

Panel on Fuzzy Logic Control Present, Future, and New Directions

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Abstract—This panel will discuss the present, challenges, future and new directions of Fuzzy Logic Control (FLC). The panel membership includes FLC pioneers as well as leading researchers from industry and academia.

I. INTRODUCTION

Fuzzy control is regarded as the most widely used application of fuzzy logic. A Fuzzy Logic Controller (FLC) is credited with being an adequate methodology for designing robust controllers that are able to deliver a satisfactory performance in face of uncertainty and imprecision. In addition, a FLC provides a method to construct controller algorithms in a user-friendly way closer to human thinking and perception which can reduce the controller development time. FLCs have given a satisfactory performance similar (or even better) to the human operators and have successfully outperformed the traditional control systems.

Since fuzzy control is a relatively new technology, it is often quite important to determine what value it has relative to conventional methods. Most work in fuzzy control has focused only on its advantages and has not taken a critical look at what possible disadvantages there could be to using it.

FLCs have been applied with great success to many real world applications where the first FLC was developed in the United Kingdom in 1974 by Mamdani and Assilian for controlling a steam generator. In 1976, Blue Circle Cement and SIRA in Denmark developed a cement kiln controller which was the first industrial application of fuzzy logic and the system went into operation in 1982. Since then and in the last thirty years FLCs have been applied in a big number of applications ranging from home appliances to heavy industries to space and defense applications.

The phenomenal success of fuzzy control, with Japanese applications to consumer product, was a surprise even to Lotfi Zadeh.

In the 1980s, Japanese researchers became interested with the successful applications of fuzzy logic in Europe. Also, some very prominent researchers in Japan further developed the theory of it, the most notable of which is Professor

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Michio Sugeno. This started many research and development efforts in the area. Professor Sugeno suggested that Asian cultures are more comfortable with uncertainty and ambiguity than are Western cultures.

II. PANEL THEME AND PURPOSE

This panel session will provide a platform for researchers and practitioners to discuss important issues with panelist concerning the past, present, challenges, future and new directions of fuzzy control. The panel will start by reviewing the success of the FLC over the previous thirty years.

The panel will also focus on the major theoretical and practical challenges facing the FLCs and wither the industrial interest in FLCs is diminishing after the great boom in last thirty years.

The panel will then discuss and debate the future and new directions in FLC research which include new areas like hybrid FLCs, type-2 FLCs and others.

III. THE PANEL TIMELINESS

After more than thirty years from the emergence of the FLC by Mamdani in UK in 1974 and now given that FUZZ-IEEE is taking place in UK for the first time, it is a great opportunity to debate and discuss the success, challenges, new directions and future of fuzzy control.

IV. THE PANELISTS

- Professor Ebrahim Mamdani, Imperial College, University of London, UK.
- Professor Michio Sugeno, Faculty of Culture and Information Science, Doshisha University, Japan.
- Professor Piero Bonissone, General Electric, USA.
- Dr. Hiroshi Nakajima, OMRON Corporation, Control Technology Laboratory, Japan.
- Dr. Dimitar Filev, Ford Motor Company, USA.
- Professor Reza Langari, Department of Mechanical Engineering, Texas A&M University.
- Professor Gary Feng, City University of Hong Kong, Hong Kong.
- Professor Jan Jantzen, Technical University of Denmark, Denmark.
- Professor Hans Geering, Measurement and Control Laboratory, Swiss Federal Institute of Technology (ETH), Switzerland.
- Professor Kazuo Tanaka, University of Electro-Communications, Tokyo, Japan.