

Smart Power Saving Climate Control System for Tea Nurseries in Sri Lanka

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Tea industry is the one of main foreign exchange source in Sri Lankan economy presently faces many challenges such as newly developed competitors, poor yielding tea varieties, poor resistive cultivars for newly developed bio-attacks possibly due to climatic changes and other phenomena. Tea varieties from different regions of country have different qualities and bio-resistance issues. This project is to mitigate above problems by introducing an affordable climatic chamber for Tea nurseries, to generate artificial climatic condition. Climatic chamber is automated with a system that has the ability to control weather conditions constantly, despite of the fluctuations in external natural weather conditions. The system includes a smart power saving weather control system controlled by Atmel microcontrollers, for greenhouses in tea nurseries. Climate control is achieved by several actuators which are interfaced to the microcontrollers via high voltage contactors connected to relay board. Priority is given to low power consuming actuators to act first for the sensor readings by the programmed logic. If it fails to maintain desired climatic conditions, signals are given to activate power consuming, efficient actuators automatically by the program logic. The microcontrollers, sensors and actuators together maintain the temperature, relative humidity, light intensity, CO₂ concentration and soil moisture of greenhouse to the reference ideal value which is a source of input interfaced into the microcontrollers through LCD screen and keypad. A priority order is programmed through logic preventing the impact of change in one factor affecting the other factor. All factors except humidity were controlled successfully, while system consumed more time to maintain humidity as it has high impact over temperature. A reference range of climatic factors instead of a single ideal climatic value as in our system will be more favorable and recommended for power saving.

Keywords: Atmel microcontrollers, Relay board, Tea industry, Climate control, Lcd screen