

Introduction & Research

Mauro Sebastián Innocente

PhD, MSc, MEng, FHEA

Senior Lecturer in Aerospace Engineering

Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)

Research Institute for Future Transport and Cities (IFTC), Coventry University

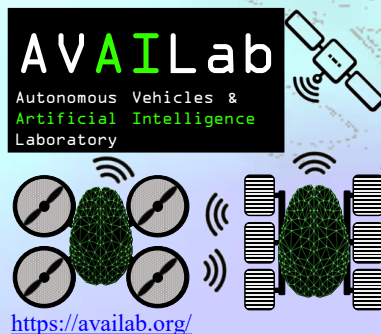
7th Floor Friars House, Manor House Drive,

Coventry CV1 2TE, United Kingdom

Mauro.S.Innocente@coventry.ac.uk | Mauro.S.Innocente@gmail.com

<https://pureportal.coventry.ac.uk/en/persons/mauro-innocente>

<https://msinnocente.com/>



Research Institute
Future Transport
and Cities



Mauro Sebastián Innocente

Oct 2020

- Core Education
 - (1996 - 2003) **Degree in Building & Structural Engineering** (UNNE, Argentina)
 - (2004 - 2006) **MSc in Numerical Methods for Calculus & Design in Engineering** (UPC – CIMNE, Spain)
 - (2006 - 2010) **PhD in Particle Swarm Optimization** (Swansea University, UK)
- Pre-doctoral Employment History
 - (2001 - 2003) **Engineering Assistant** (GINSA SA, Civil Engineering Company, Argentina)
 - (2006 - 2006) **Research Assistant** (AMADE, Universitat de Girona, Spain)
 - (2007 - 2008) **Consultancy** (Civil & Computational Engineering Centre, C²EC, Swansea University, UK)
 - (2010 - 2010) **Research Assistant** (Civil & Computational Engineering Centre, C²EC, Swansea University, UK)
- Post-doctoral Employment History
 - (2010 - 2014) **Research Officer** (ERF-funded ASTUTE project, Swansea University, UK)
 - (2014 - 2015) **Research Associate** (Institute of Energy, Cardiff University, UK)
 - (2015 - 2018) **Lecturer in Aerospace Engineering** (SVeCLab, Centre for Mobility and Transport, Coventry University, UK)
 - (2018 - to-date) **Senior Lecturer in Aerospace Engineering** (AVAILab, IFTC, Coventry University, UK)

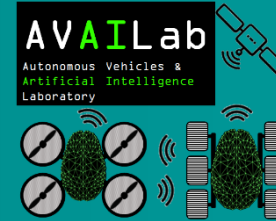
- Institute for Future Transport and Cities (IFTC)
- Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)
- Selected Research Projects
 - Physics-Based Wildfire Propagation Model
 - Swarm of drones self-organised to suppress wildfires
 - Efficiency Enhancement of Class-A Foams by Means of Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires
 - Autonomous AI-Enabled UAVs for Predictive Maintenance
 - Design Optimisation of 2nd Order Converter
 - Optimum Management of Water Flooding in Petroleum Fields
 - Microscopic Traffic Modelling Using Cellular Automata



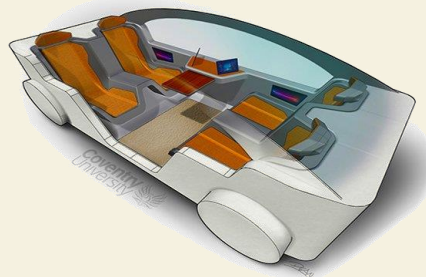
- **Institute for Future Transport and Cities (IFTC)**
- Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)
- Selected Research Projects
 - Physics-Based Wildfire Propagation Model
 - Swarm of drones self-organised to suppress wildfires
 - Efficiency Enhancement of Class-A Foams by Means of Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires
 - Autonomous AI-Enabled UAVs for Predictive Maintenance
 - Design Optimisation of 2nd Order Converter
 - Optimum Management of Water Flooding in Petroleum Fields
 - Microscopic Traffic Modelling Using Cellular Automata



Institute for Future Transport and Cities (IFTC)



- Transport sector going through technological revolution: **Low-carbon & Autonomous Vehicles** agenda creating unprecedented demand for R&D.
- Coventry University has long been associated with the Transport sector.
- **IFTC** brings together expertise across disciplines (e.g. art & design; human factors; engineering; manufacturing; computer systems; and business studies).
- Covering the full spectrum of land, rail, air and water based transport, the **IFTC** addresses the whole innovation chain from design, materials, manufacturing, systems and supply chain, as well as the business environment.



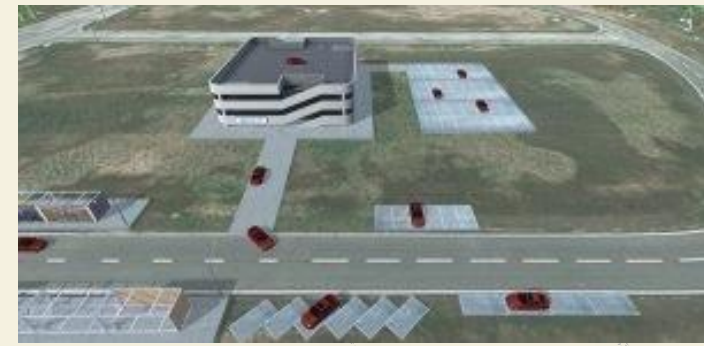
Institute for Future Transport and Cities (IFTC)

- The [IFTC](#) builds on some strategic partnerships with organisations such as [Unipart](#), [Horiba-MIRA](#) and [FEV](#).
- Over **130 research staff** and over **140 PhD researchers**

[Centre for Advanced Low Carbon Propulsion Systems \(C-ALPS\)](#) + [FEV](#)



[Centre for Connected & Autonomous Automotive Research \(CCAAR\)](#) + [Horiba Mira](#) (Collaboration)

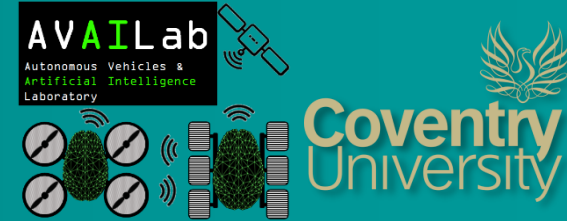


[Institute for Advanced Manufacturing and Engineering \(AME\)](#) + [Unipart](#)



[National Transport Design Centre \(NTDC\)](#)

Institute for Future Transport and Cities (IFTC)

