Online Monitoring and Controlling of Smart Drip Irrigation System Using Raspberry PI

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Abstract: This paper proposes a the perception of home automation system using ready-to-use, economical and efficient products including raspberry pi, Arduino micro-controllers, xbee modules and relay boards. Arduino microcontrollers are utilized to receive the on/off instructions in the raspberry pi using zigbee protocol Star zigbee topology can serve as backbone for the communication between raspberry pi and finish products. Raspberry pi functions a main coordinator and finish products act as various routers. Low-cost and efficient drip irrigation system works as an evidence of concept. The concept may be used in big agriculture fields plus small gardens controlled via online web page by just clicking the buttons. The live streaming of the agriculture fields is also present in the system. The utilization of ultra sound sensors and solenoid valves create a wise drip irrigation system. The paper describes the entire installation of the machine including software and hardware aspects. Experimental set-up can also be examined and described for an automatic drip irrigation system to water 50 containers.

Keywords: Raspberry pi, ARM7, Zigbee, Automatic Drip Irrigation System.

I. INTRODUCTION

The advantages of building an automation system for an office or house is growing day-by-day. Industrialist and researchers will work to construct efficient and economic automatic systems to manage different machines like lights, fans, air conditioning units in line with the requirement. Automation makes a competent utilization of the electricity and water and reduces a lot of the wastage. Drip irrigation system helps make the efficient utilization of water and fertilizer. Water is gradually dripped towards the roots of the plants through narrow tubes and valves. Water is given straight to the bottom of the plants that is a perfect method to water plants. There must be proper drainage within the fields or pot plants to prevent water logging which just in case may affect the productivity [1].There already exist automatic drip irrigation systems which water plants according to soil humidity, pH worth of soil, temperature and lightweight. These parameters are needed in big agricultural fields where productivity from the crop matters. In small areas like office premises, structures, house gardens etc. where watering plants at regular interval matters, our proposed irrigation system can be really efficient. This paper presents a wise drip irrigation system to water plants by using products like raspberry pi, Arduino microcontrollers. Xbee can be used to manage the system wirelessly while Python programming language can be used for automation purpose. This paper contributes a competent and fairly cheap automation irrigation system. System on reinstalled doesn't have maintenance cost and it is simple to use.
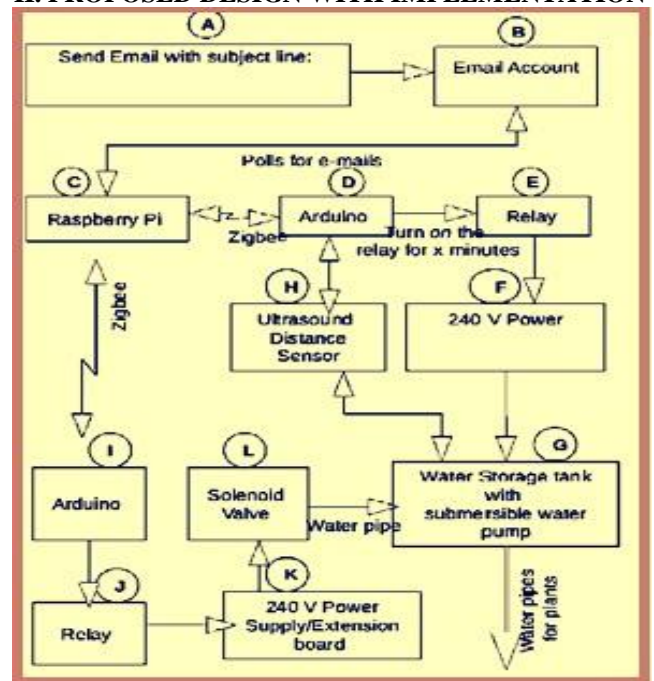
II. PROPOSED DESIGN WITH IMPLEMENTATION

Fig.1. Data flow Diagram of Proposed System.

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The functionality as follows: 240Vpower appliance from microcontrollers or low current circuits as shown in Fig.1. The connections to 1-channelrelay board is presented, you will find three pins on the relay board namely normally open (NO), normally closed (NC) and customary (C). The most popular pin is linked to NC pin once the relay is off and also to the NO pin once the relay is on. The input pin "INP" receives logic high from raspberry pi as well as in turn switches around the relay, thus common is linked to NO which turns the unit on up until the relay is on. The "VCC" and "GND" pins from the relay are linked to 5Vsupply and ground correspondingly. continuously delivered to the solenoid valve and therefore the water level in tank doesn't drop below or over a threshold to avoid any damage within the water pump also to avoid overflow water in the water tank. The communication from sensor till solenoid valve is as follows:

- Ultrasound sensor send signal to microcontroller (D).
- Arduino (D) communicates the signal to pi.
- Pi again send the signal to Arduino (I) via zigbee Relay (J) is on/off based on the signal caused by pi thus opening or closing the solenoid valve.
- Arduino: The behavior from the microcontroller is same as explained in point D.
- Relay Board: The behavior from the relay is same as explained in point E.
- Power: The behavior from the supply is same as explained in point F. L. Solenoid Valve: A 2-port, normally close, .5-10bar, 230V-50Hz, rotex solenoid valve can be used within this design. Here, the valve has got the signal from microcontroller and therefore act according.

III. CONCLUSION

This wise drip irrigation system happens to be a useful system since it automates and regulates the watering without any manual intervention. The system can be automated but manually controlling the system via online has control inside the system regarding when you should run the system based on the weather conditions. Using this system, solenoid valves and relay board might be control remotely which opens the options to handle water flow and drainage combined with the electrical flow. The limitation from the design is the failure of any particular part or product is not informed and must be tested manually.

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