

**Dr. Michel TROUBLE**  
born february 9th,1935  
French

**Education :**

- PhD, Orsay University, 1963  
scientific field : spectrographie soft X ray.
- M.S. in Nuclear Physic,1962.
- Engineer diploma Ecole Supérieure d'Electricité (ESE)  
Paris 1958.

**Experience :**

- <> PY-Automation, since 2005
  - Research director : robotics, artificial Intelligence
  
- <> Framatome, since 1974
  - *At the Robotic Systems Division, 1988 to 2000*
    - Experience in nuclear services:
      - W P Responsible in European project Teleman ANB (intervention on nuclear site), dealing with perception processing (US sensors, multi-sensor fusion); 1990 to 2000
      - Experience in information processing
        - . Responsible of the perception unit of the mobile autonomous robot RAMI-NA (pattern recognition, absolute and relative localization, US physic modelization); 1988 to date.
        - . WP Responsible in Martha project (multi-robot navigation for transport applications), dealing with perception and localization units (laser and radar sensors, multi-sensor fusion, GPS localization); 1993 to date.
        - . Responsible of the vision unit (scanning laser sensors, pattern recognition, 3D localization) of a handling system for containers and SWAP-bodies (SNCF).
          - Chairman of the “Neural Network” Club of the ECRIN Association (Exchange and Cooperation between Research industries- CNRS); 1992 to date.
          - Referee/Expert for ESPRIT Basic Research (CEC); 1993 to 2000.
  
  - *At the Department for Advanced Research, 1981 to 1988*
    - Deputy Director of an A.I research group (CNRS cooperation, LIRMM laboratory); 1985 to 1986.
    - Responsible of the R/D program for Artificial Intelligence and Advanced Information Processing:
      - > Development of a correlation method through Learning process of data (Statistico-Syntaxique method) on the interaction between uranium oxyde pellet and tube sheet in nuclear fuel element of a PWR reactor.
      - > Inventor (International Patent) of a nuclear power plant piloting process using “simulated annealing” technique (multi-parametric optimisation); 1987.
      - > Development of a core D.N.B. control process (ebullition crisis) of a PWR reactor, using Neural Net techniques.

- > Development of a vision-based system for automatic diagnosis of damaged tapped-hole in nuclear vessel (3d thread defect recognition associated with an expert system).
- *At the Technical Direction, 1974 to 1981*
  - Responsible for the development of advanced automatic process control and experimental T/H loops of a PWR reactor (steam generator and primary circuit studies)
  
- <> National Center of Space Studies (CNES), 1963 to 1974
  - *At the Spacecraft Department*
    - Project Manager of the meteorological spacecraft “Eole” (NASA/CNES cooperation).
    - Responsible of the “HEAOB” Scientific Program for the study of cosmic rays (NASA/CNES cooperation).

**Miscellaneous :**

- Doctoral Thesis.
- Scientific direction of a Dr. Ing. thesis in the A.I. field (symbolic learning); participation at 3 doctoral committees, 1983 to 1988.
- Patent for PWR control, 1987.
- Scientific direction of a Doctoral thesis (Industrial co-direction) in the Environmental Object Recognition field, 1991 to date.