Agri edge

SDN
SensorDrops Networks

Smart Agriculture Innovation

#CONNECTIVITY FOR CONTINUITY

Motivation for AgriEdge

Being a primarily agrarian nation, India still has a large chunk of its population earning their livelihood through agriculture or its associated practices. However, the recent climatic changes are disrupting the time-tested and age-old agricultural practices, which were mainly intuition-based or seasonal. Frequent reports of farmer debts, failed crops and farmer suicides are truly distressing. Scientific methods of farming and agricultural practices are slowly permeating to rural India. However, there is still a huge section of the agrarian population who are yet to open up to these practices, mainly due to the high acquisition costs of sensing equipment, which are a pre-requisite for these modern agricultural methods, and their high maintenance costs. Many recent initiatives by the Government of India have motivated people to aggressively adopt scientific methods of farming; however no initiatives towards the improvement and betterment of these sensing solutions have been adopted, yet.

Agricultural Market Drivers

The present agricultural market is driven by the factors of retail and logistics. Besides, these agricultural drivers, a key aspect of maximizing profits is reaping more/ better yields per hectare of farmland, which directly translates to more income to the farmers and producers.

Quoting directly from the "INDIAN AGRICULTURE AND ALLIED INDUSTRIES INDUSTRY REPORT", Dec 2019 (https://www.ibef.org/industry/agriculture-india.aspx):

During 2018-19* crop year, food grain production is estimated at record 283.37 million tonnes. In 2019-20, the Government of India is targeting foodgrain production of 291.1 million tonnes. Milk production was estimated at 176.3 million tonnes during FY18, while meat production was 7.4 million tonnes. As of August 2019, the total area sown with Kharif crops in India reached 92.6 million hectares.

India is the second-largest fruit producer in the world. Production of horticulture crops is estimated at a record of 313.9 million metric tonnes (MMT) in 2018-19 as per third advance estimates.

Total agricultural exports from India grew at a CAGR of 16.45 percent over FY10-18 to reach US$ 38.21 billion in FY18. In FY19, agriculture exports were US$ 38.54 billion. India is also the largest producer, consumer, and exporter of spices and spice products.

Agricultural Market Drivers

India is expected to achieve the ambitious goal of doubling farm income by 2022. The agriculture sector in India is expected to generate better momentum in the next few years due to increased investments in agricultural infrastructure such as irrigation facilities, warehousing and cold storage. Furthermore, the growing use of genetically modified crops will likely improve the yield for Indian farmers. India is expected to be self-sufficient in pulses in the coming few years due to concerted efforts of scientists to get early-maturing varieties of pulses and the increase in minimum support price.

Achievements in the sector

• Foreign direct investments (FDI) in India's food processing sector is stood at US$ 628.24 million in 2018-19.

• Sugar production in India has reached 33.16 million tonnes (MT) in 2018-19 sugar season and is expected to produce 26.85 MT in 2019-20, according to the Indian Sugar Mills Association (ISMA).

• The Electronic National Agriculture Market (eNAM) was launched in April 2016 to create a unified national market for agricultural commodities by networking existing APMCs. Up to May 2018, 9.87 million farmers, 109,725 traders were registered on the e-NAM platform. 585 mandis in India have been linked while 415 additional mandis will be linked in 2018-19 and 2019-20.

Achievements in the sector

- Agriculture storage capacity in India increased at 4 percent CAGR between 2014 -17 to reach 131.8 million metric tonnes.
- Coffee exports stood at 286.95 million tonnes in FY20 (April-September'19).
- Between 2014-18, 10,000 clusters were approved under the Paramparagat Krishi Vikas Yojana (PKVY)."

Key Agricultural Market Players:

- DuPont India Private Limited
- Rallis India Limited
- Nuziveedu Seeds Limited
- Godrej Agrovet Limited
- Nestle India Limited
- Advanta
- Monsanto
- Parle Products
- Britannia Industries Limited
- Financials
- REI Agro Limited
- IFFCO

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2) Processing layer

The processing layer lies mainly at the remote server. The remote server in the AgriEdge continuously logs the data for future use. However, the specifications of the remote server varies with the number of FSN deployed in the field.