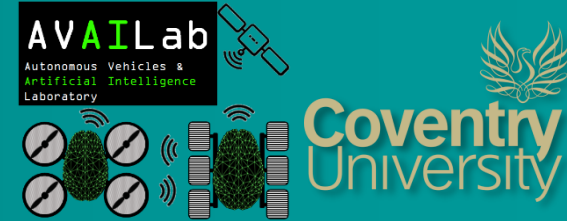


- **CCAAR**: In 2016, Horiba-MIRA and Coventry University opened the CCAAR centre at MIRA's Technology Park in Nuneaton. It was created to provide an environment to simulate, test and evaluate the security and safety of Connected Autonomous Vehicles (CAVs).
- **C-ALPS**: Established to partner with the propulsion system supply chain and accelerate the progression to carbon-zero transport. FEV is a founding partner. It aims to help guide and support cutting-edge academic research through industry collaboration and joint projects.
- **NTDC**: Established to explore new areas of transport design research and find new ways to use existing equipment and cutting-edge technology to create and refine new solutions. It brings together designers, technologists, coders, artists, gamers, material specialists and fashion experts.
- **AME**: Collaboration between Coventry University and Unipart Manufacturing Group. Part-funded by the Higher Education Funding Council for England, it brings together the best in academia, industry and R&D in a 'live' manufacturing environment.
- Within the **IFTC**, I belong with the **Structures, Control & Optimisation** research group.
- Within this group, I am the founder and leader of the **Autonomous Vehicles & Artificial Intelligence Laboratory** (**AVAILab**).

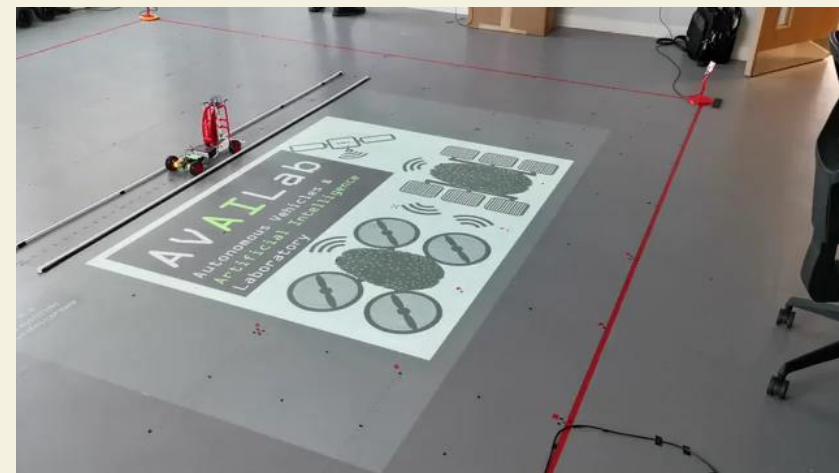
- Institute for Future Transport and Cities (IFTC)
- **Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)**
- Selected Research Projects
 - Physics-Based Wildfire Propagation Model
 - Swarm of drones self-organised to suppress wildfires
 - Efficiency Enhancement of Class-A Foams by Means of Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires
 - Autonomous AI-Enabled UAVs for Predictive Maintenance
 - Design Optimisation of 2nd Order Converter
 - Optimum Management of Water Flooding in Petroleum Fields
 - Microscopic Traffic Modelling Using Cellular Automata



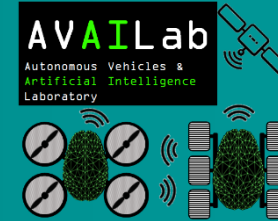
Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)



- Founded in 2016, the [Autonomous Vehicles & Artificial Intelligence Laboratory \(AVAILab\)](#) is a multidisciplinary laboratory within the IFTC.
- While open to a wide spectrum of applications, **AVAILab**'s main motivation is in conducting research and supporting teaching involving:
 - Applied Mathematical Modelling
 - Multidisciplinary Optimisation
 - Soft & Natural Computing
 - Self-Organisation & Swarm Robotics
 - Autonomous Navigation & Positioning Systemswith applications in *Aerospace*, *Automotive* and *Environmental Engineering*.
- At present, 6 PhD students.



Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)



Paolo Grasso – *Dynamics, Control and Cooperative Decision-Making in Swarms of Self-Organising Drones Aimed at Fighting Fires Autonomously.*

Funder: [Coventry University](#) via Centre for Mobility & Transport Studentship

Main Supervisor: [Dr Mauro S. Innocente](#)



Ioannis Papagiannis – *Efficiency Enhancement of Class-A Foams by Means of Metal Oxide Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires.*

Funder: Lloyds Registry Foundation International Consortium of Nanotechnologies ([LRF-ICON](#))

Main Supervisor: [Dr Mauro S. Innocente](#)

Co-Supervisors: [Dr Evangelos Gkanas](#) & [Prof Guillermo Rein](#) (Imperial College)



Jun Jet Tai – *Autonomous Artificial Intelligence Enabled Drones to Inform Predictive Maintenance Actions in the Railways and Roads.*

Funder: [Coventry University](#) via Trailblazers' Award

Main Supervisor: [Dr Mauro S. Innocente](#)

Co-Supervisors: [Dr Thomas Statheros](#) & [Dr Nadjim Horri](#)



Daizy Rajput – *A Model-Based Design Platform to Conjointly Optimise the Performance of the Powertrains and the Associated Energy Management Strategy of the HEVs.*

Funder: [FEV](#) (50%) & [Coventry University](#) via [Institute for Future Transport & Cities](#) (50%)

Main Supervisors: [Dr Mauro S. Innocente](#) & [Dr Arash M. Dizqah](#) (University of Sussex)

Co-Supervisors: [Dr José M. Herreros](#) (University of Birmingham) & [Dr Jeremy Bryans](#)



Osita N. Ugwueze – *An Optimal Recovery Method for Electric VTOL Aircraft Following Total Loss of Thrust.*

Funder: [Coventry University](#) via Computing [NTDC](#) VC Challenge fund

Main Supervisors: [Dr Mauro S. Innocente](#) & [Dr Thomas Statheros](#)

Co-Supervisors: [Dr Nadjim Horri](#) & [Dr Mike Bromfield](#) (University of Birmingham)

