Summary Description: Experimenting With My Cheap Garden Irrigation System

Tags: electronics; software; nature projects; esp8266; arduino; relays; water solenoids; irrigation

Why I did this: I have a garden, old irrigation supplies, rain collection barrels, and wanted to see if I could apply my computer skills into creating an automated watering system.

(summary pic of system)

Design Walkthrough:

Parts: esp8266; 4 channel relay; 1 channel relay; 12V water solenoids; 45W 120V water fountain pump; water hoses and spouts; various-leveled power supplies and wiring; rain barrels

For an initial evaluation setup, I wanted to create a system where my water pump would supply collected rainwater to up-to 4 garden bed areas using an esp microcontroller controlling the solenoid valves at timed intervals. I installed old water hoses in three of the bed areas and connected them to the solenoids using tie-straps (since I didn’t have reducers); strung the supply hose to the water pump sitting in a rain barrel; wired 18awg wire to the 12V solenoids and relays; cut and tied an extension cord to the single 120V relay; wired the 5V and 12V supply adapters; then wired the 5V signal wires to the esp controller. I programmed the esp (using Arduino IDE) to open the solenoids, one at a time, for 5 minutes each, then observed the irrigation performance.

(pics of system)

Lessons Learned and Future Changes:

Go Pro. I wanted to see how the system would work with what spare parts I already had (aside from the $30 12V 4 channel solenoid I bought). The system works, but only ok in some areas; the flow is not very high, and the hoses need more positioned spouts. The wires should be up to code specs (the current wires are ok for supervised usage, but I’m not comfortable leaving it run alone), and could probably benefit from some fuses. The rain coverings are just old containers, so, I could 3d print some properly fitted ABS containers.

It plugs too easily. The rain barrel seems to collect silt and grow algae and that gets sucked into the pump, and the solenoid piece has a fine mesh screen to hold back junk so as to retain better seating of the valves; that mesh plugs very quickly if the barrel experiences any turbulence. I wonder if I could 3D print an inline filter to help that mesh perform longer?

Easier monitoring wanted. Right now, the code is just simple relay timer scripts, but it would be nice to add this system to an online server where I could program schedules; maybe I will program that manually or find an MQTT service that can do that.

References:

4-valve water solenoid on Amazon: https://www.amazon.ca/dp/B085DTGWBM