



Centre for Agricultural Engineering

Common sensor platform for real-time variable rate nitrogen application



Introduction

- Real-time crop nitrogen estimation in the field is complex and depends on multiple factors, such as soil, climate, field variability, and historic yield data etc.
- A common sensor platform (CSP) was developed to record and analyse real-time multi-sensor (crop, soil, optical and vision) data to generate variable rate nitrogen application on the go.
- The CSP can also fuse background data (field soil moisture, historic crop yield data etc.) with real-time sensor data (Phenom, green seeker, crop circle, machine vision data etc.) for variable rate nitrogen application.

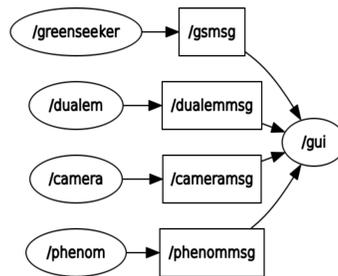
CSP Hardware

Portable / Durable / Weather proof / Easy plug and play

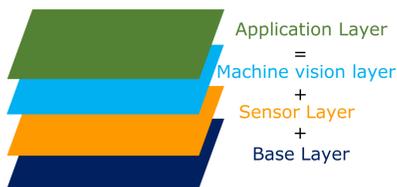
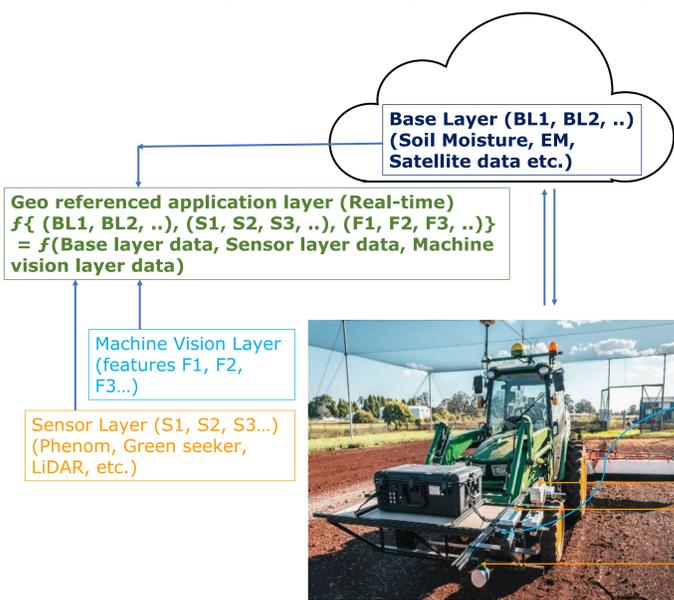


CSP Software

Robotic operating system (ROS Kinetic)
Python (2.7)
PyQt (for GUI)
Ubuntu 16.04 LTS



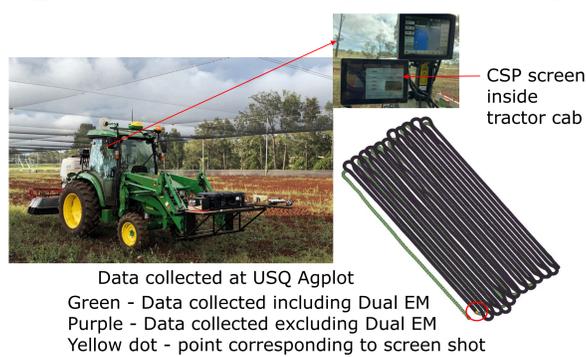
CSP for prescription map/application layer generation (Multi layer approach)



Geo-tagged....

Off line data /historic data (Satellite data, soil moisture data, weather data or historic yield data)

Real-time sensor data (NDVI, Crop canopy, height, machine vision data)

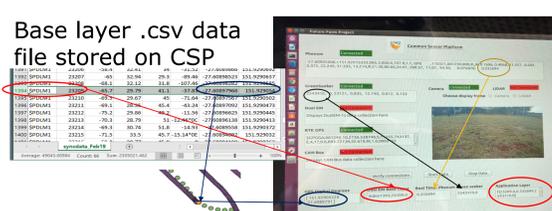


Data collected at USQ Agplot
Green - Data collected including Dual EM
Purple - Data collected excluding Dual EM
Yellow dot - point corresponding to screen shot

Base layer: Data was stored on the CSP as .csv file with GPS data and dual EM data

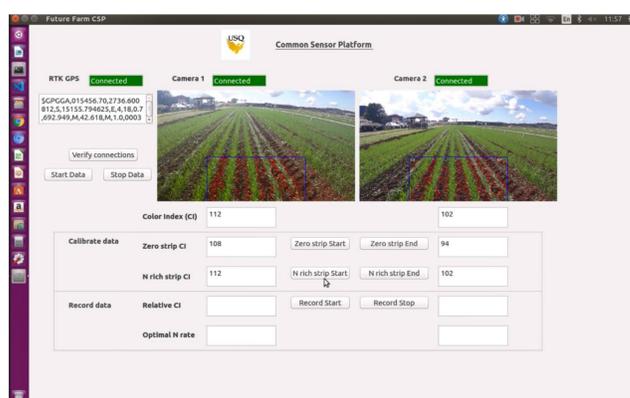
Sensor layer: Real time data from Phenom and green seeker was used.

Application layer: Dual EM data, corresponding to GPS data was obtained and combined with optical sensors data to generate an application map.



Screen shot corresponding to the yellow dot

Machine vision implementation on CSP



Real-time communication with tractor and variable rate controller