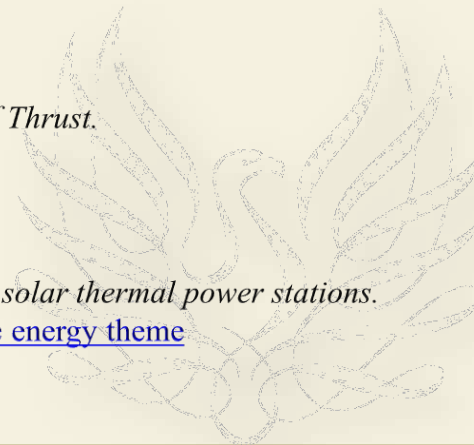


Malambage P. G. Sirimanna – *Developing a mathematical programming tool to design and optimise solar thermal power stations.*

Funder: [Coventry University](#) via [Centre in Fluid and Complex Systems](#) and [Doctoral Training Alliance energy theme](#)

Main Supervisor: [Dr Jonathan Nixon](#)

Co-Supervisors: [Dr Mauro S. Innocente](#) & [Dr Janis Priede](#)



- **Selected External Funding**

- Subcontract Award for project entitled:
“Resilient Connected & Autonomous Vehicles (ResiCAV)”
Funder: [HORIBA MIRA Ltd](#)
fEC: £10,000.
PI: [Dr Hoang Nga Nguyen](#)
Co-Is: [Prof Siraj Shaikh](#), [Dr Jeremy Bryans](#), [Dr Mauro S. Innocente](#)
- 5th LRF-ICON PhD Studentship Award for project entitled:
“Efficiency Enhancement of Class-A Foams by Means of Metal Oxide Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires”
Funder: [LRF International Consortium of Nanotechnologies](#)
fEC: £100,000 (£50,000 award + £50,000 match funding)
PI: [Dr Mauro S. Innocente](#)
Co-Is: [Dr Evangelos Gkanas](#), [Prof Guillermo Rein](#) (Imperial College)
- Early-Career Researchers Grant for project entitled:
“Optimisable system-level thermal models for power electronic converters”
Funder: [EPSRC Centre for Power Electronics](#) (through grant EP/K035304/1)
fEC: £55,000 (fEC for Coventry University: £50,000)
PI: [Dr Daniel J. Rogers](#) (University of Oxford)
Co-I: [Dr Mauro S. Innocente](#)



• Selected Internal Funding

- Research Equipment Grant Scheme for project entitled:
“Electro-Thermal Modelling and HiL Validation Underpinning Design Optimisation of DC-DC Converters”
fEC: £30,000.
PI: [Dr Mauro S. Innocente](#).
- Full International Scholarship for PhD project entitled:
“Autonomous Artificial Intelligence Enabled Drones to Inform Predictive Maintenance Actions in the Railways & Roads”
fEC: £110,000
PI: [Dr Mauro S. Innocente](#)
- Pump Prime Grant Scheme for project entitled:
“Self-Organising Swarm of Autonomous Fire-Fighting Quadcopters Using Small Hardware & Simulated Environments”
fEC: £10,000.
PI: [Dr Mauro S. Innocente](#).
- Full Scholarship for PhD project entitled:
“Dynamics, Control & Cooperative Decision-Making in Swarms of Self-Organising Drones Aimed at Fighting Fires Autonomously”
fEC: £85,000
PI: [Dr Mauro S. Innocente](#)
- Research Equipment Grant Scheme for project entitled:
“A model-based design platform to conjointly optimise powertrains & associated energy management strategy of HEVs”
fEC: £30,000
PI: [Dr Arash Moradinegade](#) Dizqah (University of Sussex)
Co-I: [Dr Mauro S. Innocente](#)



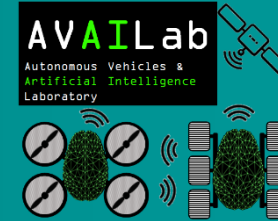
• Selected Publications

- **P. Grasso, & M.S. Innocente** (2020). [Physics-based model of wildfire propagation towards faster-than-real-time simulations](#). Computers and Mathematics with Applications, 80, 790-808. DOI: [10.1016/j.camwa.2020.05.009](#)
- A.M. Dizqah, B.L. Ballard, M.V. Blundell, S. Kanarachos, & **M.S. Innocente** (2020). [A Non-Convex Control Allocation Strategy as Energy-Efficient Torque Distributors for On-Road and Off-Road Vehicles](#). Control Engineering Practice, 95. DOI: [10.1016/j.conengprac.2019.104256](#)
- **P. Grasso, & M.S. Innocente** (2020). [Debiasing of position estimations of UWB-based TDoA indoor positioning system](#). In Proc. of the 2020 UK-RAS Conference: 'Robots into the Real World', Lincoln, UK (virtual), 2020. DOI: [10.31256/Ua2Vp3X](#)
- **P. Grasso, & M.S. Innocente** (2020). [Theoretical study of signal and geometrical properties of two-dimensional UWB-based indoor positioning systems using TDoA](#). In Proceedings of the 6th International Conference on Mechatronics and Robotics Engineering, Barcelona, Spain, 2020. DOI: [10.1109/ICMRE49073.2020.9065121](#)
- **M.S. Innocente, & P. Grasso** (2019). [Self-organising swarms of firefighting drones: Harnessing the power of collective intelligence in decentralised multi-robot systems](#). Journal of Computational Science, 34, 80-101. DOI: [10.1016/j.jocs.2019.04.009](#)
- **P. Grasso, & M.S. Innocente** (2018). [A two-dimensional reaction-advection-diffusion model of the spread of fire in wildlands](#). In Advances in Forest Fire Research 2018 (334-342). Imprensa da Universidade de Coimbra. DOI: [10.14195/978-989-26-16-506_36](#).
- **M.S. Innocente, & P. Grasso** (2018). [Swarm of autonomous drones self-organised to fight the spread of wildfires](#). In Proceedings of the GEOSAFE Workshop on Robust Solutions for Fire Fighting (Vol. 2146), L'Aquila, Italy, 2018. CEUR.
- D. James, **M.S. Innocente**, J. Cherry, D. Carswell, M. Holmes, S. Brown, & N. Lavery (2016). [A Methodology for Automated Pellet size Distribution in a Pellet Mill](#). The Journal of Innovation Impact, 7(2), 732-743.
- H.U. Levatti, **M.S. Innocente**, H.D. Morgan, J. Cherry, N. Lavery, S. Mehmood, ... & J. Sienz (2016). [Computational Methodology for Optimal Design of Additive Layer Manufactured Turbine Bracket](#). The Journal of Innovation Impact, 7(2), 641-652.