3) Analytics Suite

the analytics and visualization suite in AgriEdge is primarily a data-driven toolset. It has to be customized as per the users' requirements. However, the collective visualization of data from various sources often serves as a self-sufficient tool for decision making. The automation and rudimentary advisories from the sensor data require extensive customization, which has to be taken up with individual clients.

AgriEdge Suite of Products

Our AgriEdge suite of products is comprised of two groups - 1) Mandatory units, and 2) Customizable Sensing units. The mandatory units are typically associated with the backend infrastructure and require only a few units (depending on application scenario and requirements). The customizable sensing units are deployed in bulk and can communicate with the mandatory units. The customizable units can be selected in any quantities or of any type, or combination of different types, as per requirements.

Mandatory units

1. Server and control/visualization software
2. Android application for smartphones
3. IoT gateway

Customizable Sensing units

Each sensing unit has a self-contained processor, solar panel, battery, charging circuit, wireless connectivity, and power-on/off capabilities.

1. Ambient temperature and humidity
2. Non-contact temperature sensing
3. Ambient temperature
4. Humidity
5. Ethanol
6. Soil moisture
7. Rainfall
8. Soil temperature
9. Water level

Features

- IoT-enabled data communication for low network usage
- Wireless connectivity
- Low form factor of sensing units
- Pick and place sensing units
- A wide variety of sensor integration capabilities
- Low-power mesh network for seamless and access-point-free connectivity
- Reliable end-to-end sensor data delivery
- Robust visualization
- Selective visualization
- Smart analytics at the remote control server
- Smart IoT gateway for local data accumulation and forwarding
- Android application-based portable visualization on smartphones

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What is Edge Computing?

The Edge computing paradigm arose due to the need for improving response times of IoT devices and networks, and freeing-up network bandwidth from unnecessary data load. Edge computing is a distributed computing framework. It brings decision-making and computing closer to the source of data collection, such as onto the IoT devices themselves or edge servers. The use of Cloud computing, especially for large-scale industrial scenarios, mandates dedicated private cloud infrastructures or very high operational costs for public clouds. By bringing the computation closer to the source of data collection, not only the savings in network bandwidth, but the reduction of latency and decrease in recurring operational costs can be achieved.

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Sensordrops Networks: Vision Statement

We aim to address basic societal needs by means of integrated IoT-based sensing, monitoring, and control solutions. Initially, we are focusing on the medicare and the power sectors for providing IoT-based sensing and monitoring of various field-related parameters by individually addressing the challenges specific to both of these domains. As both of these domains are clearly gaining momentum not only in India but world-over, in terms of the use of connected and automated solutions, we have identified multiple challenges and opportunities in which our company can step-in to provide economical and sustainable solutions for specific challenges, which are yet to be addressed in these technological realms.

About us:

SensorDrops Networks is an Indian Department of Industrial Planning and Policy (DIPP) recognized startup and is also registered with MSME. Currently, we are incubated at the Science and Technology Entrepreneur's Park (STEP) at IIT Kharagpur, W. Bengal, India

SensorDrops Networks is a newfangled company dedicated to addressing basic social needs by utilizing advanced Internet of Things (IoT) based sensing, monitoring, and control solutions. With IIT Kharagpur professionals and a team of bright and dedicated researchers at the reins, we design and deploy contemporary solutions to overcome domain-specific challenges using economical and sustainable means. The team has already won several awards including the recent Gandhian Young Technological Innovation Award for the system of battery-less IoT sensing from the President of India in Mar 2018.

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What is the AgriEdge?

AgriEdge consists of two layers – (1) Physical layer and (2) Processing layer. The physical layer consists of a set of agricultural IoT sensor node along with a local processing unit. On the other hand, the processing layer lies mainly at a remote server. The detailed layers-wise description of the system is as follows:

1)   Physical layer

Field Sensor Nodes (FSN) FSNs are solar-powered pick-and-place units for monitoring field parameters. Primarily designed for sensing soil and ambient parameters in a field (mainly, soil moisture, soil temperature, ambient temperature, humidity), these can be easily customized as per requirements to enable actuation of field devices such as motors and pumps. The FSNs form a low-power mesh network among themselves in order to forward their sensed data to the field's local processing unit.

