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The Internet of Thing in Sustainable Agriculture

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Abstract: *The Internet of Things is an extremely modern technology that signifies the future of communication and computing. Today, the Internet of Things has been widely used in smart traffic, smart cities, smart homes and other fields. The implementation filed on the Internet of Thongs is very wide and can be implemented in various fields. This research is regarding the implementations of the Internet of Things in sustainable agriculture. The Internet of things supports improve resource management, cost-effective farming, crop management, better quantity and quality, conduct field monitoring, crop monitoring. The Internet of Thing sensors utilized in the proposed model is soil pH sensor, moisture sensor, air temperature, the sensor of water volume, soil moisture sensor, etc. This article studied typical farming techniques utilized via growers this time and what are the big challenges they confront, visited Poly Farmhouses to get further knowledge regarding modern agricultural machinery. The recommended model is a simple design of the Internet of Thing sensors, which can assemble the better information and send it to a server a Wi-Fi system and the server can take measures based on the information.*

Key words: Smart agriculture, IoT, sensor, Poly farmhouse, Wi-Fi system

INTRODUCTION

Modern agriculture is the implementation of several modern types of equipment and technologies such as the internet, Internet of Things devices and cloud. As in at the present time the population of the world is rising. By 2050, the population will reach about 9.7 billion. To feed those billion people, we require to increase the output of agriculture crops. The population of the world is expanding, on the other side, due to many reasons, such as commercial markets, industrialization, houses, cites construction on these farms farming land is decreasing. To support these billions of people we need to enhance agriculture yield and this can be accomplished via utilizing the Internet of Things in modern agriculture, smart and modern agriculture is also called precision agriculture (Dagar *et al*., 2018; Srininvasulu *et al*., 2016). In the current situation, due to many reasons, such as plant diseases, insect attack, lake poor communication, the lake of new technology, lack of proper understanding of necessary supplements of crops, farmers are unable to obtain the better fruits and vegetable crops and there are other several difficulties (Ahmed *et al*., 2018). In order to obtain the ride of these difficulties and agriculture more advantages, friendlier and smarter for growers, they require technological progress.

Precision agriculture and traditional agriculture are extremely diverse in all aspects (Srinivasulu *et al*., 2017). Traditional agriculture utilizes old and traditional farming practices and uses this old equipment for growing seasonal crops, without the need to evaluate the weather reports, market, transport and other needs, etc., modern agriculture uses latest tools or techniques, such as sensors, the internet, intelligent connected deceives, chat communities of growers, from time to time assess different factors, such as optimal situations for growth of the plant, soil quality, check of water quality and how much nutrients are required smart and modern agriculture makes farming relaxed, economical, reduces labor expenses, cost-effective, increase agricultural production and gives good quality yields (Srininvasulu *et al*., 2016; Takekar and Takekar, 2017).

RECOMMENDED MODEL

Poly farmhouse: In modern farming Poly farmhouse is completely covered steel structure and uses polyethylene

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as a cover. This polyethylene can defend farming crops from dangerous sunlight, rainstorms and other external harmful factors that may damage the crops and effective yield. In poly houses, cultivation is carried out in a completely protected and regulated manner (Patil and Kale, 2016; Liu *et al*., 2015). With the benefit of the poly house, the yield and quality of crops can be almost doubled but there are still some ways to increase yield, which can be achieved by deploying the Internet of things tools in Poly house.

Soil pH sensor: The soil pH sensor is a machine that can detect the pH value of the soil according to the specific type of crops maintaining a good pH value. The pH sensor tracks the soil pH and sends it to the server. The user can see the accumulated information on the server and can utilize chemicals to provide the proper pH for the smart farming crop.

Soil moisture sensor: Sensors the working principle of soil moisture sensor is related to pH sensor. Then send the collected data to the server and the server will play the needed operations, for example, if the humidity is less than the required humidity, the spray pump will be utilized to wet the soil (Mat *et al*., 2016). If the humidity is greater than the required humidity, the server will adapt the temperature inside the poly farmhouse, to make the normal humidity levels.

Water volume sensor: The water volume sensor is an Internet of thing system that can track the amount of water flowing via the pipeline. If the volume of water we provide exceeds the demand, it will lead to poor production and also water wastage. The water volume sensor machine delivers the records to the server and the server will operate the required operations, such as turning off the water pump.

Soil moisture sensor algorithm:

Procedure:

Stage 1. Peruse the level of moisture (m_1) value from stipulated sensor
Stage 2. If m_1<500
Print “Low Moisture”
Action "Turn on the pump
If m_l<1000&m_l> 500 otherwise
Print “Medium level Moisture
Other
Print “High-level Moisture”
Stage 3. Remain to interpret the information

Air temperature sensor: The air temperature sensor is in the Internet of Things that can sense the temperature inside the poly farmhouse and then send the information to the central server and the server can play essential actions, such as turning on the air conditioner (heater, coolers (whatever is required)) spray water and exhaust fans when required. This will assist to sustain the best temperature inside the farmhouse.

Air temperature sensor algorithm:

Procedure:

Stage 1. Interpret the air temperature (m_1) value from the stipulated sensor
Stage 2. The mini and maxi temperatures required to initialize this certain crop.
Stage 3. If a_t<min_t
Print “low air temperature”
Action “Turn on the heater”
Otherwise a_t<max_t&a_t> min-t
Print “Ideal temperature”
Other
Print “High temperature”
Action “Turn on cooler”
Stage 4. Remain to interpret the information

Motion detector sensor: The motion detectors can be utilized in poly farmhouses. These latest sensor devices sense any abnormal motion that occurs around them and then transmit the information to the server. The server operates the information and transmits the message after processing the information. The device is further implemented on the boundary of the polygonal farmhouse (Dan *et al*., 2015). The device is utilized to generate noise and the animals will escape after hearing the noise.

