ABSTRACT

The Thesis elaborates a solution for dynamic control for linear and nonlinear system, in the form of an intelligent remote control. System is developed in two sections-remote control and receiver section. It is capable of controlling the light intensity, temperature and humidity of the room as per the user's requirement both in autonomous and semiautonomous mode. In autonomous mode the parameters are controlled at ambient conditions by the receiver section, by adjusting applied voltage levels for appliance. It is done by calculating error signal generated from the difference of set point by remote control and feedback signal from sensor, in a closed loop. In semiautonomous mode, the parameters are controlled by user through the remote control, at different levels. RF modem (Zigbee) with frequency of 2.4 GHz is selected as the communication media between remote control and the receiver section. System modelling is done with the help of MATLAB simulation tool. A comparative study for PID controller without optimization and with optimizing algorithms (Genetic algorithm and Particle swarm optimization algorithm) is carried out. PSO-PID is found to be the best suited algorithm to control the designed system.

Light intensity of bulb is measured by using LDR. The temperature/humidity sensor is used to measure the temperature and the humidity level of the room. Sensors are calibrated and tested with the help of standard instruments. To calibrate the temperature/humidity sensor Psychometer and for LDR digital Lux meter is used.

The major outcome of the research is a low cost, energy efficient, intelligent system with a generic optimization algorithm to control the ambient conditions of the room. Experimental results show that by using PSO-PID controller, the power saving for heater is 14.88%, for the exhaust fan it is 36.9% and for the bulb it is 37.49% with respect to the conventional appliances.