LERCH BATES
Building Insight

8089 S. Lincoln St.,
Suite 300
Littleton, CO 80122
T 303.795.7956
F 303.797.7109
www.lerchbates.com

PREPARED BY:

Michelle Baratta
Regional Manager
Pacific Southwest Region
31899 Del Obispo, Suite 100
San Juan Capistrano, CA 92675
T 949.487.7203
F 888.603.6676

WHITE PAPERS

Artificial Intelligence

DEFINITIONS:

What Is Artificial Intelligence (A.I.)?:
A.I. is the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines. A.I. is defined as machines that exhibit human like intelligence such as learning, reasoning and solving problems.

What Is Fuzzy Logic?:
Fuzzy Logic and Fuzzy Expert System, Fuzzy Logic is a superset of conventional logic that has been extended to handle the concept of partial truth; that is truth values between "completely true" and "completely false".

OPERATIONAL FUNCTIONS:

Artificial Intelligence (A.I.):
A.I. uses the compilation of statistical traffic data, which is continuously monitored and recorded in pre-set time segments. Using operational demand patterns and parameters such as the number of hall calls per floor, the time taken to answer those call, etc. a data base is formed and the microprocessor is enabled to predict peak traffic demands, etc. before they occur.

A.I. Systems include long term learning functions that record existing traffic patterns in the building and the seeks to predict demand at any given time of day.

Fuzzy Logic:
Traditionally, systems use strict values such as true/false, either/or, etc. Fuzzy Logic applies ambiguities and uncertainties allowing the system to incorporate multiple values such as "true", "not true", etc. Use of this process is considered a statistical prediction method that can be used in a variety of instances. Prediction of passenger arrivals, peak periods, car calls, traffic trends, etc. is possible.

Fuzzy Logic takes truth values that are graded between completely true and completely false. An If this then that guessing game allowing dispatch strategies and car assignment to change rapidly.

Together:
A.I. systems include long term learning functions and Fuzzy Logic rule sets that use a short term learning function of predicted traffic patterns. The new systems are generally composed of Fuzzy Logic circuits or histogram profiles of the building traffic kept on a hard disk. The latest Fuzzy logic employs neural network Fuzzy Logic or genetic algorithms.

October 1, 2003

LERCH BATES

Building Insight

8089 S. Lincoln St.,
Suite 300
Littleton, CO 80122
T 303.795.7956
F 303.797.7109
www.lerchbates.com

Michelle Baratta
Regional Manager
Pacific Southwest Region
31899 Del Obispo, Suite 100
San Juan Capistrano, CA 92675
T 949.487.7203
F 888.603.6676

HOW IT DIFFERS FROM THE MICROPROCESSOR OPERATION:

Artifical Intelligence:
The microprocessor controller with A.I. offers improvement in its dispatching capabilities by learning to do intelligent dispatching. The controller remembers past experiences and applies them to current decisions. The system can learn patterns of activity in buildings and allow system to anticipate activity and respond more efficiently. The system can make better dispatching system decisions than the conventional system.

Fuzzy Logic:
Classic control theory such as used in microprocessor controls applies rigid mathematical models to model the system's operation. Fuzzy Logic controls replaces the role of the mathematical model with another that is built from a number of smaller rules that in general only describe a small section of the whole system. The process is one of inference binding them together to produce the desired outputs.

Together:
A.I. and Fuzzy Logic are like selecting a slightly darker or lighter doneness with your toast. A.I. can provide a response that is more than just well done or light. It has sophistication to make subtle changes and reactions based on evaluation.

AI and Fuzzy logic employs memory to stage elevators where the system next thinks action will occur. The best car is dispatched rather than the closest one. Numerous parameters are viewed before making decisions.

Microprocessor controllers with these features offer further improvement in their dispatching capabilities by learning to do intelligent dispatching; it remembers past experiences and applies them to current decisions.

WHAT BENEFITS DOES A.I. AND FUZZY LOGIC PROVIDE:

The use of A.I. and Fuzzy Logic enables the system to assign hall calls to elevators while handling constantly changing parameters. By incorporating this information and providing features such as "smart parking/zoning" etc. the elevator system provides improvements in passenger service and comfort.

With A.I. and Fuzzy Logic the system can then dispatch elevators to meet those needs even before the calls have been registered. As patterns and demands change, the data stored is revised as is the dispatching based on the A.I. of the system.

The primary benefit derived from using A.I. and Fuzzy Logic is to mitigate the number of excessively long hall calls.

A.I. and Fuzzy Logic are most beneficial in limiting excessively long hall calls. These systems are useful in handling two way traffic during lunch hours, etc. and in buildings where interfloor traffic demands are expected.

In conclusion, the benefits for A.I. and Fuzzy Logic seem clear for buildings with inter-floor traffic and heavy two way peaks.