• Selected Publications (cont'ed)

- **M.S. Innocente**, S.M.B. Afonso, J. Sienz, et al. (2015). [Particle swarm algorithm with adaptive constraint handling and integrated surrogate model for the management of petroleum fields](#). Applied Soft Computing, 34, 463-484. DOI: [10.1016/j.asoc.2015.05.032](#)
- J. Sienz, & **M.S. Innocente** (2010). [Individual and Social Behaviour in Particle Swarm Optimizers](#). In B. H. V. Topping, J. M. Adam, et al. (Eds.), Developments and Applications in Engineering Computational Technology (pp. 219-243). (Computational Science, Engineering & Technology Series). Stirlingshire: Saxe-Coburg Publications. DOI: [10.4203/csets.26.10](#).
- J. Sienz, & **M.S. Innocente** (2008). [Particle Swarm Optimization: Fundamental Study and its Application to Optimization and to Jetty Scheduling Problems](#). In M. Papadrakakis, & B. H. V. Topping (Eds.), Trends in Eng. Computational Technology (pp. 103-126). (Computational Science, Eng. & Technology Series). Stirlingshire: Saxe-Coburg Publications. DOI: [10.4203/csets.20.6](#).
- **M.S. Innocente**, & P. Grasso (2018). [Proof-of-Concept Swarm of Self-Organising Drones Aimed at Fighting Wildfires](#). In [Proceedings of the 2017 UK-RAS Conference: 'Robots Working for and among Us'](#), pp. 102–105, Bristol, UK, 2017.
- Pelley, C., **M.S. Innocente**, & J. Sienz (2011). [Memetic Particle Swarm for Continuous Unconstrained and Constrained Optimization Problems](#). In Proceedings of the 2011 International Conference on Swarm Intelligence, Cergy, France, 2011.
- **M.S. Innocente**, & J. Sienz (2011). [Particle Swarm Optimization with Inertia Weight and Constriction Factor](#). In Proceedings of the 2011 International Conference on Swarm Intelligence, Cergy, France, 2011.
- **M.S. Innocente**, & J. Sienz (2010). [Coefficients' Settings in Particle Swarm Optimization: Insight and Guidelines](#). In E. Dvorkin, M. Goldschmit, & M. Storti (Eds.), Mecánica Computacional: Computational Intelligence Techniques for Optimization and Data Modeling (B) (Vol. XXIX, pp. 9253-9269). Asociación Argentina de Mecánica Computacional, Buenos Aires, Argentina, 2010.
- **M.S. Innocente**, & J. Sienz (2010). [Pseudo-Adaptive Penalization to Handle Constraints in Particle Swarm Optimizers](#). In B. H. V. Topping, J. M. Adam, F. J. Pallarés, R. Bru, & M. L. Romero (Eds.), In Proceedings of the 10th International Conference on Computational Structures Technology [123] (Civil-Comp Proceedings). Stirlingshire: Saxe-Coburg Publications. DOI: [10.4203/ccp.93.123](#).

Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)



- Small Robots & Indoor Positioning System



20 x Crazyflie 2.0



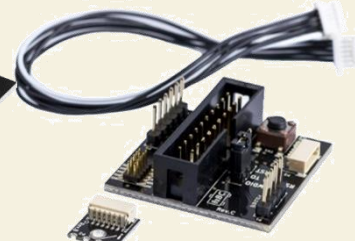
1 x Erle-copter
(Erle-brain 3)



30 x Bitcraze Loco
Positioning Decks



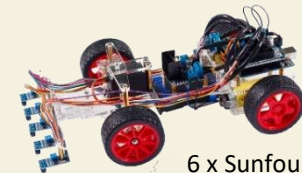
10 x Bitcraze Loco
Positioning Nodes



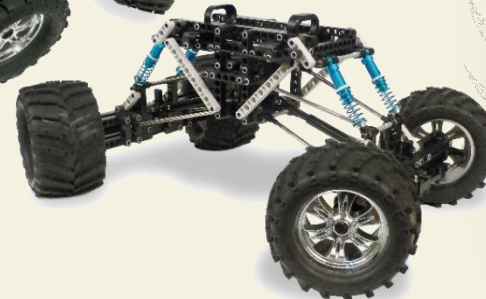
4 x Bitcraze Loco
Position Debug Adapter



4 x Intel® Aero
Ready-to-Fly Drone



6 x Sunfounder Smart
Car Kit for Arduino



5 x RPLIDAR A2M8
360° Laser Scanner

Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)

- HiL Simulation Platform



dSpace Scalexio LabBox Real-Time Simulation Platform

- Power Supply



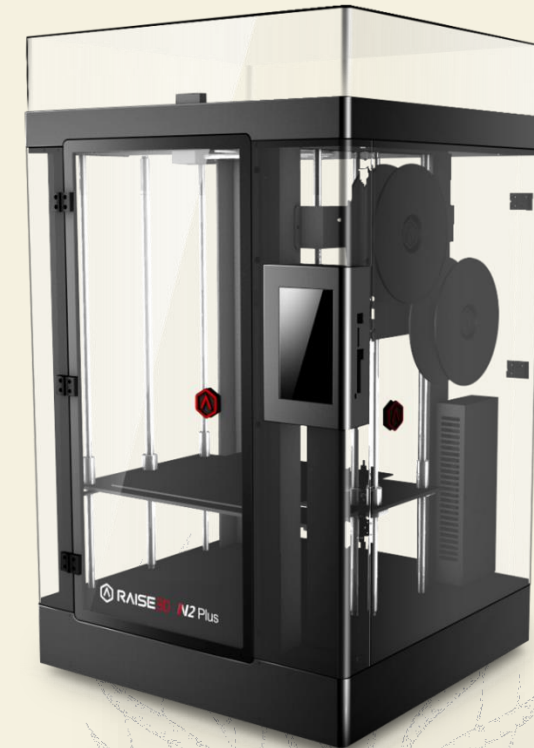
Power Supply Sorensen DLM 600-5E, 3000 W, 0-600 V, 0-5 A

- Thermal Imager



Thermal Imager Testo 890, High temperature (+1200 °C), SuperResolution 1280x960 px

