

## Development of a Wireless Irrigation Control System

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**Objective:** Our objective is to develop a prototype Wireless Irrigation Control System with the aim of reducing barriers to Variable Rate Irrigation and improving pivot, fuel, and water management.

**Rational and economic significance:** Variable Rate Irrigation (VRI) can save water and optimize the spatial distribution of applied water. Farmers in Georgia and other irrigating states are now able to retrofit a UGA designed commercial VRI system. Over 35 systems have been installed on Georgia farms with an additional 10 scattered in other states across the USA.

Although the current generation of VRI has been commercialized we are continuing to look at methods of making the system less expensive and more farmer friendly. We believe that a fundamental redesign of system components based on wireless communication technologies can greatly reduce the cost of the system while improving the installation time and maintenance requirements. In addition we believe we can alter the system architecture to allow remote monitoring and control.

**Procedures and plan of investigation:** We have begun development of 'smart' nozzles which will retrofit onto existing center pivots. The first generation prototype has been assembled and tested for proof of concept by a Macon, GA company we have partnered with. We are now refining this design to make the system better integrated, reliable and cost effective.

Once complete, the nozzles will be fully self-contained, and self-powered, control and communications devices. Water micro-turbines will be used in each nozzle for power and water application rate will be adjusted at the individual sprinkler head based on time on/time off (20 sec/minute, 40 seconds/minute...) similar to our current systems.

The desired rates for each field area will be pre-programmed into the master control located near the pivot point, GPS at the end-tower will provide field location and each 'smart' nozzle will be linked to the master control using a wireless ZigBee network. ZigBee is our communications choice because it is an open standards technology, it has great power consumption characteristics, range, and mesh architecture. These 'smart' nozzles should completely obviate the current need for air hoses, air lines, communications wires, and electrical wires. Besides eliminating these costs, there will be substantial benefits from not having to install and maintain this infrastructure.