

Technological applications in agriculture

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Abstract: Manual cultivation and yielding was the old tradition and still now is a practice. It is to be improved due to increasing population and upcoming generation, with more production with less wastage of resources and with efficient output of the crops. The modern technology used in agriculture has brought rapid change in standard of crops, from well seeded to high yield in productivity, the crops and cultivating lands are well efficient due to modern technologies for any type of crops.

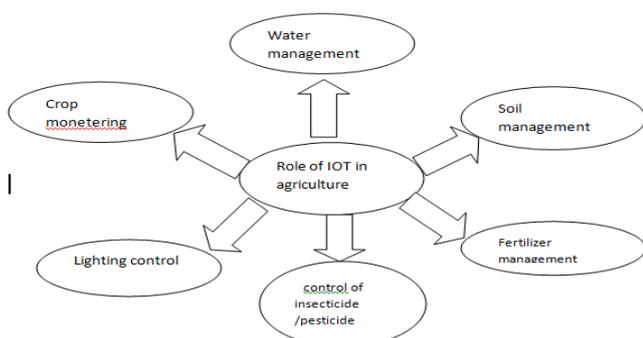
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I. INTRODUCTION

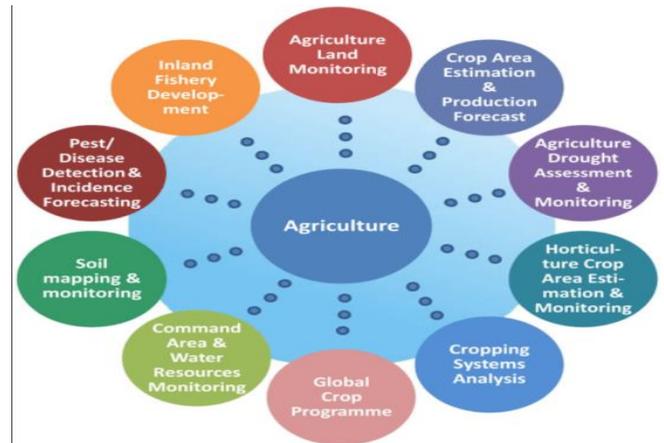
The global population is set to touch 9.6 billion by 2050. So, to feed this much population, the farming industry must embrace IoT. Against the challenges such as extreme weather conditions and rising climate change, and environmental impact resulting from intensive farming practices, the demand for more food has to be met. Smart farming is not only conventional, large farming but could also be new levers to uplift other growing or common trends in agricultural like organic farming, family farming sensors are an important part to any measurement and automation applications, many sensors with their functions widely used in agriculture, home automation and industries. The moisture, temperature, humidity, soil nutrient sensing sensors for the purpose of agriculture, lightning sensors for saving electricity are used based on on-grid or off grid power supply in farm lands and the green house farming technique soliculture using transparent solar cell.

Physical environment of the farm lands like temperature pressure moisture soil nutrients etc; are implementing the rate of growth. Thus these are managed by the wireless sensors including area monitoring, health care monitoring, environmental sensing, earth sensing, natural disasters prevention etc;

Figure.1 role of IOT in agriculture



II. ROLE OF IOT IN AGRICULTURE



Figure;2. applied techniques in different field

Water is the main resource for animals and plants due to some changes in the environment due to human activities water causing scarcity, it should be used with careful avoiding unnecessary usage and leakage must be avoided, all about sensors predominantly taking a part in irrigation and watering in rural areas and also urban areas.

Water management: a moisture sensing sensor is adopted in the farm land which usually sense the soil water content of the soil by the basis of soil humidity, if the soil moisture according to that of the plant needy goes down the presetted moisture value then the farmer is going to be get alerted or if else this

can be further improvised by automatic water pumping with respect to soil moisture feed back by constructing sub pipe lines to the plants roots connecting it to the main pipe line and the automated start of the motor for pumping of water by the sensor signal or if it can be handled manually by the farmer after getting an alert through IOT. Through this maximum amount of water is going to be saved even a droplet of water is not going to expel without the feedback from the sensor. The optimum watering is maintained, no exceeding of water level that the plant/crop is needed.

Spoiling of water unravel to downside can also be detected by the sensors and avoided. This can also be operated through remote sensing technology. More aggravated saturation if the detector is triggered action within motor to decide between on/off. On/off by proper irrigation and level of water resource. Apart from the sensor irrigation the counteract of depleting water being legitimate management irrigation system, frame work of water system also leads to degree in progress or not in progress. Thus ingress protection and management is needed. Prompt detection of water leakage helps in water resource in save mode.

Power for the working :

Due to irregular supply of power and networking of power lines in the agricultural lands, the power can accessed by the attribution of off grid like solar technologies as well as the on grid also. Compare to operation of motor the small sensor needs upto 5v of input.

Automatic irrigation

It's a technical operating device which use for the flow of water from one canal to another canal at the non-present of farmer or irrigator. We can also say that's self-made soil moisture. Different number of ways that the automation can be used

1. It's used for the on and off the pump.
2. It's used to change the direction of the water flow from irrigation area to another area.

Merits of using the automatic irrigation

1. Save time:

It's save the time for watering the lawns ,garden and flower with the comparison of past time that had taken for the watering the plants .we should give command time so that watering will take at the Required situation.

2. Saves money:

There is no money and water should be wasted because everything has been timed and programmed such way that single drop of water used only when its needed or required.

3. Saves water:

We know that one of the major problem of this world is water. Its save the wanted water which is simply wasted and that can be used for the normal work and daily life so there is no water waste.

4. Improve growth:

Flower, garden, and crop grow faster when the water is provide long period of time(time to time) ,our environment also becomes greenery for a long time n beautiful .