Local Processing Unit (LPU) A LPU works as a Gateway between the physical sensor nodes and the remote server. The raw data, collected from the agricultural field, is transmitted to the remote server through the LPU. For data transmission between FSN and the remote server, an LPU is equipped with communication features to access the Internet over a cellular connection or a WiFi network (if available). In the absence of any connectivity with the remote server, our cutting-edge low-form-factor analytics suite can be easily hosted on the LPUs themselves with minor hardware upgrades.

Features

Features

IoT sensor node
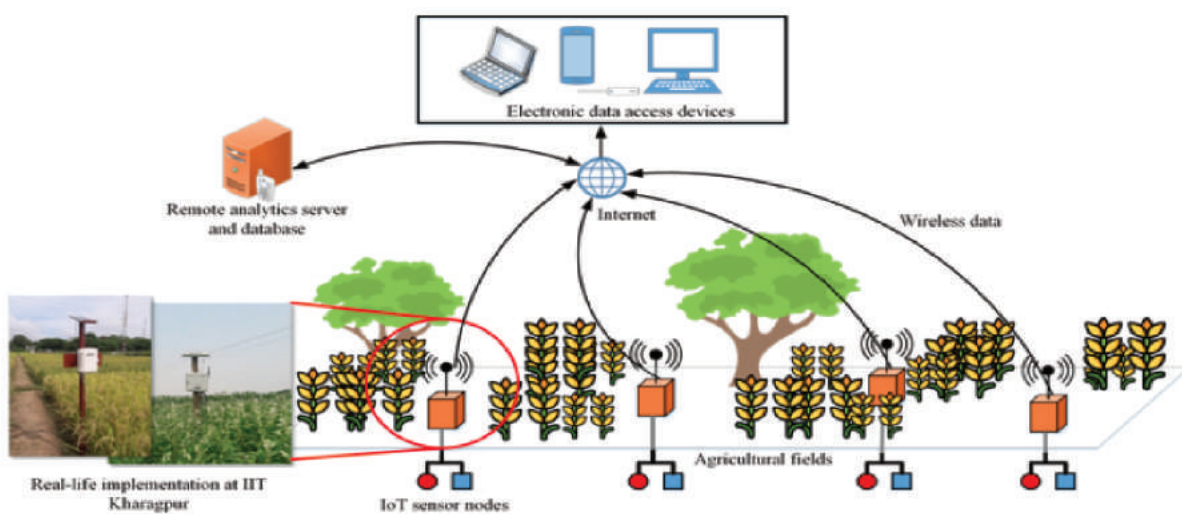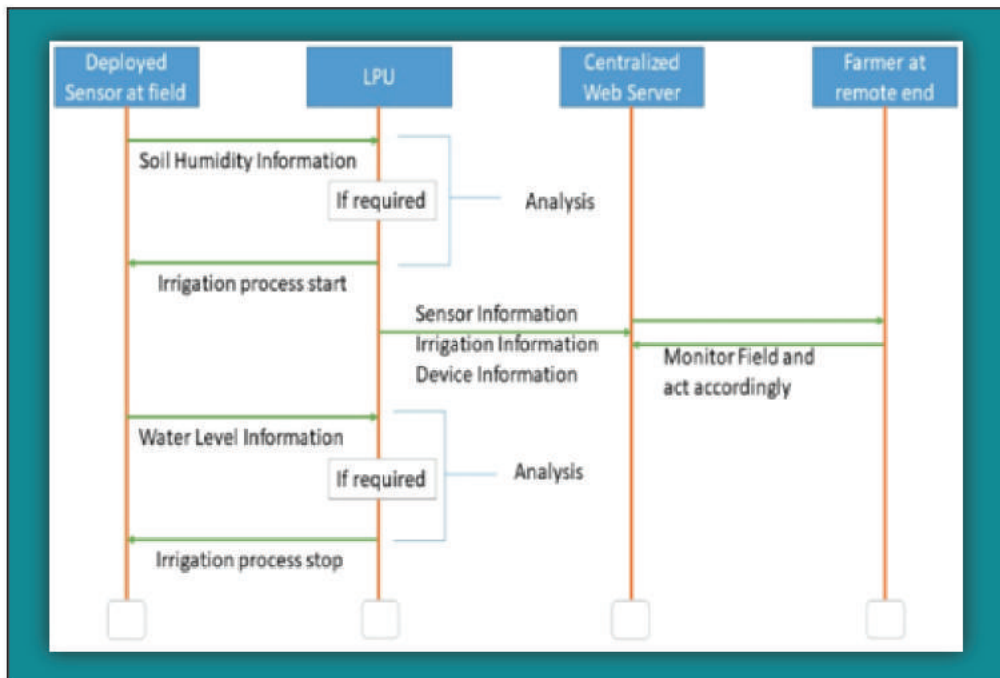
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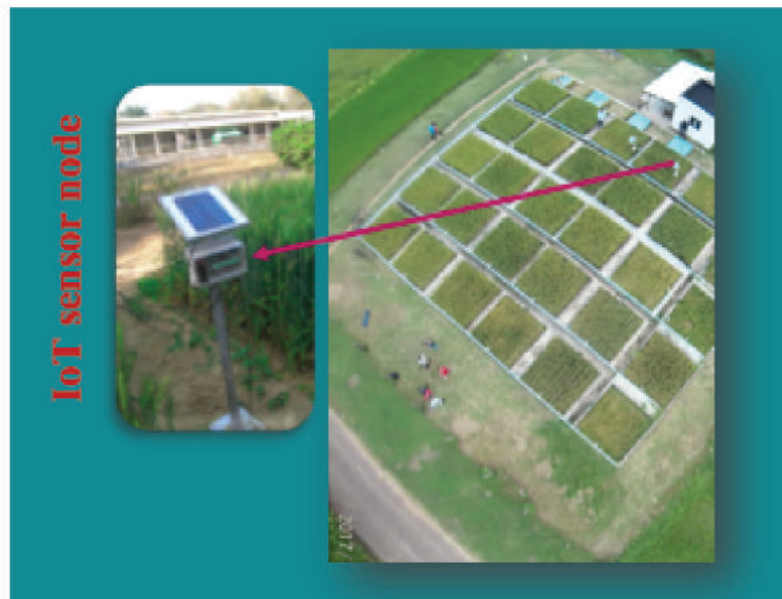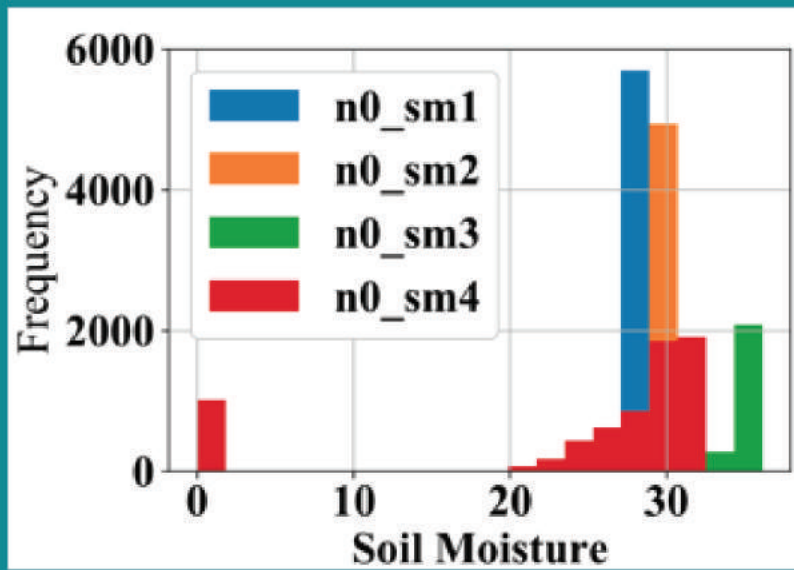
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