- 3D Printer

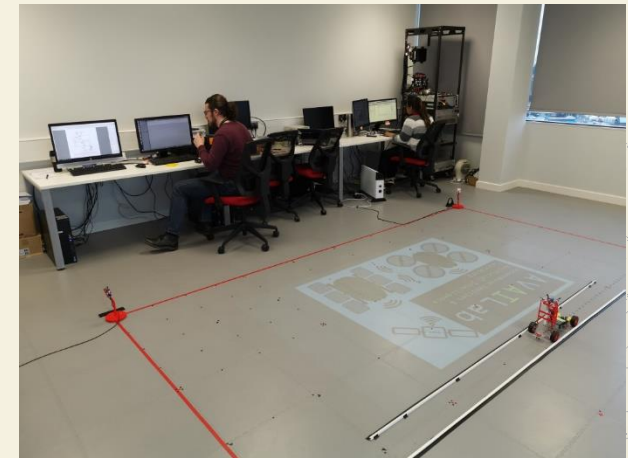
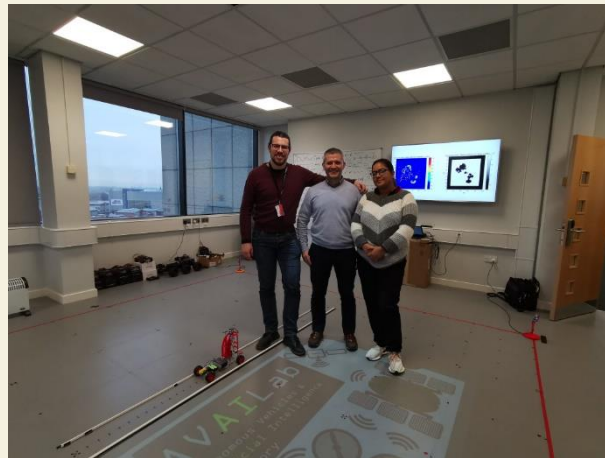
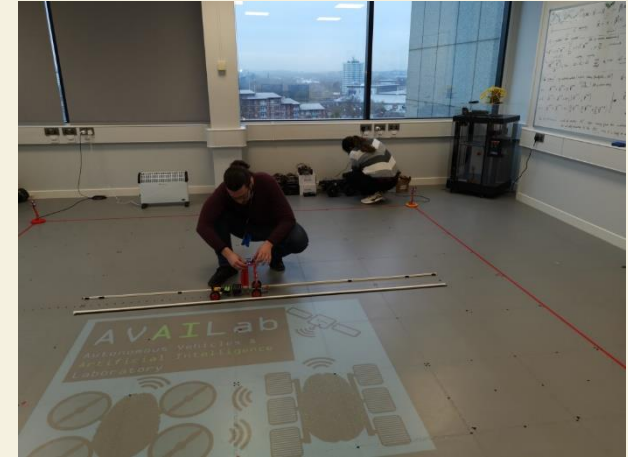
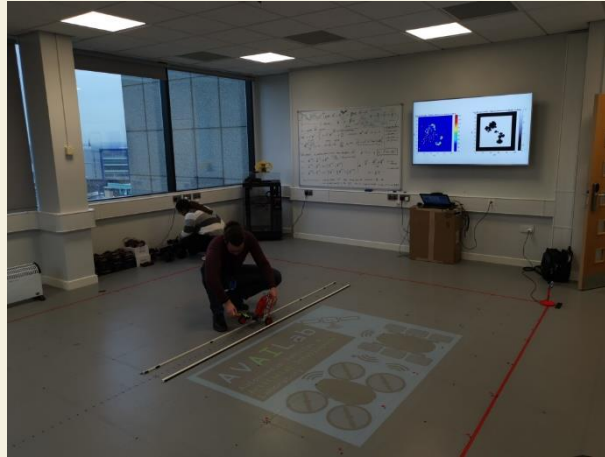


RAISE3D N2 Plus 3D Printer

Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)



- Facilities



- Institute for Future Transport and Cities (IFTC)
- Autonomous Vehicles & Artificial Intelligence Laboratory (AVAILab)
- **Selected Research Projects**
 - Physics-Based Wildfire Propagation Model
 - Swarm of drones self-organised to suppress wildfires
 - Efficiency Enhancement of Class-A Foams by Means of Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires
 - Autonomous AI-Enabled UAVs for Predictive Maintenance
 - Design Optimisation of 2nd Order Converter
 - Optimum Management of Water Flooding in Petroleum Fields
 - Microscopic Traffic Modelling Using Cellular Automata



Selected Research Projects

- Fire Propagation Modelling (FireProM) (*Coventry University funded*)
- Self-Organising Swarms of Firefighting UAVs (*Coventry University funded*)
- Efficiency Enhancement of Class-A Foams by Means of Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires (*LRF-ICON funded*)
- Autonomous AI-Enabled UAVs for Predictive Maintenance (*Coventry University funded*)
- Power-Dense Design Optimisation of DC-DC Converters (*EPSRC-CPE funded*)
- Adaptive Surrogate Modelling & Optimisation (ASMO) of Problems Described by Real or Synthetic Data
- An Optimal Recovery Method for Electric VTOL Aircraft Following Total Loss of Thrust
- Model-Based Design Platform to Conjointly Optimise the Performance of Powertrains & Associated Energy Management Strategy of HEVs (*FEV funded*)
- Pilot Research Projects: e.g. 1) *Light-Tracking Drone Fleet*; 2) *Microscopic Traffic Modelling Using Cellular Automata*; 3) *Cellular Automata Based Wildfire Propagation Model*.

Selected Research Projects

Funded by Coventry University via
Centre for Mobility & Transport
Scholarship.

• Physics-Based Wildfire Propagation Model

- Balance of energy.
- Balance of chemical species (consumption due to combustion).

$$\left\{ \begin{array}{l} \rho c_p \frac{\partial T}{\partial t} = \overbrace{-\rho h_c \frac{M}{M_{fuel}} r}^{\text{Combustion}} + \overbrace{k \frac{\partial}{\partial x} \left(\frac{1}{c_p} \frac{\partial (c_p T)}{\partial x} \right) + k \frac{\partial}{\partial y} \left(\frac{1}{c_p} \frac{\partial (c_p T)}{\partial y} \right)}^{\text{Thermal Diffusion}} \\ \quad + \overbrace{k \frac{\partial}{\partial x} \left(\frac{1}{c_p} \frac{\partial h_c}{\partial x} \right) + k \frac{\partial}{\partial y} \left(\frac{1}{c_p} \frac{\partial h_c}{\partial y} \right)}^{\text{Enthalpy Diffusion}} + \overbrace{C_a (T_{amb} - T)}^{\text{Vertical Convection}} \\ \quad + \overbrace{\sigma \epsilon \left[4 \frac{\partial}{\partial x} \left(T^3 \frac{\partial T}{\partial x} \right) dx + 4 \frac{\partial}{\partial y} \left(T^3 \frac{\partial T}{\partial y} \right) dy \right]}^{\text{2D Radiation}} + \overbrace{\sigma \epsilon \left[\frac{T_{amb}^4 - T^4}{dz} \right]}^{\text{Vertical Radiation}} \\ \frac{\partial X_i}{\partial t} = -\frac{\theta_i}{\theta_{fuel}} \frac{M}{M_{fuel}} r \quad ; \quad \text{with } i = 1, \dots, 4 \end{array} \right.$$

Selected Research Projects

- Realistic Scenario: Large scale, towards faster-than-real-time physics-based simulations.

