

Design, implementation and evaluation of a central unit for controlling climatic conditions in the greenhouse

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Abstract

In greenhouse culture, in addition to increasing the quantity and quality of crop production in comparison with traditional methods, the agricultural inputs are saved, too. Recently, using new methods, designs and materials, and higher automation in greenhouses, better management has become possible for enhancing yield and improving the quality of greenhouse crops. The constructed and evaluated central controller unit (CCU) is a central controller system and computerized monitoring unit for greenhouse application. Several sensors, one CCU, several operators, and a data-collection and recorder unit were the major components of this system. The operators included heating, cooling, spraying, ventilation and lighting systems, and the sensors are for temperature, humidity, carbon dioxide, oxygen and light in inside and outside the greenhouse. Environmental conditions were measured by the accurate sensors and transmitted to the CCU. Based on this information, the CCU changed variables to optimize the greenhouse environmental conditions to predetermined ranges. This system was totally made of local instruments and parts and had the ability to integrate with the needs of the client. The designed and implemented CCU was tested in a greenhouse located in Agriculture and Natural Resources Research Center of Khuzestan Province during summer season of 2011. The CCU was operated successfully for controlling greenhouse temperature in the range of 22-29 °C, relative humidity of 35-55%, artificial lighting in the case of receiving radiation of less than 800 Lux and turning on the ventilation units if the concentration of carbon dioxide was more than 800 mg/L.

Keywords: Control of environmental conditions, Automation, Sensor.

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