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**TO STUDY AND ANALYSE THE IMPACT OF SMART ARTIFICIAL IRRIGATION SYSTEM ON AGRICULTURE INDUSTRY USING THE CONCEPTS OF ARTIFICIAL INTELLIGENCE AS A CSR FOR FARMERS**

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**Abstract**

Agriculture performs a key role in the economy and its contribution is based on the potential crop yields that are highly dependent on irrigation. The history of England gives us a clear evidence that the revolution in Agriculture preceded the Industrial Revolution in United Kingdom. Also, In U.S.A. and Japan, agricultural development has contributed to a great extent in the process of their industrialisation. Similarly, many under-developed countries who got involved in the process of economic development by now have learnt the inadequacies of putting too much stress on industrialisation to attain greater per capita real income. “Thus, we can say that industrial and agricultural advancements are not substitutes, they are complementary and are mutually supporting with respect to both inputs and outputs.” It is seen that enhanced agricultural output and efficiency tend to contribute significantly to an overall economic development of the country, it will be logical and suitable to place greater emphasis on additional development of the agricultural sector. In a nation like India, where agriculture remains heavily reliant on the informal sector, irrigation methods and procedures are ineffective and often result in unnecessary water spills. This calls for the need for a system that can provide an effective and reliable solution. Agriculture is dependent on the monsoons, therefore this new smart irrigation system has been introduced for agriculture by Texanium. It is a web development company. In this system, based on the soil form, the water will be supplied to the agricultural field. The present paper demonstrate and conclude that an automatic Irrigation System supported by Artificial Intelligence and the Internet of Things, can independently irrigate fields using soil moisture data. The program is based on prediction algorithms that use historical weather data to identify and predict rainfall patterns and climate change; thus, a smart system that irrigates crop fields selectively only when necessary with the climate and the actual soil moisture data. The system has been tested in an 80 percent accuracy-controlled environment, thus providing a practical solution to the problem. Texanium Company has plan to introduce present technique as CSR activity for Indian farmers in 2021.

**Keywords:** artificial intelligence, irrigation, internet of things, advanced technology, machine learning, water conservation, and CSR activity of texanium (IT Company)

**Introduction**

It is believed that our country India is a country surviving mainly on agriculture. According to a survey in 2014 the land allotted for farming is 60.4% which is growing at a rate of 0.3%. An agriculture dependent country like India should be well equipped with one of the most important requirements for farming and that is proper irrigation facilities. Irrigation plays a very important role in farming, as we

all know due to global warming the temperature across the globe has been rising at a great rate followed by abnormal and uncertain monsoons. Artificial Irrigation helps to water all the crops in these abnormal situations of unanticipated rains. Some crops require a lot of water, some require less, and these requirements also vary based on the atmospheric temperature. To fix this problem, there has to be proper artificial irrigation facilities. For a country like India which is mainly dependent on agriculture, irrigation system needs to be made more advanced by using micro controllers with Artificial Intelligence which in turn is going to decrease the burden on farmers and is going to make the process of irrigation more effective and efficient. To demonstrate how we can use this new technology in irrigation, we have created a prototype device called Smart Artificial Irrigation System (SAIS) which uses Arduino as the micro controller and with the help of several moisture sensors, senses the level of moisture in the soil and automatically processes the information collected from the sensors to turn on the water pump/ solenoid valves. This system doesn't just reduce the burden on the farmers but also makes sure that the crops are not over watered or underwatered. The later version of this device might come with a new feature of disease detection in plants with the help of an inbuilt image processing system, which can help the farmers understand the disease and take measures to fix it accordingly. The device has an inbuilt WIFI Module, which allows the user to communicate with the device from anywhere across the globe. The user can check the moisture level in the soil and with just a tap of a button on their mobile device. The user can turn the device on/off. The application has an Emergency Stop button, which in case of any technical fault in the device, a pop up in the users phone notifies the user about the fault and the user can press this button to cut the electricity supply to the device and stop all functions.

The device is equipped with a temperature sensor as well, which automatically cuts the power to device in case the device temperature rises at an alarming level, to avoid any fire and notifies the user about it through the mobile application.

## **Literature Review**

In the present research paper written by Mathew J Smith, has expressed importance of artificial intelligence in the agriculture field. The focus of this paper is on robotics and automated systems to reduce human decision making and perfection in water soiling according to the soil quality. He also expressed that there are more challenges and opportunities in this regard. Books written by Pradip Tomar, Gurjit Kaur, Singh have emphasised the need of Artificial Intelligence in Indian Agriculture. Rajesh Singh has focused on making it simpler to understand the farmers. He has given information about accessibility and availability with financial budget to the farmers.