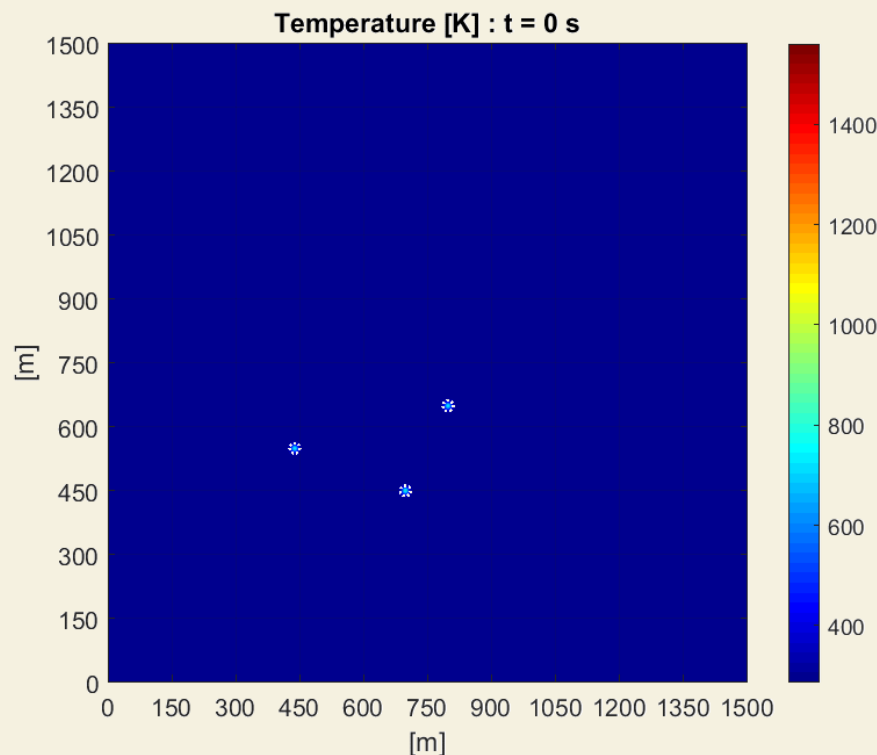


Figure 1. Flaming Area: Temperature distribution evolution after *multiple* ignition of a *realistically* distributed fuel bed (3 hours simulation)

