and surface qualities of the articles before the sensor. When an objects, for example, a human, goes before the background, for example, a wall, the temperature in the sensor's field of view changes over the subsequent change in the approaching infrared radiation into an adjustment in the output voltage, and this triggers the identification. Objects of comparable temperature however extraordinary surface attributes may likewise have an alternate infrared outflow example, and consequently moving them regarding the foundation may trigger the indicator as well.

5. Ultrasonic Sensor:

The Ultrasonic Sensor utilizes sonar to decide separation to a question like bats do. It offers phenomenal non-contact run identification with high precision and stable readings in a simple to-utilize package. From 2cm to 400 cm or 1" to 13

feet, its operation is not influenced by daylight or dark material like Sharp rangefinders. The sensor transmits ultrasonic waves into the air and distinguishes reflected waves from an object.

6. Sand Moisture Sensor IR:

Having the right sand dampness levels of soil is a basic part amid the different phases of cultivation. The sand moisture can turn out to be either excessively wet or dry squandering maker's chance and cash and affecting the nature of the end product. The IR-3000 Sand Moisture Sensor that is in a perfect world suited to gauge the sand moisture levels in any production procedure. The IR-3000 sand moisture sensor ought to be mounted a few creeps over the conveyor, prior and then afterward the dryer. This will permit the user to constantly screen the procedure and can control the glass dampness content either manually or automatically in the production process, installed near the dryer outlet where it will be defenseless to outrageous warmth conditions, it is important to cool the sensor with either air or water.

7. Temperature Sensor LM35:

The LM35 is a coordinated circuit sensor that can be utilized to quantify temperature with an electrical yield corresponding to the temperature (in °C).It can measure temperature more precisely than a thermistor. The sensor hardware is fixed and not subject to oxidation. The LM35 creates a higher yield voltage than thermocouples and may not require that the output voltage be increased. The LM35 has a yield voltage that is relative to the Celsius temperature. The scale component is .01V/°C. The LM35 does not require any outside alignment or trimming and keeps up an exactness of +/ - 0.4°C at room temperature and +/ - 0.8°C, over a scope of 0°C to +100°C.Another essential normal for the LM35 is that it draws just 60 micro amps from its supply and has a low self-warming capability.

6. Conclusion:

The cultivating business will turn out to be seemingly more vital than any other time in recent memory in the following couple of decades. The world should deliver 70% more sustenance in 2050 than it did in 2006 with a specific end goal to nourish the developing populace of the Earth, as per the UN Nourishment and Horticulture Association. To take care of this demand, ranchers and rural organizations are swinging to the Internet of Things for examination and more prominent creation abilities. Mechanical advancement in cultivating is just the same old thing new. Handheld instruments were the benchmarks several years prior, and afterward the Modern Unrest achieved the cotton gin. The 1800s realized grain lifts, compound composts, and the principal gas-fueled tractor. Quick forward to the late 1900s, when farmers begin utilizing

satellites to arrange their work. The IoT is set to push the fate of cultivating to the following level. Shrewd agribusiness is now turning out to be more ordinary among ranchers, and cutting edge cultivating is rapidly turning into the standard on account of agrarian automatons and sensors. Smart Farming and exactness farming are taking off; however they could simply be the forerunners to considerably more noteworthy utilization of innovation in the farming scenario. So in Technology (SFT) will act as huge step in bring forward the smart farming technologies which will provide a much easier and comfortable ways for the farmers to go ahead with their cultivation with better results and much more larger profit that too in a very easy manner.

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