Real-time, web-enabled adaptive control and monitoring of surface and overhead irrigation systems

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Irrigation control system

Surface irrigation system

Overhead irrigation system

1. Sensors

2. Control strategy

3. Real-time irrigation adjustment
Irrigation control system

1. Sensors
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Surface irrigation system

Overhead irrigation system
Internet-enabled infield sensors

- Data uploaded to server from:
  - Weather station
  - Soil moisture sensors
- Variability estimated from EM surveys
Fruit load estimation sensor

Overhead-mounted platform for centre pivots/lateral moves

Ground-based platform for surface irrigation
Irrigation application

- Advance meters
- Flow meters on surface and overhead systems
Irrigation control system

1. Sensors
2. Control strategy
3. Real-time irrigation adjustment
Irrigation control strategies

- Use sensed data to determine irrigation application/timing
- Developed adaptive control frameworks:
  - AutoFurrow – real-time surface irrigation event optimisation
  - VARIwise – site-specific surface/overhead irrigation control
AutoFurrow

- Real-time optimisation of irrigation along surface irrigated fields
  - Requires advance and flow measurements
  - Simulates hydraulics
  - Determines flow rate and cut-off time to optimise application efficiency or distribution uniformity
Simulates and develops irrigation control strategies at spatial resolution to 1m² and any temporal resolution.

Control strategies based on difference between measured and desired performance.

Analyses irrigation hydraulics and updates irrigation control signals.
Irrigation control system

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Surface irrigation system

Overhead irrigation system
Real-time surface irrigation adjustment

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Real-time overhead irrigation adjustment
Irrigation control system

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Surface irrigation system

Overhead irrigation system
Irrigation control system implementation

- Bay irrigated dairy fields in Victoria
- Siphon surface irrigated cotton farms
- Centre pivot irrigated cotton
- Setting up for gated pipe implementation
Conclusion

- Created frameworks that enables spatial/point-based databases
- Developed Internet-enabled sensors for input to control strategies
- Forms basis for automated irrigation decision-making
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