The oven used by Team PrISUm for curing composite test samples was controlled by a complicated system that lacked several features desired by the team. The old system used an on-off controller on an Arduino that was programmed by a Raspberry Pi. It was difficult to use and had stability issues. A new system was designed to add a web interface, data logging, and a PID controller with adjustable gain scheduling. Python 3.4 and the Flask web framework were used to develop the system, and the code was run on a Raspberry Pi.

Theory

Equations 1 and 2 show the parallel form of the PID controller:

\[ u(t) = k_p e(t) + k_i \int_0^t e(\tau) d\tau + k_d \frac{de(t)}{dt} \]  

Equation 4 eliminates a concept called integral windup by limiting the summation term in Equation 3.

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References


