


Agri IoT





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Agriculture is the only sector which can actually grow something. All the other industries are transferring of services. Which showcases the importance of the agricultural sector in the economy. Agriculture as an industry is dealt in different ways in different type of economy. The developing economy is still trying to implement the technology in it's agricultural process. And the developed economy is already using a lot of automation. The trend of automation in the agriculture sector started from the [British Agricultural Revolution](#) between 17th to 18th centuries. And it has always seen an upswing from then onwards.

Today with modern set of data stats, agriculture is changing its form and formats. Today globally the income dependency of the gross domestic product has reduced on the agricultural sector. Agriculture sector's contribution to the GDP has been dropping from the year 1950 in [India](#) and in the year 2016 agriculture contributed to just **1%** to the total GDP in USA. But the contradicting point is that the world population is increasing and now there are more mouths to be fed. According to the United Nations, the world population will reach more than nine billion by 2050. And as we know land is a very limited resource and we have to use it wisely. This compels us to produce better yields with the ever reducing space for agriculture.

Introduction

With the ever evolving technology that has enabled various sectors to develop a better output today it is also helping the agriculture industry with same efforts. Agriculture being an industry that is controlled majorly by uncontrollable external factors, nature's wrath, the demand and supply, the price mechanism etc, the influence of technology has only helped to take care of factors which can be partially controlled.

Today with Internet of Things every industry has been benefiting from the automation that has been brought into the industry. And it is doing the same with agriculture industry. Agriculture industry is just not limited to the growing of crops but also the delivery & supply chain, cattle management, water conservation, power utility, etc.



Challenges

- ▣ Measuring the fertility of the land from year to year
- ▣ Understanding the change in the soil structure
- ▣ Optimize water use, reduce runoff and improve plant health
- ▣ Optimum time to deliver the harvested crop.
- ▣ Managing the supply chain in the food chain.
- ▣ Apt use of Manures, Fertilizers and Biocides
- ▣ Storage Facilities
- ▣ Affordable and reliable data capturing
- ▣ Market Linkage

How technology is playing an important role?

Today you see so many start-ups that are operating out of various countries, but have you given a thought why? Well the main reason for that was the democratization of the entire eco system. When cloud was introduced to tech eco system it made businesses/start-ups to not invest heavily on servers. Cloud service providers made it easy for start-ups, by providing the service at a very economical cost. This enabled new entrepreneurs to invest their limited capital and invest their knowledge on other aspects which has given us many new products and solution today.

With IoT's intervention in agriculture, we are expecting a similar change. The democratization of technology which will enable even small landholders to look at technology as an affordable option. Which will give them advantage to intellectual insights which will increase their profit sooner. Following are some of the cases where IoT has played an important part and enabling the producers to provide quality product which in turn helped them to gain additional profits.



When it is all about Soil

The main reason many small scale agriculturist lose out is because they do not understand the changing properties of soil. But with today's technological revolution it is possible to monitor soil and all its supporting characteristics. According to [Jeannine Sargent](#), president of Innovation and New Ventures at Flex "Analytics is really the queen of disruptive technologies. This is true in all industries and is now happening in agriculture" We can see how companies are enabling agriculturist to adopt technology. We have built an agricultural application on Winjit's IoT Sense Platform that will enable agriculturist to assess the soil quality, level of moisture, temperature of the soil which send data in real time to the IoT Sense which enabled the farmers to decide on water requirement, best crop to be grown etc

Drones & Imaging technology

Today with the advancement of technology newer gadgets are been used in a very un-conventional way. Drones which when innovated was just used to capture images but today they do more, delivering, monitoring etc. Drones have been used the same way in agriculture too. Today large scale agriculturists are taking the support of drones which are now connected to imaging technology. These drones hover around the entire area and capture images of the entire field and monitors the entire process through images, which are sent to the IoT gateway where the operator can keep the daily tab on the growth of the crops. This will enable him to have a bird's eye view on the entire farm and if there is any area that needs attention it can be tackled immediately, which otherwise would have taken a long time to identify.

Not just production but also Supply

Today many agriculturists face this problem. They would have grown an excellent high quality product, but it is of no use if it does not reach the consumer at the right time. If the product does not reaches the consumer at the right time it will affect the producer by either reduction in the profit or even in a loss. Therefore it is important to maintain an excellent supply chain too.

