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Fuzzy Logic Systems

Fuzzy Logic was conceived as a better method for sorting and handling data but has proven to be an excellent choice for many control system applications since it mimics human control logic. It can be built into anything from small, hand-held products to large computerized process control systems. It uses an imprecise but very descriptive language to deal with input data more like a human operator. It is very robust and forgiving of operator and data input and often works when first implemented with little or no tuning.

Fuzzy logic deals with uncertainty in engineering by attaching degrees of certainty to the answer to a logical question. Why should this be useful? The answer is commercial and practical. Commercially, fuzzy logic has been used with great success to control machines and consumer products. In the right applications fuzzy logic systems are simple to design, and can be understood and implemented by non-specialists in control theory.

In most cases someone with an intermediate technical background can design a fuzzy logic controller. The control system will not be optimal but it can be acceptable. Control engineers also use it in applications where the on-board computing is very limited and adequate control is enough. Fuzzy logic is not the answer to all technical problems, but for control problems where simplicity and speed of implementation is important then fuzzy logic is a strong candidate. A cross section of applications that have successfully used fuzzy control includes:

Environmental Control

- Air Conditioners • Humidifiers

Domestic Goods

- Washing Machines/Dryers • Vacuum Cleaners
- Toasters • Microwave Ovens
- Refrigerators

Consumer Electronics

- Television • Photocopiers
- Still and Video Cameras – Auto-focus, Exposure and Anti-Shake
- Hi-Fi Systems

Automotive Systems

- Vehicle Climate Control • Automatic Gearboxes
- Four – Wheel Steering • Seat/Mirror Control Systems

This is an impressive list, and gives an idea of the key application areas. In general you will not find a fuzzy controller in a safety critical application, unless the practical and theoretical performance has been completely studied.