



# Automated irrigation systems: Smart Irrigation control for water and labour savings in rice growing systems.

## 1. What is the project about?

This project is developing a linked sensing, forecast and automation control system (Smart Irrigation) for rice. Previous research has found Smart Irrigation control systems can significantly improve the water productivity of a partly ponded or strategic ponded 'Dry Rice' system.

Soil moisture monitoring, water control, crop stress monitoring together with automated Internet of Things (IoT) irrigation control structures and weather forecasts are important components Smart Irrigation control systems.

This project is pulling these components together to develop and commercialise cost effective and reliable Smart Irrigation control systems for rice production. Systems that can also be integrated into the Sunrice GIS system.

Research and development activities are being conducted on two sites. One at Widgelli in the Murrumbidgee Irrigation area and the second at the Rice Research Australia (RRAPL) farm near Jerilderie in southern NSW.



## 2. Why automate irrigation systems?

Water price and labour costs are fundamental drivers of irrigation decisions and business success.

Optimal sensing and forecasting systems linked to automated irrigation systems can maximise water productivity and reduce labour costs.

'Dry Rice' systems aim to minimise water application and their use will be critical in ensuring the industries future.



## 3. How will the research benefit irrigators?

Economic benefits of rice automation have been analysed using a baseline economic approach focused on the farm level. This analysis and results have been published in Farmers Newsletter No. 204 Spring Edition. <https://irec.org.au/wp-content/uploads/IREC-FN204-fin.pdf>.

The results of the analysis show a potential range of economic benefits under three scenarios ranging from \$666/ha to \$2827/ha over a 10 year period. Current sensing and automation systems developed in the project are well below \$666/ha (varies due to bay size etc) so the economics for irrigation automation in rice are favourable, especially with high water prices.

A number of rice farmers are now investing in automation technology specifically to grow rice. An early outcome from this project.





### 4. Key results to date

During the 2019/2020 irrigation season two smart sensing and irrigation automation control trial sites were established. The sites were instrumented with Padman seasonal autowinches across irrigation outlets and Wi-Field in-field sensing systems. A combination of various cloud based infraststructure was tested, with sensing and control clouds utilising CatM1, Lora and WiFi.

Across this sensing and automation hardware a Google Cloud based software platform was developed in the project known as "IRRISSENS" to integrate the sensing and control platforms. The IRRISSENS platform integrates the sensing and control elements and provides the analytic engine for decision making on irrigation processes. It has the ability to be run in both a supervised and unsupervised fashion when controlling irrigation. The platform uses a microservices approach which was found to be robust in nature during the 2019/2020 irrigation season when tested across farms.

During the trials suitable sensing parameters for monitoring irrigation water needs were refined. These parameters will be used in the 2020/2021 irrigation season trials to control water under both un-ponded and ponded water conditions with algorithms now developed for both situations in irrigated rice.

In order to integrate IRRISSENS into the Sunrice GIS system an Application Programming Interface (API) has been developed that allows the integration of IRRISSENS into the Sunrice GIS system. This uses a common approach and will allow access to the IRRISSENS platform within the Sunrice GIS system.

**For more information** visit the [Smarter Irrigation for Profit](http://Smarter Irrigation for Profit) website and listen to the webinar or watch the video:

- <https://smarterirrigation.com.au/ial-icid-webinar-addressing-the-global-water-challenge-through-autonomous-irrigation/>
- <https://smarterirrigation.com.au/dr-john-hornbuckle-associate-professor-from-deakin-university-talks-about-new-technologies-for-automation/>

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