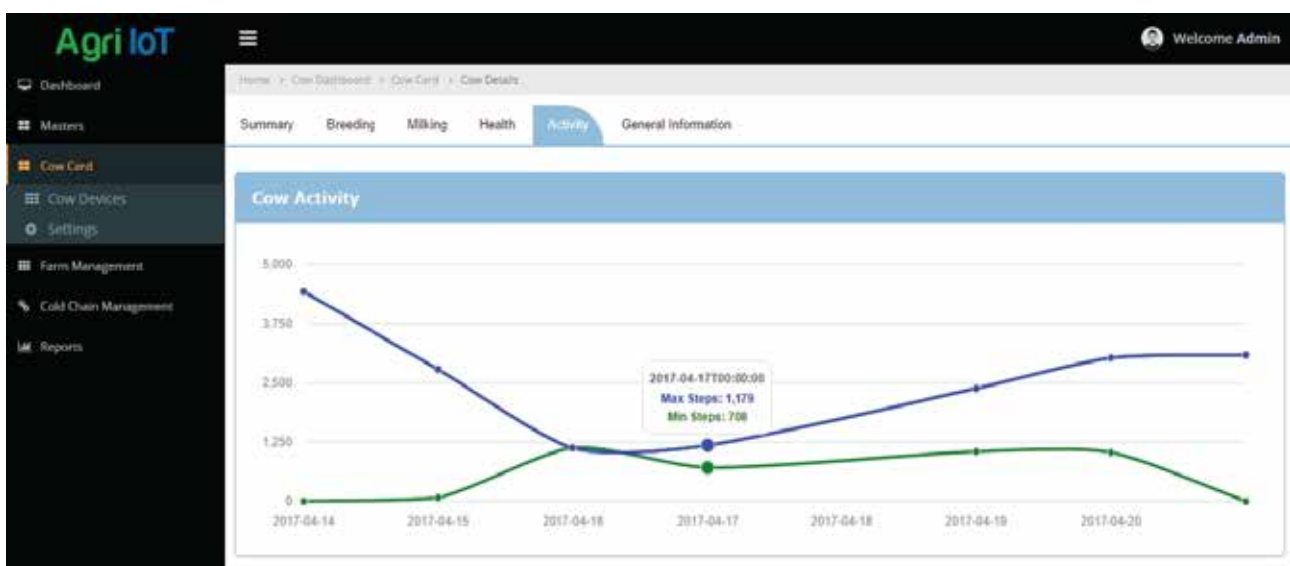
By fixing GPS positioning systems on the vehicles enables the manager to track the goods, and even guide the drivers with an optimum routes. There by reducing the time of delivery and making it more efficient.

Controlled Mechanism

Today in the world where there is so much of information you still don't exactly know where your food is coming from and also whether it is safe? Grown without chemicals? Today with technology we can actually monitor our crops. Companies like **FARBOTS** are letting you do just that. They let you see your crops grow. They have used the IoT technology to build a solution and hardware that gives you complete control over the production of your crops. Currently it is in a small scale like your gardens etc but it is a technology that we will soon see adoption at a very large scale. Since it is completely built on open API it enables the user to add his/her knowledge and come up with something better

