Abstract

The more days, environmental condition in cities become less possible for applicating conventional farms, indeed require extensive ground fields. That affair made the urban farming happen, but the cultivation method is selective caused by the need of adaptation to the cities' environmental condition. Aeroponics are used in this final exam, as an example of urban farming method, because it's a soilles cultivation method and yet uses 98% less water than the conventional soil based cultivation. However, the application of aeroponics is concern on the irrigation system, that point on the pump's pressure to make small water particles to irrigates the plants' root, which consumes big amounts of power.

To overcome that such of problems, this final exam built a prototype for automation temperature control in aeroponics cultivation. Operation of the actuators, water pump and water cooler, are automated that based on the root-zone temperature. Since the system communicate between sensor node, middleware, and application, it is an M2M system. The sensor node is a Raspberry Pi microprocessor based that connected with sensors and actuators, OpenMTC as the M2M middleware to receive sensing datas from sensor node and receive response datas from a Node.js built realtime graphical web application, that role as the user interface and data processor. This M2M system can fulfill the concept of Internet of Things (IoT) which applied in agriculture.

Prototype that have built in this Final Exam serves data acquisition process for temperature in root-zone and displayed them in the web application, also did the watering and root-zone cooling when the root-zone temperature reach above 25℃. The tested communication between sensor node and application bridged by middleware, result the average transmission and computation time is 3,579 seconds, and the shortest duration of activated actuator is 9,336 hours within the 24 hours calibration that's done three times in uncontrolled environment. In the controlled environment calibration, shows that the actuators in this prototype hadn't worked effectively to the current environmental condition. So, it needs further research(es) to improvise this prototype.

Keywords: *aeroponics, actuator system, microprocessor, sensor, actuator, server, application.*