

## FPGA Based Real Time Monitoring System for Agricultural Field

Chris Hartigan  
[chrishartigan09@rediffmail.com](mailto:chrishartigan09@rediffmail.com)

Hussain Bandoorkwaala  
[hussain\\_bandoorkwaala@yahoo.com](mailto:hussain_bandoorkwaala@yahoo.com)

*Abstract* — The most important factors for the quality and productivity of plant growth are temperature, humidity, light and the level of the carbon dioxide. Continuous monitoring of these environmental variables gives information to the grower to better understand, how each factor affects growth and how to manage maximal crop productiveness. The optimal greenhouse climate adjustment can enable us to improve productivity and to achieve remarkable energy savings - especially during the winter in northern countries. The system itself was usually simple without opportunities to control locally heating, lights, ventilation or some other activity, which was affecting the greenhouse interior climate. This all has changed in the modern greenhouses. The typical size of the greenhouse itself is much bigger what it was before, and the greenhouse facilities provide several options to make local adjustments to the lights, ventilation, heating and other greenhouse support systems. However, more measurement data is also needed to make this kind of automation system work properly. Increased number of measurement points should not dramatically increase the automation system cost. It should also be possible to easily change the location of the measurement points according to the particular needs, which depend on the specific plant, on the possible changes in the external weather or greenhouse structure and on the plant placement in the greenhouse. For the implementation of agricultural technologies, low cost and real time remote monitoring are needed, in this sense, programmable Logic Devices (PLDs) present as a good option for the technology development and implementation, because PLDs allow fast development of prototypes and the design of complex hardware systems using FPGAs (Field Programmable Gate Arrays) and Complex Programmable Logic Devices.