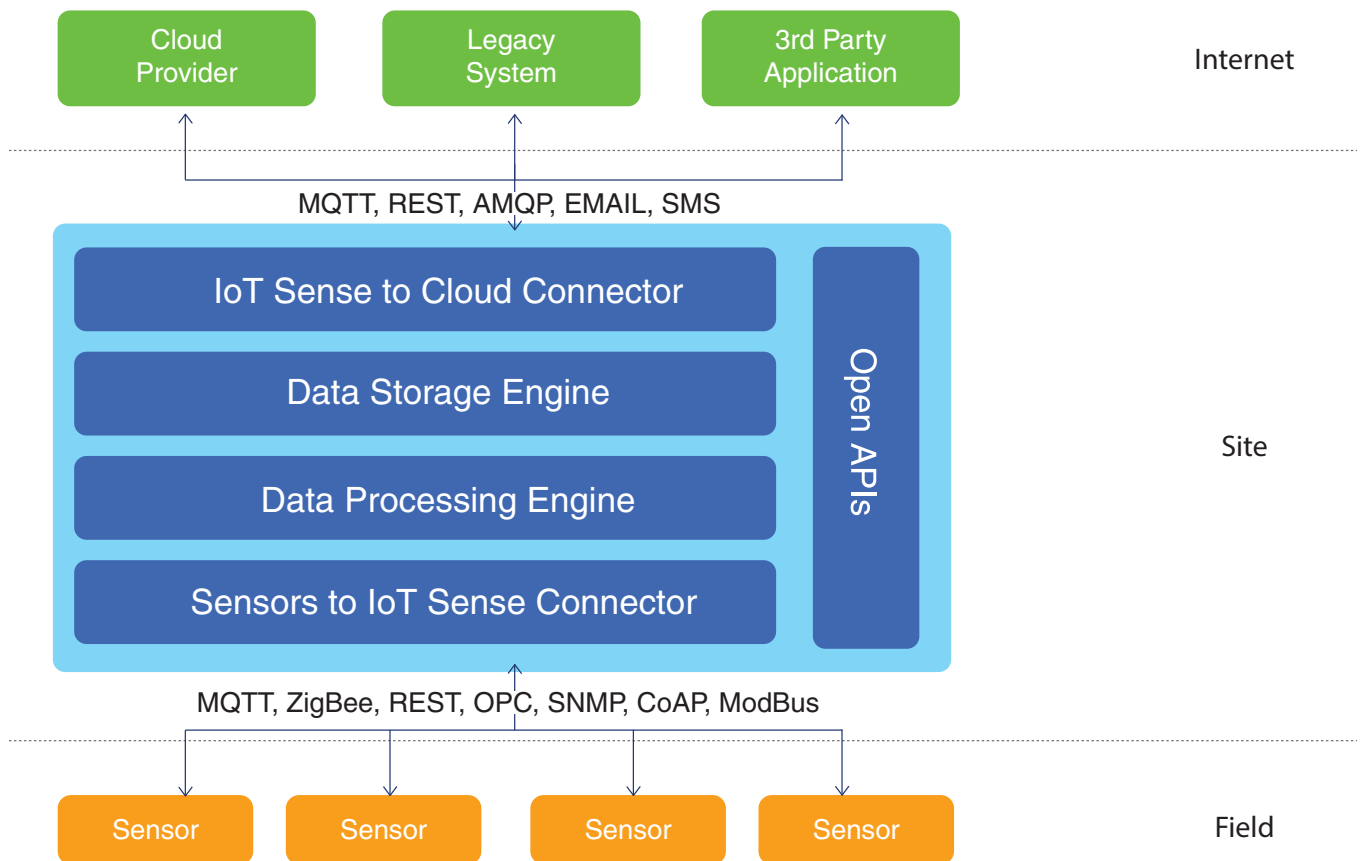
Cattle the way to health

In a dairy farms nothing is more important than the cattle and it's health. IoT Sense has helped and made it possible for the dairy owners to manage their cattle in the best possible way. IoT Sense has deployed some unique solution for it's client. **Sensor Collars** – this was one of the features to locate the cattle at any given point of time across their farm. This enabled the client to keep the track of their cattle and also a safeguard against theft. **Step Tracker** - Was the other important feature, this has enabled our client to understand the health of the respective cows. As warmer the cows feel, longer and faster they walk. Through the data obtained the farmers were able to predict and identify the perfect insemination window. This has increased impregnation chances which lead to better herd management. This also acted as an early warning system that would alert farmers of increased activity that often means an animal is warm or decreased rumination, which can indicate a health problem.



