

AN IMPROVED TEMPERATURE CONTROL SYSTEM FOR NEONATAL INCUBATOR

Okpagu P. E¹, Mbachu C. B¹, Nwosu A. W²
Department of Electrical and Electronic Engineering
Chukwuemeka Odumegwu Ojukwu University, Uli
Anambra State, **NIGERIA**

ABSTRACT

This work is aimed at modeling an improved system to regulate the temperature inside a neonatal incubator. A neonatal incubator is a device consisting of a rigid box-like enclosure in which an infant may be kept in a controlled environment for medical care. An infant incubator provides stable levels of temperature, relative humidity and oxygen concentration. Temperature control is the most important part of a baby incubator which has to be maintained around 37⁰C. In this work, we regulated the temperature at the incubator by adopting an automation technique in which PID temperature control parameters were implemented in microcontroller. Mathematical models of the incubator subsystem, actuator and PID controller were developed and controller design based on the models was also developed using Simulink. The models were validated through simulation, adopting Zeigler-Nichol tuning method as the tuning technique for varying the temperature control parameters of the PID controller in order to achieve a desirable transient response of the system when subjected to a unit step input. After several assumptions and simulations, a set of optimal parameters were obtained at the result of the 3rd test that exhibited a commendable improvement in the overshoot and peak time, thus improving the robustness and stability of the system.

Keywords: Neonatal incubator, Temperature control, automation technique, PID controller, Microcontroller.