Sensing, monitoring and operational improvements in St. Mary River Irrigation District

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Introduction

The proposed project aims for the operational improvements of the St. Mary River Irrigation District's (SMRID). The first goal is the application of a measurement sensor network in order to address the algae content in the irrigation district. Two types of remote measurements will be used: visual mapping and in-situ sampling.

Combined, these two type of measurements should provide enough data to model and predict algae growth, and the system should be able to advise when and where chemical intervention is necessary. A software and server will be developed for proper communication, data processing, prediction and visualization.

Algae Growth Detection

The aerial pictures are able to show the growth of large-scale algae but might not be able to properly capture the growth of smaller algae. Thus, the in-situ sampler agent is used for this situation. Together, the data from both agents should be able to give a complete assessment of the current algae growth condition and locations.
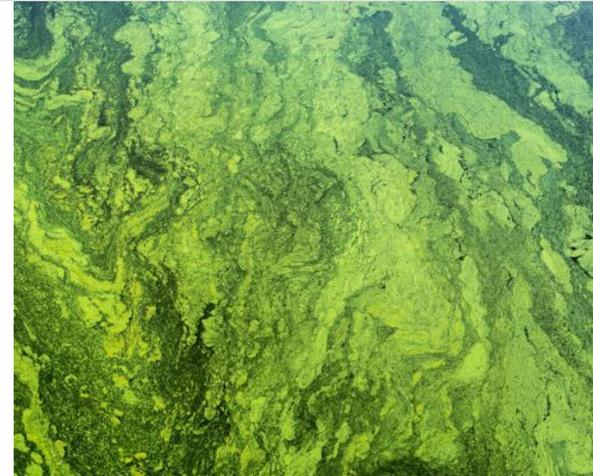
Remote Data Processing

In an effort to decrease the size and cost of the field agents, the data processing will not be carried out by the agents themselves. The data will be transferred to a central server, acting as a supervisory control and data acquisition (SCADA) system, responsible for all the data processing, visualization and growth prediction. The data will be updated across all St. Mary River District building/personnel.

Project Benefits

This would be a first time attempt to address the operational monitoring at a scale such as the SMRID's area. The current practices do not account for neither the daily aerial inspections nor the monitoring of algae bloom by autonomous agents.

The operational improvements and the benefits of this project finding could easily be transferred to other water irrigation districts in Alberta.

Sensor Design

Hardware

As mentioned earlier, there will be two types of agents employed on site:

Software

The areal pictures will be analyzed by means of pattern recognition, searching for matching features algae blooming and spreading.

The measurements from the in-situ agent will be analyzed against previous sampled data of algae bloom.

A communication and visualization interface for the whole St. Mary district is also being developed.

Next Step

The data for the in-situ agent and the proper sensor development have been studied and tested on a lab scale. For the next summer, when the climate allows for in site sampling, the two types of agents will be deployment for testing and data collection on the St. Mary River Irrigation District;