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**Development of a Precision Irrigation Control System for
Horticultural Food Crops in Tanzania**

Abstract

As the Tanzania population grows, scarcity of resources such as water and electricity will pose a great risk to horticultural crop production and society activities. Precision irrigation presents a great opportunity to save water and energy in agriculture. The current off-the-shelf machines used to control water are incompatible to Tanzanian conditions, very expensive, delicate, or do not have enough features.

This study proposed a precision irrigation control system (PICS) prototype design and implementation that can be used in African countries, particularly in Tanzania. The PICS is a solar-powered control system that uses low cost electronic devices to automate drip irrigation and to determine when to irrigate and how much to irrigate. The hardware and software of the PICS were designed, integrated, and constructed in USA and then in Tanzania.

Under testing, the PICS worked properly and achieved a high level of reliability and maintainability. The controller is a high tech tool that can be programmed wirelessly using a laptop and the data can be downloaded using any android based smartphone. The wireless technology incorporated can be used to transfer instant data of rainfall and soil moisture content. The system updates its data every four minutes (but can be reprogrammed). The system automates data cleaning while collecting instant information of the soil moisture, temperature, humidity and rainfall. It can store data at least for seven days.