How we can maintain our sprinkler system?

We should have to check the leakage and cracks of the nozzles so, maintenance can be easy to do.

We can hire a skill person to regular check out the leakage n nozzle cracks so that our house will be neat and clean all the time.

Process of automatic irrigation maintenance

1. Avoid the polluted water
2. Operating device should be able to measure and flow of water control.
3. Maintain all the system efficiently.

Which irrigation method is best manual or automatic?

1. Manual irrigation is done by hand
2. Automatic irrigation is reduce the time and labour for working.
3. Automatic irrigation is vast expensive than manual but automatic has more advantage than manual.

Crop monitoring and pesticides / insecticide : yield condition and the plant development survey can also done through the internet updates of photo based sensors, natural changes in the crop physical condition can be detected by a good magnified cameras using as a sensors, which determines the plant growth, this is done through using drones or else the agricultural robot, and the alternative method for healing the problem can decided probably by sitting anywhere in the corner of world. And disease also be predicted with its affected insect and remedies are allocated manually or by robotics.[2]

Soil monitoring and fertilizers: by the sensor detection of soil nutrients content, we can apply limited acceptable fertilizers for the crops not exceeding more or less than the plant level. Thus the good condition is maintained for the best yield. And money is not drained unusually.

Lighting purpose: in rural side networking of power lines is not more extended upto every extent. During that condition renewable energy, the primary source sun can choose instead as alternative continuous power supply for efficient function of whole setup. Automated operation of lightning by light sensing wireless sensor saves power and also improves safety level during dark.[2]

III. APPLICATION OF IOT IN AGRICULTURE

1.precision farming: use of IT and various items like sensors, control systems, robotics, autonomous vehicles, automated hardware, variable rate technology, and so on.

The adoption of access to high-speed internet, mobile devices, and reliable, low-cost satellites characterizing precise agriculture.

2.Agricultural drones: The ways ground-based and aerial based drones are being used in agriculture are crop health assessment, irrigation, crop monitoring, crop spraying,

planting, and soil and field analysis. From the drone data, we can draw insights regarding plant health indices, plant counting and yield prediction, plant height measurement, canopy cover mapping, field water mapping, scouting reports, stockpile measuring, chlorophyll measurement, nitrogen content in wheat, drainage mapping, weed pressure mapping, and so on.

3.Smart Greenhouses:Greenhouse farming is a methodology that helps in enhancing the yield of vegetables, fruits, crops etc. Greenhouses control the environmental parameters through manual intervention or a proportional control mechanism. As manual intervention results in production loss, energy loss, and labor cost, these methods are less effective. A smart greenhouse can be designed with the help of IoT; this design intelligently monitors as well as controls the climate, eliminating the need for manual intervention.[1]

4.livestock monitoring: the cattle health, development location, well being separating diseased animal from herd and can cost less labour charge for maintenance.[1]

Demerits of using the automatic oriented farming

1. Cost: we should focus on the cost of the motor that not be expensive so that its easy for the irrigator to establish and easy to maintenance. The cost should be less because the all the irrigator are mainly poor family.
2. Skill: it's required skill person to operate otherwise it's difficult for uneducated one.

Importance of automatic irrigation

1. It's keep the soil moisture and necessary for the germination of seed.
2. Performance of the plants nutrients can also notice from the soil that's soil is good or not for all the types of plants.
- 3 .it's necessary for the growth of plants root.
4. When the water is supplies two time to the plants then no lack of hydrogen and oxygen .

IV. SOLICULTURE

Transparent colored solar cell is also one of the trendy used for exterior designs of the buildings in the field of agriculture it has a wide improvement taking place that is soliculture.

Soliculture is the one of the method of harvesting the solar energy for the purpose of agriculture that might be in the form of sunlight through the green house cultivation or either by supplying electricity for the agricultural works.

The ideas of transparent solar cell on greenhouses came out accidentally with a happy output carter and her research team working on the luminicent solar concentrators they can be used as flurocent dye to be absorb light and make efficient the panel. Credits goes to UC santacruz where the technology developed.

Concentrator absorb the sunlight ,where it absorb the higher energy photons and reemits the lower energy photons ,no energy is not cent percent efficient ,and some of the light doesn't get utilized and its get wasted and the curiosity among the rosy colored light which is going to lost from the panel were tested ,and said this light was not waste ,it was a fuel. This was realized that red color is the exactly commercial grow lamps for the plants, carter said.

Plant doesn't use entire spectrum of the visible rays for the photosynthesis process in carter lab the green light absorbed by the solar panel and emitted red light to enhance the power generation of solar cell, and the remaining extra sunlight was made to fall on the plants oriented to that where exactly in the range of spectrum that plants use.

As the price of the solar cell reduces proportionally the production of different crops increases and become wide in use. In hotter regions the growers are using swamp coolers, cooling has become an issue, here again the color of solar panel is important its not only provide the electricity to the green house cooler also color shaded panels green house cooler , this technology helping regions like california. Plants are not only sensitive to intensity of the light but also the color of light. But it turns out the plant grow as well. This method requires 5%less water compare to the conventional glass houses associated with photosynthesis increase magenta glasshouse.

Advantages :

Greenhouses have a long list of benefits

1. Greater food production
2. Less water consumption
3. Reduction in pesticide needing.
4. Increasing in growing season.
5. Necessary power production even in drought condition.

Disadvantages:

- Higher cost of panel
- More installation cost

V. CONCLUSION

These technologies are aided for economic development in agriculture and rural developments ,conserve less energy and more efficient work, safer faster and smarter techniques for incredibly production, farmers must be educated technically to operate these setups.

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