Problem statement for CoE in IoT in Agriculture

The traditional agriculture and allied sector cannot meet the requirements of modern agriculture which requires high-yield, high quality and efficient output. Thus, it is very important to turn towards modernization of existing methods and using the information technology and data over a certain period to predict the best possible productivity and crop suitable on the very particular land.

The adoptions of access to high-speed internet, mobile devices, and reliable, low-cost satellites (for imagery and positioning) are few key technologies characterizing the precision agriculture trend.

Precision agriculture is one of the most famous applications of IoT in the agricultural sector and numerous organizations are leveraging this technique around the world.

Some products and services in use are VRI optimization, soil moisture probes, virtual optimizer PRO, and so on. VRI (Variable Rate Irrigation) optimization maximizes profitability on irrigated crop fields with topography or soil variability, improve yields, and increases water use efficiency.

IoT has been making deep inroads into sectors such as manufacturing, health-care and automotive. When it comes to food production, transport and storage, it offers a breadth of options that can improve India's per capita food availability. Sensors that offer information on soil nutrient status, pest infestation, moisture conditions etc. which can be used to improve crop yields over time.

Some of the sample problem statements related to Agriculture & allied sectors where IoT application will be beneficial are given below.

1. **Tea Industry**
    a) Use of pesticides / fertilisers more than required quantity leads to rejection of the produced Tea.
    b) Plucking coarse leaves will lead to drop in the quality of made Tea.
    c) Tea pruning is widely used to keep the plants in ideal shape. However, too much pruning leads to destruction of the plant.
    d) Processing of Tea from the leaves (withering, curled, fermentation, dried, sieves and packed) is a hectic and robust job.
    e) Maintaining ideal storage condition.
    f) Exported / supplied stocks are rejected by the customers due to undesired quality.

2. **IoT enabled micro irrigation and farming land health logging system**

History-based soil health parameters like soil moisture, pHlevel, temperature etc. are very essential of organic cultivation. IoT applications may assist in controlling the irrigation pump, opening and closing water flowing gates and also data logging the soil health conditions for present and future purpose. Further, with the help of IoT applications, provision for live guidance based on stored date of soil health from professional/experts to farmers in remote locations may be made available.

3. **Revolutionising the field of Agriculture using integrated technology**

Overuse of pesticides and fertilizer in agricultural fields leads to destruction of the crop as well as reduces the efficiency of the field increasing the soil vulnerability toward pest. IoT applications may be used to update the farmer/user about type & quantity of pesticide required by the crop.

4. **Eco-Harvester for fruits**

The Eco-harvester injects an artificial PME enzyme activator which allows the detachment of only the mature fruits from the branches of the tree leaving behind the immature ones and thereby allowing them to mature, thus minimising harvesting loss. IoT application may be used to keep track when and which part of the field is ready for the process.

5. **Livestock**

Large farm owners can benefit from IoT applications to collect data regarding the location, well-being, and health of their cattle. This information helps them in identifying animals that are sick so they can be separated from the herd, thereby preventing the spread of disease. It also lowers labor costs as ranchers can locate their cattle with the help of IoT based sensors.

6. **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. IoT applications can immensely benefit the farmers using greenhouse technology and make their work simple & easy.

7. **Cold Chain**

By cold chain monitoring techniques and improved storage monitoring, the amount of agriculture produce wasted can be reduced significantly. With use of IoT applications, storage and transport practices can be improved while improving the shelf life of produce. All this can be done with minimal human intervention.

8. **Detection and analysing parameters of milk at different stage of collection**

If we can get the important milk parameters during different stages of collection i.e. from cattle farm to dairy collection centre including health of the animals. This will be helpful in pasteurization process and knowing the important parameters from cattle farm itself will be really helpful in milk processing too. IoT applications can provide solutions in maintaining the quality of food products and over all safety of the consumers.

9. **Fish-farming and breeding**

The consumption of fish in Assam is very high. But the fish-farming and breeding techniques haven’t improved much to meet the growing demand of fish in the region. To increase the productivity and reduce input cost, IoT application to monitor dissolved oxygen, pH indicator, Ammonium nitrate indicator as well as automatic fish feed system can help reduce manpower and improve quality & quantity.