Madan Gupta
A Fuzzy Pioneer
1936-2021

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1. Madan Gupta – A Pioneer

- Madan Gupta was one of the pioneers of *fuzzy logic* – research area that transforms:

  - expert knowledge formulated by using imprecise ("fuzzy") words from natural language like "small"

  - into precise computer-understandable numerical terms.

- His 1991 book on fuzzy arithmetic was the world's first monograph on this topic: many of us still have (and use) our copies of this book.

- He was also one of the pioneers of *neural networks* – research area that simulates biological brains.

- He also pioneered the area of *fuzzy neural networks*, a research area that combines both fuzzy and neural techniques.

2. Madan Gupta – A Leader

- Madan Gupta was one of the founders of the international fuzzy organizations:
    - International Fuzzy Systems Association (IFSA),
    - North American Fuzzy Information Processing Society (NAFIPS), and
    - Canadian Fuzzy Society.
- He actively participated in all international fuzzy conferences.
- This is where I first met him in person – at NAFIPS'92 in Puerto Vallarta, Mexico.
- At all conferences, he gave very interesting talks about his results and his innovative ideas.
- He always encouraged all of us to solve challenging problems – and his enthusiasm was contagious.

3. Dr. Gupta Loved Challenging Applications

- Here is an impressive list of some of his application areas.

- He developed many new effective *control* algorithms, with a special emphasis on robustness.

- He used his algorithms in *robotics*:
    - to enhance robotic vision;
    - to control robotic arms;
    - to control autonomous aerial, ground, and underwater vehicles – in particular, caravans of autonomous cars and flocks of drones;
    - to design and control resilient – in particular, self-reconfiguring – robots.

- He used his algorithms in *engineering*, to detect anomalies in mechanical equipment.

4. Challenging Applications (cont-d)

- He used his algorithms in *medicine*:

  - to better process ultrasound and X-ray images,
  - to better analyze electrocardiograms, and
  - to make better clinical decisions.

- He applied his algorithms to *clothing design.*

- He applied his algorithm to *economics*, to get a more adequate description of poverty and richness.

- He came up with new ideas of *group decision making* in general.

- It is not easy to come up with an area of human endeavor where he did not have successful applications.

5.   Madan Gupta: 1936-2021

We miss him
We miss his research ideas.
We miss his enthusiasm.
We miss his friendliness and willing to help.
Let him rest in peace.