Recommended model: This model is described in **Fig. 1**.

Crop management: The latest sensor obtains information related to crop observation and conveys it to the server. If the soil moisture is below the marginal value, the server can take mearing to water the plants (Ahmed *et al*., 2018). Such measures are accomplished mechanically by the server, rather than manual intervention (**Fig. 2**).

Utilization of mobile phone and internet technology: Due to the low penetration rate of PCs in rural households and the high use rate of Pakistani mobile phones, the new model was generated by taking advantage of multiple internet innovations. The portable customer can be connected to our recommended system anywhere and anytime. Rural information is available to farmers who are smartphone or located on any farmland. The benefits of universal data are everywhere, accessible and geologically recognizable (Mekala and Viswanathan, 2017; Roy *et al*., 2017; Ahmed *et al*., 2018). The organization showed a data dispersion model that relies

Fig. 1: Recommended model

Fig. 2: Poly farmhouse and Internet of Things

on it to overwhelm the future. According to Pakistani "Internet Development Statistic Report", 4G network coverage in rural areas will reach 30% in 2030.

Challenges in Implementation of the Internet of Things

Sectorial obstacles

The heterogeneity of the region: there is a variety of performing artists in the nutrition system, from physical (product stockbrokers, seed and information sources providers and stores) to very few (creditors of cheddar cheese, roadside food grown from the ground suppliers and microbrewery factors). As a result, no matter whether it is an innovation administration or business exhibition, there no signal arrangement that can suit or satisfy the requirement of everyone. Hungarian vineyard needed very special arrangements in North America, for arable landowners. For example, in the European Union, the vast number of ranchers in Central Europe and Northern Europe widely accept precision agricultural rehearsals in farming, while keeping in mind the ultimate target of establishing creations and advancing quality (Brewster *et al*., 2017). In any case, in SE, the latest financial situation of farming, the high-level division and decentralization of pastures and the growing shortage of water resources all require the use of accurate water system strategies to minimize asset use.

Ranch size and capital venture cost: More concentrated capital homesteads have produced a greater response to the adoption of Internet of Things innovations (Brewster *et al*., 2017; Kapoor *et al*., 2016). In addition, the beneficiaries of this innovation are the continued focus on new hardware (such as ranch gear and modern tractor, the main aspect gear). Present driving precision farming machinery is designed for a wide range of homes, such as My John Deere (John Deere™), or working in narrow land spaces, such as Field-View (The Weather Corporation™) and En circa (DuPont ™), which provides management services in the majority parts of the Canada and USA (Khattab *et al*., 2016). Moreover, 365FarmNet is adjusting the expense and type of management institutions provided based on the size of the shares it holds, but its market access is limited to Central Europe. This test enables Internet of Things products enough to attract smaller ranchers and provide limited risks for new innovations and fear of information misuse.

Business privacy and plans of action: Suitable action plans must be taken and the information requested by the agricultural worker must be strictly monitored and controlled, but the screen roles of pastures and other agricultural foods are allowed to adjust the information they provide. This is an area full of contradictions (Nayyar and Puri, 2016). Large companies like John Deere have tried to misuse the information captured through the technologies they provide and agriculturists have so far opposed it. This is again the loss of control and the defeat of major assets (Jaiganesh *et al*., 2017). The Federation of American Agricultural Service has been fighting for the control and information rights of ranchers and recently established the FarmingInformation Alliance.

Client and societal acknowledgment: The education and preparation perspectives are essential to support end customers understand of the use and suitability of these modern innovations. As pointed out, since recently, 71% of the heads of EU farming have been working on the ground. They believe that they do not need daily career upgrades and do not have enough motivation to learn. There is no doubt that attempts to modernize will work for every child who has not received an innovation education (Dagar *et al*., 2018). However, so far, mentoring and preparation activities are still being carried out across Europe to spread the Internet of Thongs culture among young people and all partners in a natural order.

Technological hurdles

Lack of interoperability: common components, information conventions and standards need billions of devices to interoperate and they are various criteria for the agri-food sector seeking to reach a general agreement here (Dagar *et al*., 2018). Such scales exist for information display and semantic (AgroXML, AgroRDF and AgroVOC) agriculture hardware (ISO-BUS), information about climate (SWEET), for hyper processing chains (EPCIS from GSI). Online commercial retail locations (for example, Schema.org and Excellent Interactions).

CONCLUSION

The implementation of the Internet of Things gadgets can make agriculture more effective and accurate. The Internet of Things can be utilized in various fields of smart farming. Water and electricity are the major fields and their costs can enhance or destroy the farming sector.

Due to the outdated leak system of irrigation, the way of wasting water is beyond our imagination, the pumps run on electricity. Therefore, if the growers can control the wastage of water, then growers also automatically control the wastage of electricity. The volume of water can be measured by utilizing modern gadgets with a pump and also measure the flow duration. More domains in farming are pesticides, insecticides and fertilizers. As described in this article, we recommended using the Internet of Things in the fresh-keeping warehouse (Poly Farmhouse), which is a completely covered structure, so there are approximately no external issues such as bugs and other harmful animals, it does not enter any dangerous things to damage the crop, so the requirement for insecticide will decrease. Through utilizing modern sensors and agricultural crop fields linked to the Internet, a suitable decision can be made. Finally concluded that growers necessary to create and adjust the Internet of Things planning for smart farming to improve the quantity and quality agricultural yield, save resources such as electricity and water and cost-effective crops, thereby reducing cost and obtaining more benefits, because Such a Pakistan, where growers play a significant job in the gross domestic product can also increase the whole GDP.

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