



A Neural Network base control for A Glycol & Water Chiller Plant

Investigator: Hathaithep Wongsuvan

This research work focuses on the use of artificial neural networks (ANNs) for the identification and control of non-linear dynamic systems. ANNs have been proposed by information and neural scientists as results of their studies in mechanisms and structures of human brains. This has led to development of new computational models, based on this biological background, for solving complex problems like pattern recognition, fast information processing, learning and adaptation.

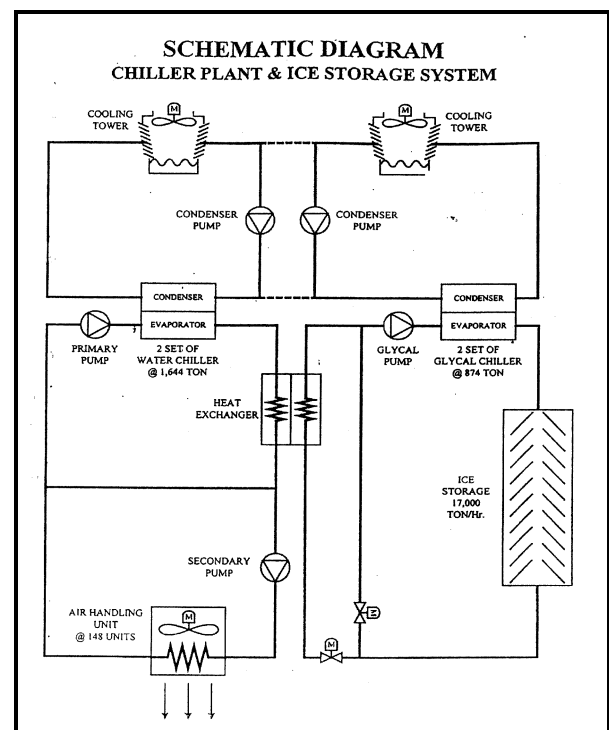
This research shows how a neural network can control a chiller plant at the headquarter of Siam Commercial Bank (SCB). This chiller plant is consisted of two glycol & water chillers. This plant has non-linear dynamic characteristic due to the outside air temperature and humidity. Ambient air periodically changes from day to night and from season to season. In addition, there is non-linearities in valves and actuators within the plant such as pumps, modulates valves.

The objectires of this research is to minimize energy cost while maintaining high performance of plant. In developing this algorithm for achieving objectives, the first step is to plant modeling or plant emulation. Typically, the plant has many inputs (such as entering chilled water temperature, return chilled water temperature, flow rate etc.) and many output parameters (such as on/off pump, on/off valve, on/off cooling tower, rating of controlling chiller etc.) The attached picture indicates a schematic diagram of the chiller plant & ice storage systems. Adaptive neural network is used to model an unknown plant

and to learn the plant dynamics from historical data.

Once the plant emulator converges, it can be subsequently used to train neural-net controllers. After the network is trained, a search will be performed over the neural network input space to find a formulation that optimizes the network.

Neural network applications are growing rapidly. Before the turn of the century, we can reasonably expect to see neural networks become a household word and a part of everyday life.



Schematic Diagram of Chiller Plant