A Low-Cost Soil Moisture-Based Automated Irrigation Control System With Web Application

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Introduction: Climate change, population growth and poor water conservation continue to worsen water shortages in the world. Engineering Goal: To develop a low cost, water-on-demand, soil moisture based automated irrigation control system with web application. Methods: Two plastic circuit boards (PCBs) were developed using etching. An online database of soil moisture measurements and a website (soil-moisture-recording.com) were also developed. Programming of the PCBs was done using C programming language on Arduino IDE and that for the website was done using hypertext pre - processor (PHP). In the field, a transmitting micro-controller (TMC) [Node-MCU Wi-Fi module] was mounted onto one PCB and connected to both a moisture sensor and a submersible water pump (3.4 volts). The TMC was used to connect to a Wi-Fi and to update the online database in real time. These records could be accessed from the website at any time and from any location using a computer, a tablet or a mobile phone. The water pump in the field was triggered automatically by the TMC when the soil moisture level was low at less than or equal to 60%. In the house, another PCB had a receiving micro-controller (RMC), an LCD, and LEDs connected to it. The RMC was connected to the website and data of soil moisture measurements could be read on the LCD. The LEDs showed the levels of moisture: Red for Low (<40%), Yellow for Medium (40 – 60%) and Green for Optimum (>60%). This PCB was optional. The cost of setting up a working prototype was USD $11. Results: A working prototype of a soil moisture based automated irrigation control system with web application was developed. Conclusion: This was a practical project that has the potential to help any country in the world to conserve water.

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