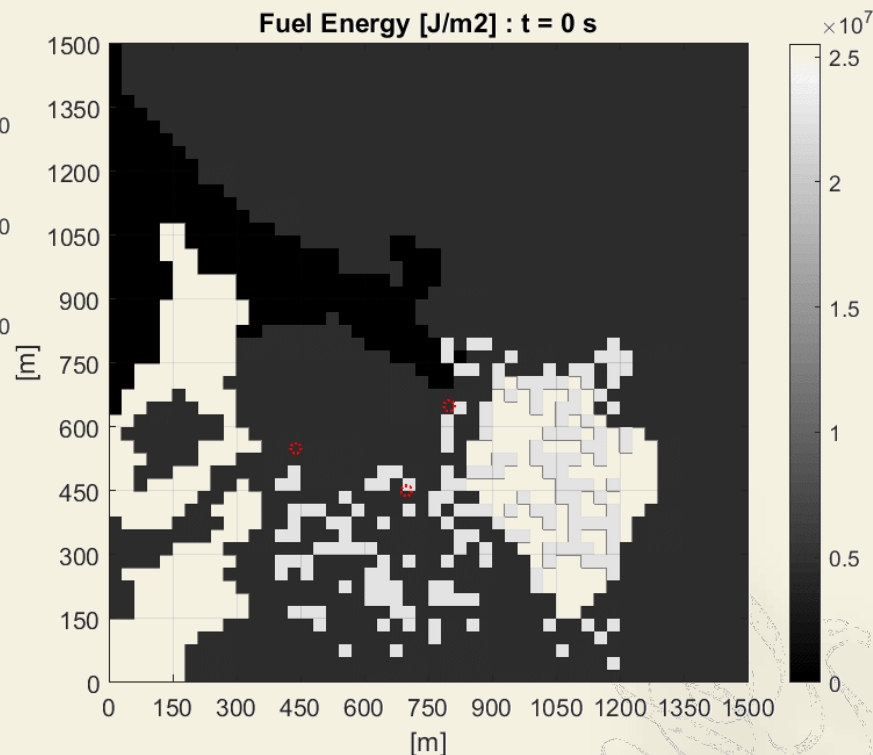


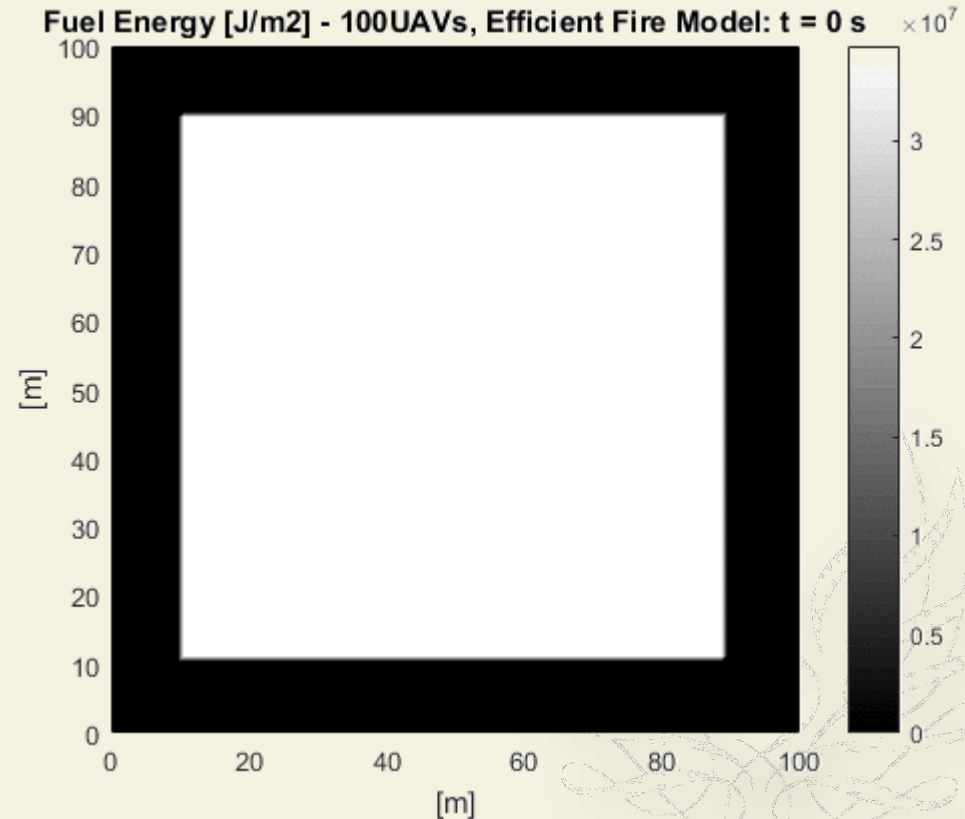
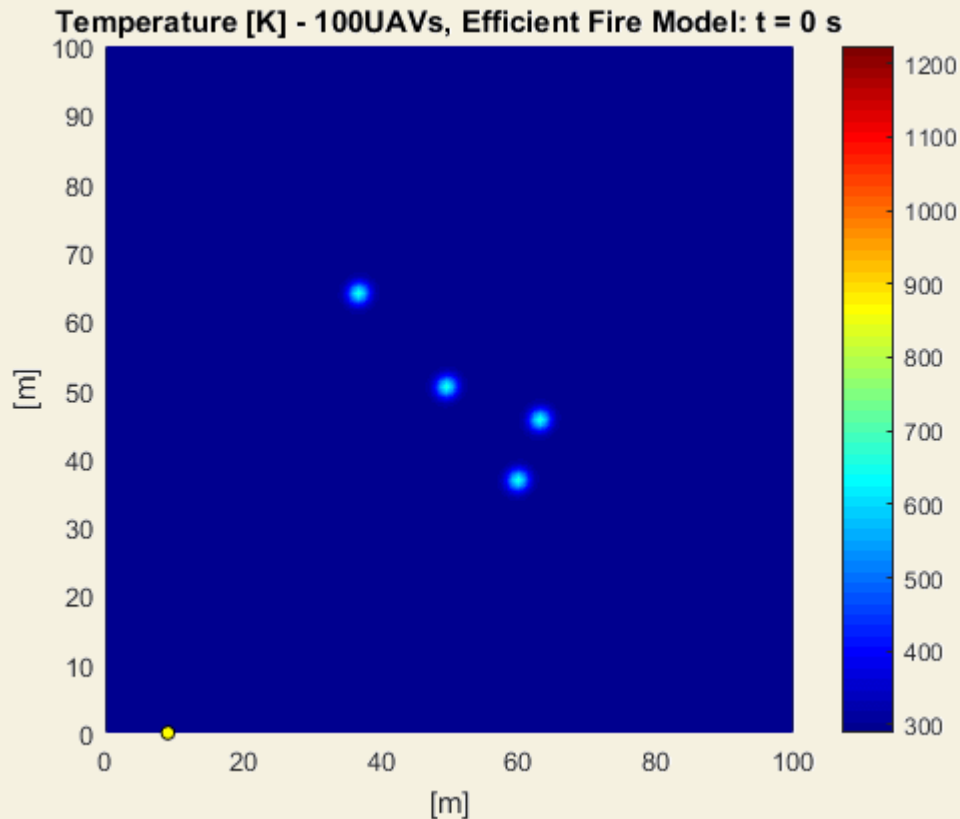
Figure 2. Burnt Area: Distribution of fuel energy (if black means no more fuel available or *natural obstacle* – e.g. a lake)

Selected Research Projects

- **Swarm of drones self-organised to suppress wildfires**

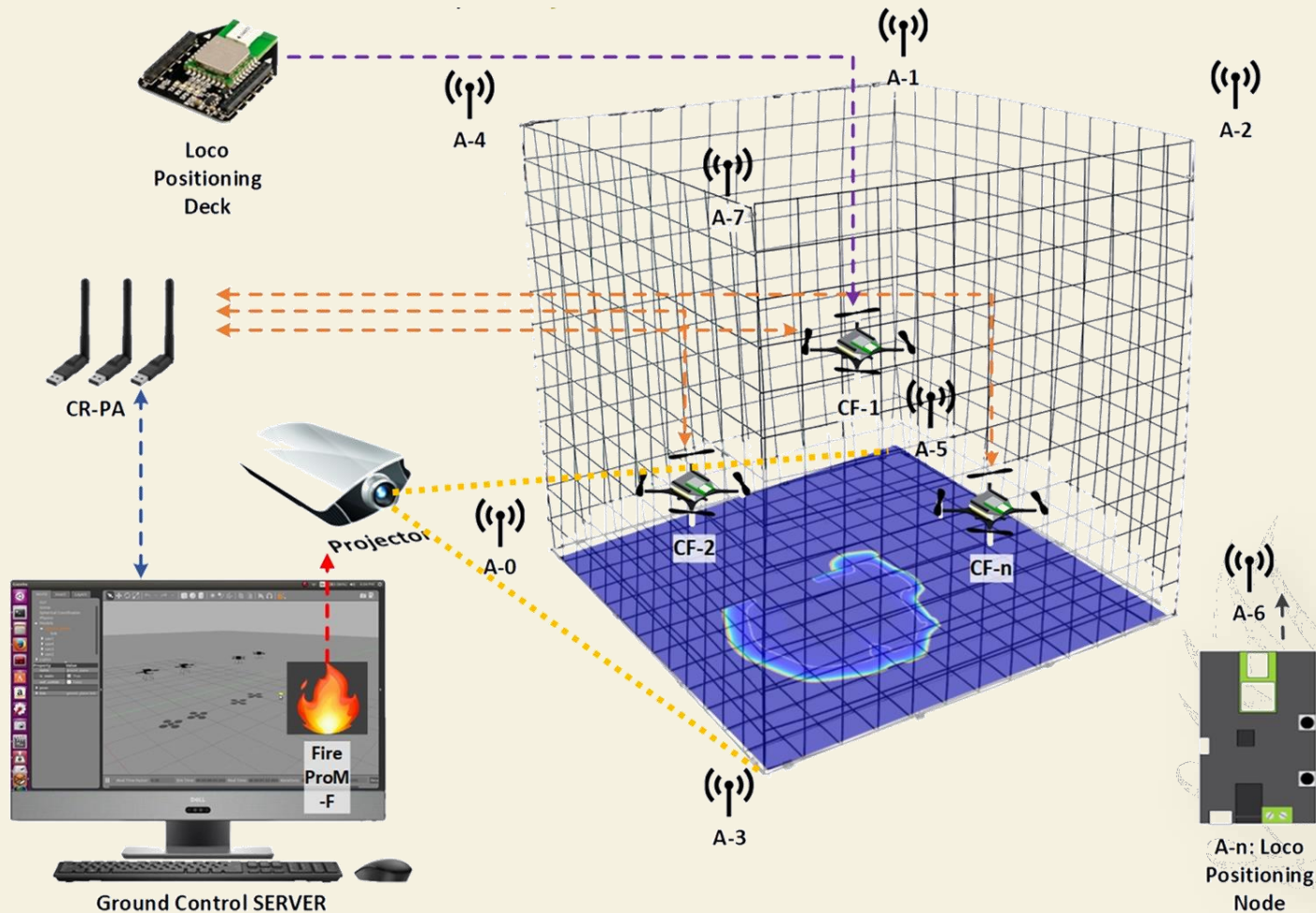
A drone is lost at regular time intervals during firefighting operations.