## **Objectives**

- To study the use of Artificial Intelligence in agriculture.
- To study and analyse the current agricultural scenario and fix the problems in it with the latest technology.
- To analyse the use of Smart Artificial Irrigation System (SAIS) in the current agricultural scenario for farmers
- To study the use of IoT (Internet of Things) along with Artificial Intelligence with reference to SAIS.

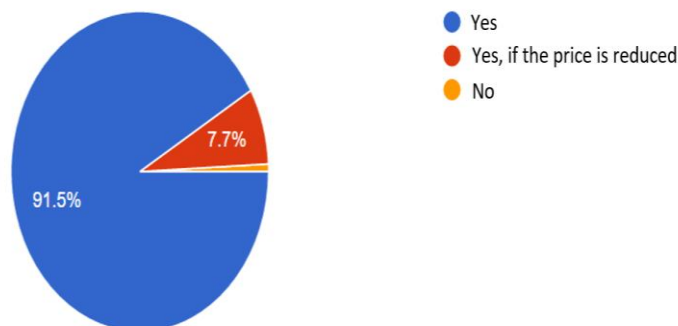
## **Hypothesis**

**H<sup>0</sup>** Artificial Intelligence is not very feasible to Indian agriculture.

**H<sup>1</sup>** Artificial Intelligence is feasible to Indian agriculture.

### Research Methodology

In the present research paper, researcher has performed a survey through google forms, to figure out how many people would be interested to buy this kind of a product if priced between Rs. 2k-3k. Results are-



### Data Analysis & Interpretation for Smart Artificial Irrigation System

Smart Artificial Irrigation System (SAIS) is a device built and designed by Texanium. This is an extremely cost effective and useful device, not only for the farmers, but for every person who wishes to grow a life in the soil.

The device basically plugs into the soil with a continuous water supply to it. It has soil moisture sensors attached to it, which senses the dampness intensity of the soil. In case the water content in the soil is less than moisture sensor communicates with the relay with the help of a microcontroller, and the relay turns on the water pump which opens the water flow in the soil, as the soil is containing the required moisture content, it again communicates with the relay through the microcontroller and asks it to stop the water flow.

This way the crops/plants are neither overwatered nor under watered, which happens in case you use a fixed time interval plant watering system or sometimes we, the humans make such mistakes.

The most major difference between a fixed time interval watering system and our product SAIS is that, our product actually measures the content of water already in the soil, because different crops/plants need different amount of water during different time of the day keeping in mind the dynamic weather changes over a day, on the basis of which it waters the plant all by its own without even a single human intervention required since the whole device works on its own artificial intelligence, apart from setting up the device for the first time. On the contrary the fixed time interval watering system, simply waters the plant/crop, every day at a fixed time, without even checking if the plant really needs it or not.

Apart from the completely automated working of the SAIS, it also has an inbuilt WIFI Module, which allows the user to communicate with the device from anywhere across the globe. The user can check the moisture level in the soil and with just a tap of a button on their phone, the user can turn the device on/off. The application has an Estop button, which in case of any technical fault in the device a pop up in the users phone notifies the user about the fault and the user can press this button to cut the electricity supply to the device and stop all functions.

SAIS is equipped with a temperature sensor as well, which automatically cuts the power to device in case the device temperature rises at an alarming level, to avoid any fire and notifies the user about it through the mobile application.

