Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Cherouat | Given names : Abel

Status (prof., assistant prof., …) : Prof.

Laboratory : UR-GAMMA3 | Website address : https://recherche.utt.fr/gamma-3-projects

Institution : UTT | Website address : www.utt.fr

Scientific competence of the supervisor:

Abel CHEROUAT obtained a Habilitation to Supervise Research from UTC in 2002. Since 2003, he has been a University Professor at UTT. His research focuses on innovative materials, mechanical modelling, manufacturing processes simulation. The approaches developed combine mathematical model and numerical simulation methods associated with adaptive remeshing techniques in order to identify, optimize, and simulte multiphysical problems. He has supervised 33 doctoral theses. He is the author and co-author of + 3 books and + 200 published articles.

Two major publications in the field proposed for the PhD :

1. Study on Ammonia Concentration Prediction Model of Pigsty Based on LTSM Neural Network, DOI: 10.36347/sjavs.2022.v09i07.001
2. Lai, W.-I.; Chen, Y.-Y.; Sun, J.-H. Ensemble Machine Learning Model for Accurate Air Pollution Detection Using Commercial Gas Sensors. Sensors 2022, 22, 4393. https://doi.org/10.3390/s22124393

Website address of the personal page :

Supervisor's email : abel.cherouat@utt.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** II-5;

Title : Ammonia Gas Detection in Agricultural Environments Using Numerical Model

Subject :

Ammonia (NH_3) is a critical gas in agriculture, affecting livestock health, soil quality, and environmental sustainability. Its presence in farm environments, particularly in corn and chicken farms, necessitates efficient monitoring and control methods to mitigate these risks.While Metal Oxide and electronic nose sensors are widely employed in precision agriculture for gas detection, they suffer from limitations such as cross-sensitivity, response delays, and sensitivity to environmental factors like temperature and humidity. Developing a numerical model for ammonia detection depends on the detection method, environmental conditions, and the physical or chemical sensors used.
This project aims to develop a dynamic control model to accurately model ammonia gas concentrations below 5 ppm in dynamic agricultural environments. And to design an optimal control model to enhance the performance of MOX gas sensors by improving response time, voltage output, and gas concentration accuracy. This research aims to address key challenges through innovative mathematical modeling and control strategies. By improving the accuracy and responsiveness of MOX sensors, the proposed solution aligns with EU environmental objectives.

Keywords :

Modeling; FEA, Signal processing, Model Prediction, Sensors

Expected collaborations :

Agricultural Environments, Safety Monitoring, Carbone Emision

Background required from the applicant :

Python or Matlab knowledge, Solid backround of Mathematics and Modelling, Signal processing

Existence of a PDF file detailing the proposal ("yes" or "no") : NO

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