# IDEATION

# Idea 1:

# With the development of information technology, Internet-of-Things (IoT) and low-altitude remote-sensing technology represented by Unmanned Aerial Vehicles (UAVs) are widely used in environmental monitoring fields. In agricultural modernization, IoT and UAV can monitor the incidence of crop diseases and pests from the ground micro and air macro perspectives, respectively. IoT technology can collect real-time weather parameters of the crop growth by means of numerous inexpensive sensor nodes. While depending on spectral camera technology, UAVs can capture the images of farmland, and these images can be utilize for analyzing the occurrence of pests and diseases of crops. In this work, we attempt to design an agriculture framework for providing profound insights into the specific relationship between the occurrence of pests/diseases and weather parameters. Firstly, considering that most farms are usually located in remote areas and far away from infrastructure, making it hard to deploy agricultural IoT devices due to limited energy supplement, a sun tracker device is designed to adjust the angle automatically between the solar panel and the sunlight for improving the energy-harvesting rate.

# Idea 2:

Unmanned Aerial Vehicle (UAV) as a tool of farming has attracted the interests of an increasing number of researchers. In this paper, we study the problem of deploying a group of UAVs to track and monitor the livestock such as cattle and sheep in a pasture. We assume all targeted animals have been fitted with GPS collars, and the mobility of each targeted animal cannot be ignored. We further assume the number of UAVs is sufficient for covering the entire pasture, and we aim to find the optimal UAVs’ deployment for minimizing the average UAV-animal distance. We first introduce a procedure of performing sweep coverage by UAVs. By deploying UAVs to achieving sweep coverage for the entire pasture, the initial locations of all targeted animals can be acquired. Then, determine and update the UAVs’ deployment by streaming k-means clustering based on the initial locations and received updated locations from the GPS collars. We demonstrate that our solution can always yield a lower average UAV-animal distance compared with a standard K-Means clustering algorithm without considering targeted animals’ mobility.

# Idea 3:

The newer scenario of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture sensor at suitable locations for monitoring of crops is implemented in [1]. An algorithm developed with threshold values of temperature and soil moisture can be programmed into a microcontroller-based gateway to control water quantity [2]. After the research in the agricultural field, researchers found that the yield of agriculture is decreasing day by day. However, use of technology in the field of agriculture plays important role in increasing the production as well as in reducing the extra man power efforts. Some of the research attempts are done for betterment of farmers which provides the systems that use technologies helpful for increasing the agricultural yield [3]. The use of remote switching and monitoring of irrigation system using smart phones to address the need of automatic control of the water is presented. The data about soil moisture, temperature and humidity is sent to the smart phone for the user to make the decision. [4]. In the studies related to wireless sensor network, researchers measured soil related parameters such as temperature and humidity. Sensors were placed below the soil which communicates with relay nodes by the use of effective communication protocol providing very low duty cycle and hence increasing the life time of soil monitoring system. The system was developed using microcontroller, sensors while the transmission was done by hourly sampling and buffering the data, transmit it and provide the necessary water [5] .

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