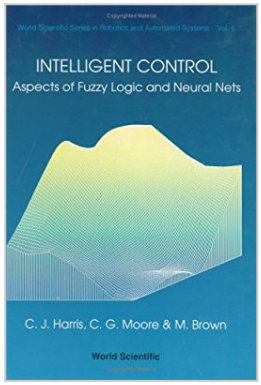

Intelligent Control: Aspects of Fuzzy Logic and Neural Nets (World Scientific Series in Robotics and Automated Systems)

By Christopher J Harris, Tom Husband, M Brown

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With increasing demands for high precision autonomous control over wide operating envelopes, conventional control engineering approaches are unable to adequately deal with system complexity, nonlinearities, spatial and temporal parameter variations, and with uncertainty. Intelligent Control or self-organising/learning control is a new emerging discipline that is designed to deal with problems. Rather than being model based, it is experiential based. Intelligent Control is the amalgam of the disciplines of Artificial Intelligence, Systems Theory and Operations Research. It uses most recent experiences or evidence to improve its performance through a variety of learning schemas, that for practical implementation must demonstrate rapid learning convergence, be temporally stable, be robust to parameter changes and internal and external disturbances. It is shown in this book that a wide class of fuzzy logic and neural net based learning algorithms satisfy these conditions. It is demonstrated that this class of intelligent controllers is based upon a fixed nonlinear mapping of the input (sensor) vector, followed by an output layer linear mapping with coefficients that are updated by various first order learning laws. Under these conditions self-organising fuzzy logic controllers and neural net controllers have common learning attributes.A theme example of the navigation and control of an autonomous guided vehicle is included throughout, together with a series of bench examples to demonstrate this new theory and its applicability.

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- Sales Rank: #9683753 in Books
- Published on: 1993-03-01
- Original language: English
- Number of items: 1
- Dimensions: 8.75" h x 6.25" w x 1.00" l, .0 pounds
- Binding: Hardcover
- 400 pages

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