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Embedded real-time system for climate control in a complex greenhouse

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abstract This paper describes the development of an embedded real-time system devoted to microclimate control in a complex greenhouse. The control system is capable of managing multiple, independent poly-tunnel units (PTUs). Both the internal temperature and humidity of PTUs as well as the external temperature, rainfall and wind conditions are monitored and regulate decisions of the control system. The control system is directed by parameters entered at configuration time through a userfriendly graphical interface. The realization depends on the use of Java technologies and on a specific methodology suited to the development of real-time systems. The approach is based on hierarchical state machines extended with timing constraints, and a supporting toolbox which enables graphical modelling, automatic code generation, simulation and real-time execution of a system. The paper discusses design and implementation aspects of the control system and reports information collected from real operation.

keywords greenhouse climate control, embedded real-time systems, statecharts, integrated development, Java