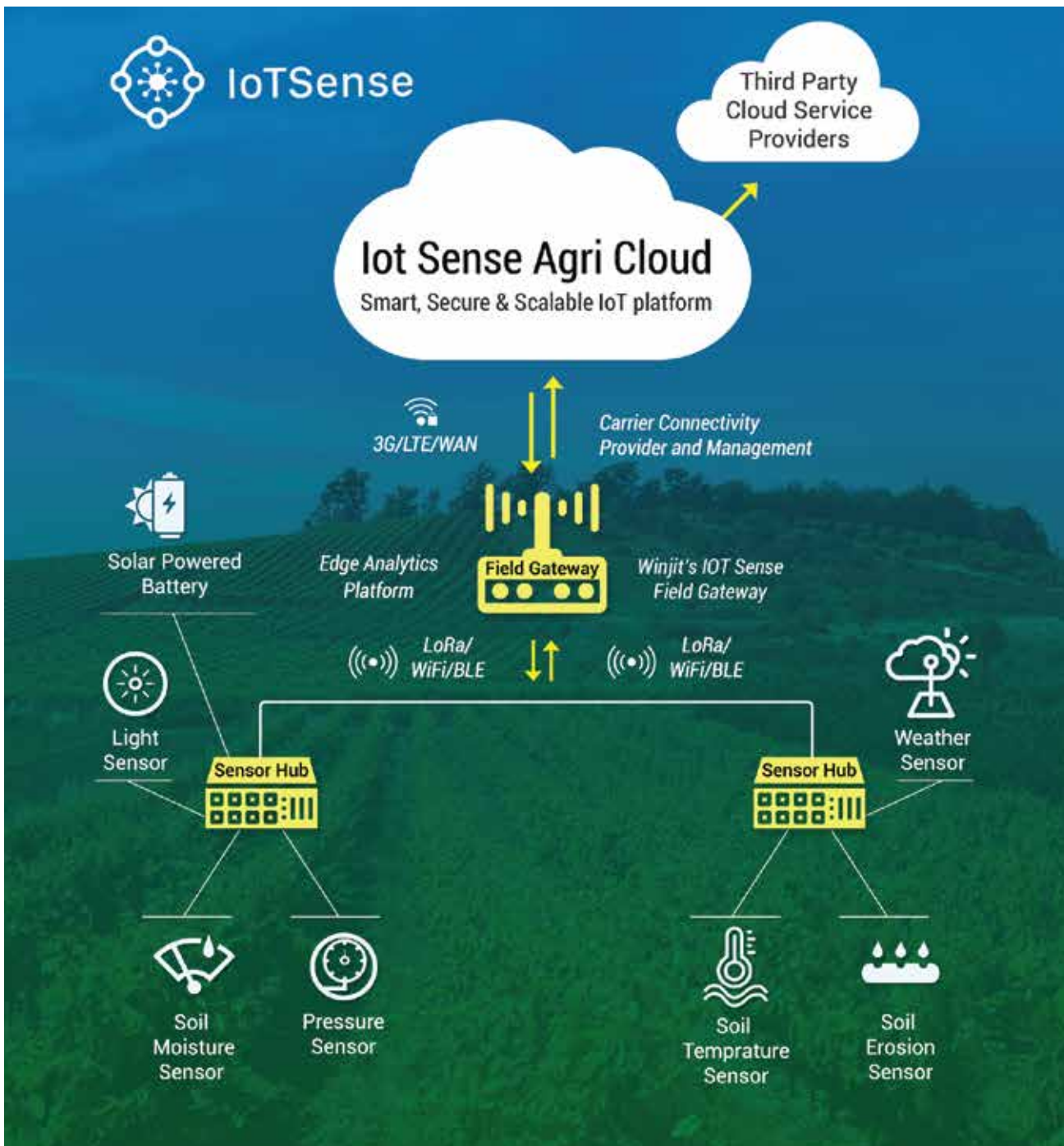
How will IoT Sense help?


With years of research we have come up with a Smart, Secure & Scalable IoT Platform – IoT Sense. Our IoT Sense is an edge level software gateway solution with an intelligent hardware agnostic platform, which is built on an open API architecture. IoT Sense helps you connect legacy & new sensors with ease of customization and rapid deployment. It is the platform on which Agri IoT is built on



Components & Process of Agri-IoT Sense

SMART Agriculture system collects multi sensors data from the field and processes them in the Agri gateway. Maintains limited history on the gateway and syncs up normalized data on agri cloud connected through Ethernet or 3G (option need to be activated with the carrier).





Connectivity - Provides multi-sensor node to connect wired analogue and digital sensors and actuators as well as BLE sensors. Upstream communication is supported through BLE, WiFi and LoRa. Communication medium plays important role in IOT implementation in Agri space due to large open Area and number of limitation factors (Power, Range, connectivity etc).

Gateway - IoT Sense is the most preferred Smart, Secure & Scalable IoT Platform which provides a connection between Sensor Hub to upstream Ethernet or 3G. At every Gateway Agri application running, which normalizes the data locally and if any policies defined, they are executed locally.

Cloud - Provides Agri management and data services through cloud. Most Popular cloud services are AWS IoT, ThingWorx, Azure IoT, Xively etc. Many of these platforms share common features and architectural patterns. The cloud will enable access to advanced analytics and monitoring. Data Generated from the Sensors is in large size and variety of Machine learning algorithms and cognitive services running on the cloud to provide valuable insights to the Farmers and every stakeholder in the Agri chain.

Edge Analytics & Edge Computing - Where most of the IoT platform pushes the data in to cloud Agri IoT will analyze and determine the action at the edge level which means in the gateway itself. The advantage of this would be quick and real-time actionable triggers. This will enable agriculturists to respond quicker to any verticals that are monitored through Agri IoT.

Unified Data – If the agriculturist already have some sensors in place, and with new sensors in place there may be chances that the data collected from various sensors will in different Agri IoT will enable changing the data definition after it's received to receive unified/formatted data for easier and standard data access/processing and visualization.

With all this adaption in the field of agriculture with bigger co-operation and business taking and initiative of giving it back to the community this is just a start to an enormous infusion of technology in the agriculture sector.

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