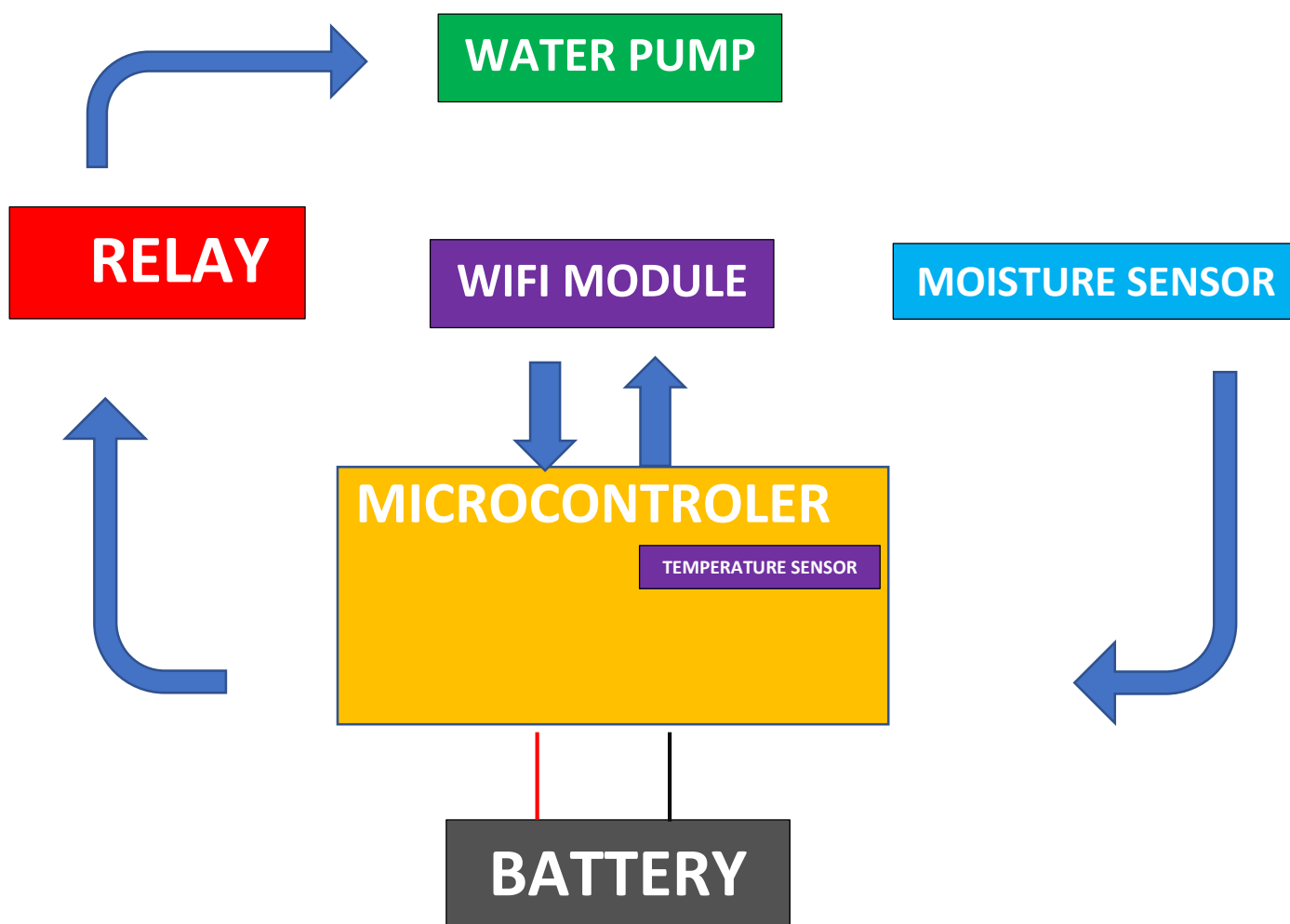
The device is also equipped with a 10000mah lithium polymer battery, which can power up the device for approximately 2 days without any additional source of electricity, which is a very beneficial feature for the farmers, as they face the problem of power cut very frequently.

In case the size of the field is very big and one device is not enough, then don't bother to spend extra on buying a new device and increasing the cost of production, we provide 10 extra detachable moisture

sensors with extendable wires of up to a 100mtrs with the device itself. So, all you must do is plug in the additional sensor into the device in case you feel you need more.

We tried to make this device as cost effective as possible keeping in mind the current financial condition of the Indian farmers, so that everyone can afford this and can make farming more effective and efficient.

#### SAIS WORKING MODEL



The above diagram basically shows that the soil moisture information is collected by the moisture sensor in the soil, which if detects that the soil needs the water, send the information to the micro controller which in turn triggers the relay and the water pump turns on and when the sensors detects that the required moisture level in the soil is fulfilled, it again communicates with the microcontroller which triggers the relay to shut down the water pump. The WIFI Module is connected to the Microcontroller directly from where it accesses all the information provided by the humidity sensor and the temperature sensor to the microcontroller and displays it in the user's phone screen with the help of the mobile application, and it also accepts remote orders, which is processed through the micro controller and the microcontroller performs the task accordingly and in the same way, if the temperature sensor detects an extremely high overall temperature of the device, it sends the information to the microcontroller to turn of the device completely.

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## Conclusion

Indian Agriculture is highly dependent on Monsoon. To support and resolve many issues regarding soil moisture, the present paper has created Smart Artificial Irrigation System (SAIS) which waters the plant automatically by checking the moisture level in the soil, in other words, on the basis of the plant's requirement with the help of artificial intelligence that too with WIFI connectivity to the device, so that the users can access information and the device controls from anywhere across the globe so that you can travel freely without worrying about your plants and also without bothering your neighbours. In the end, the conclusion is to assist Indian Farmers through CSR activity of Texanium Company to improve water management and reduce dependency on monsoon for irrigation.

## Discussion

Agriculture is one of the most important source of income for India and to grow crops, the farmers need to have a proper irrigation system which can actually measure the water required by the plant by indirectly asking the plant itself, that is by connecting a sensor to the soil, so that the plant is neither over watered, nor under watered, which can damage the crops since different plants/crops need different quantity of water during different times of the day as the weather in India is very dynamic too and the water supply to the plant needs to be adjusted accordingly since in India there are almost 7-8 dry months every year in almost every state, as a result we can't simply depend on rainfall always.

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