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Smart Automated Furrow Irrigation: A Preliminary Evaluation

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Abstract : Surface irrigation is the most popular irrigation method all over the world. However, two issues: low efficiency and huge labour involvement concern irrigators due to scarcity in recent years. To address these issues, a smart automated furrow is conceptualised that can be operated using digital devices like smartphone, iPad or computer and a preliminary evaluation was conducted in this study. The smart automated system is the integration of commercially available software and hardware. It includes real-time surface irrigation optimisation software (SISCO) and Rubicon Water's surface irrigation automation hardware and software. The automated system consists of automatic water delivery system with 300 mm flexible pipes attached to both sides of a remotely controlled valve to operate the irrigation. A water level sensor to obtain the real-time inflow rate from the measured head in the channel, advance sensors to measure the advance time to particular points of an irrigated field, a solar-powered telemetry system including a base station to communicate all the field sensors with the main server. On the basis of field data, the software (SISCO) is optimised the ongoing irrigation and determine the optimum cut-off for particular irrigation and send this information to the control valve to stop the irrigation in a particular (cut-off) time. The preliminary evaluation shows that the automated surface irrigation worked reasonably well without manual intervention. The evaluation of farmers managed irrigation events show the potentials to save a significant amount of water and labour. A substantial amount of economic and social benefits are expected in rural industries by adopting this system. The future outcome of this work would be a fully tested commercial adaptive real-time furrow irrigation system able to compete with the pressurised alternative of centre pivot or lateral move machines on capital cost, water and labour savings but without the massive energy costs.

Keywords : furrow irrigation, smart automation, infiltration, SISCO, real-time irrigation, adoptive control
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