Funded by Coventry University via
Centre for Mobility & Transport
Scholarship.



Selected Research Projects

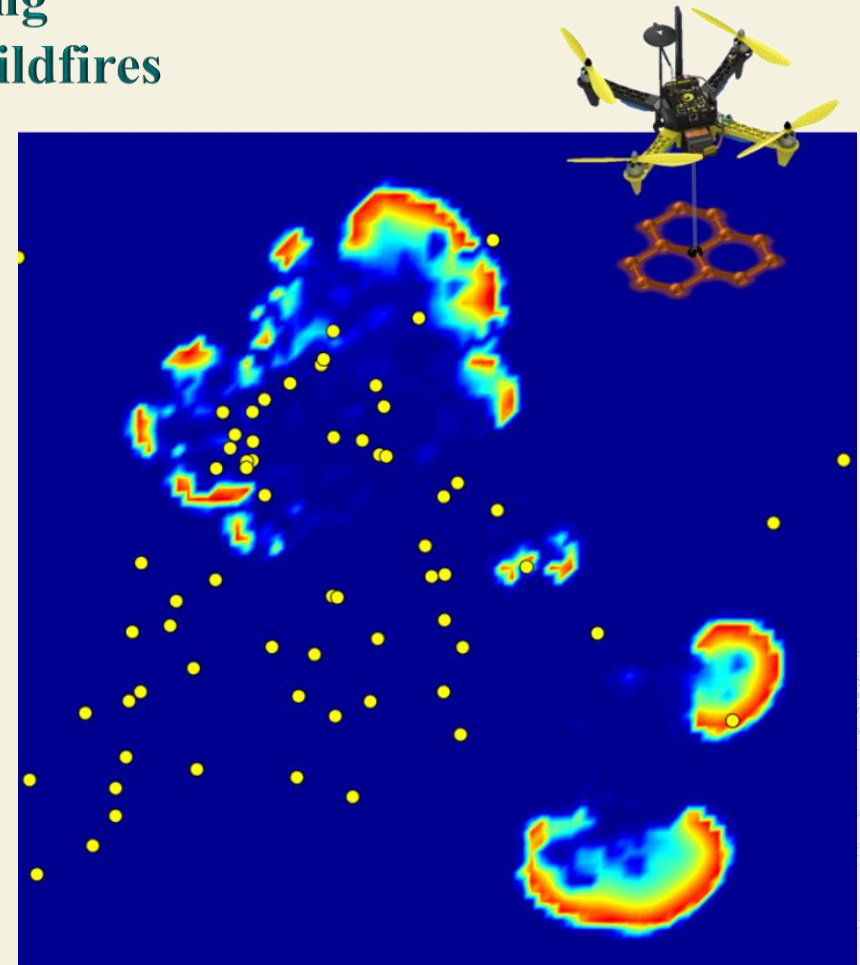
- Swarm-in-the-Loop (SwiL) Test Platform



Selected Research Projects

- **Efficiency Enhancement of Class-A Foams by Means of Nanoparticles for Self-Organising Swarms of Autonomous UAVs to Fight Wildfires**

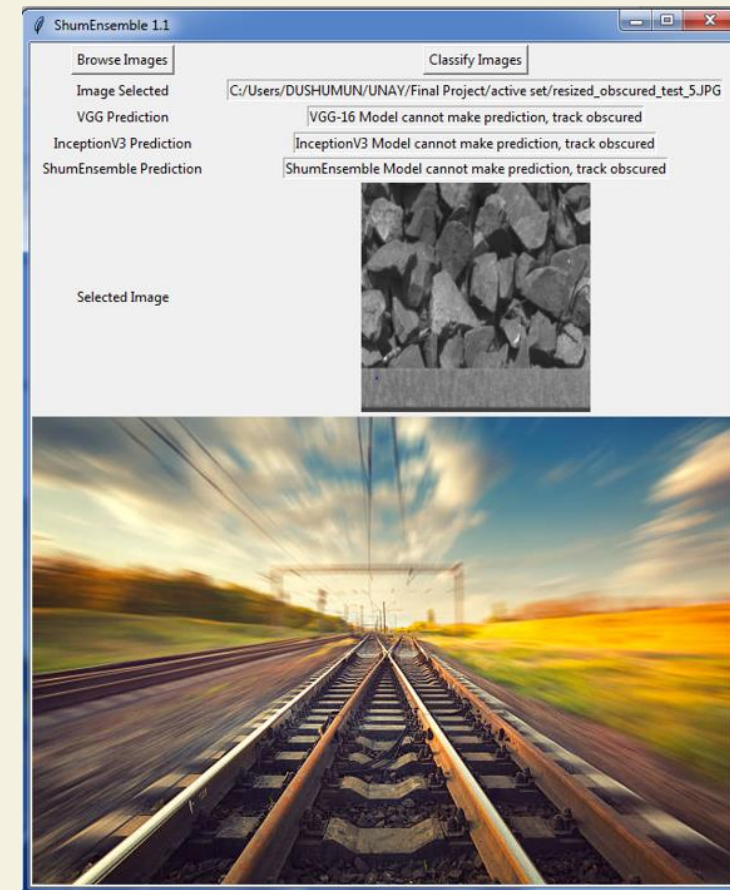
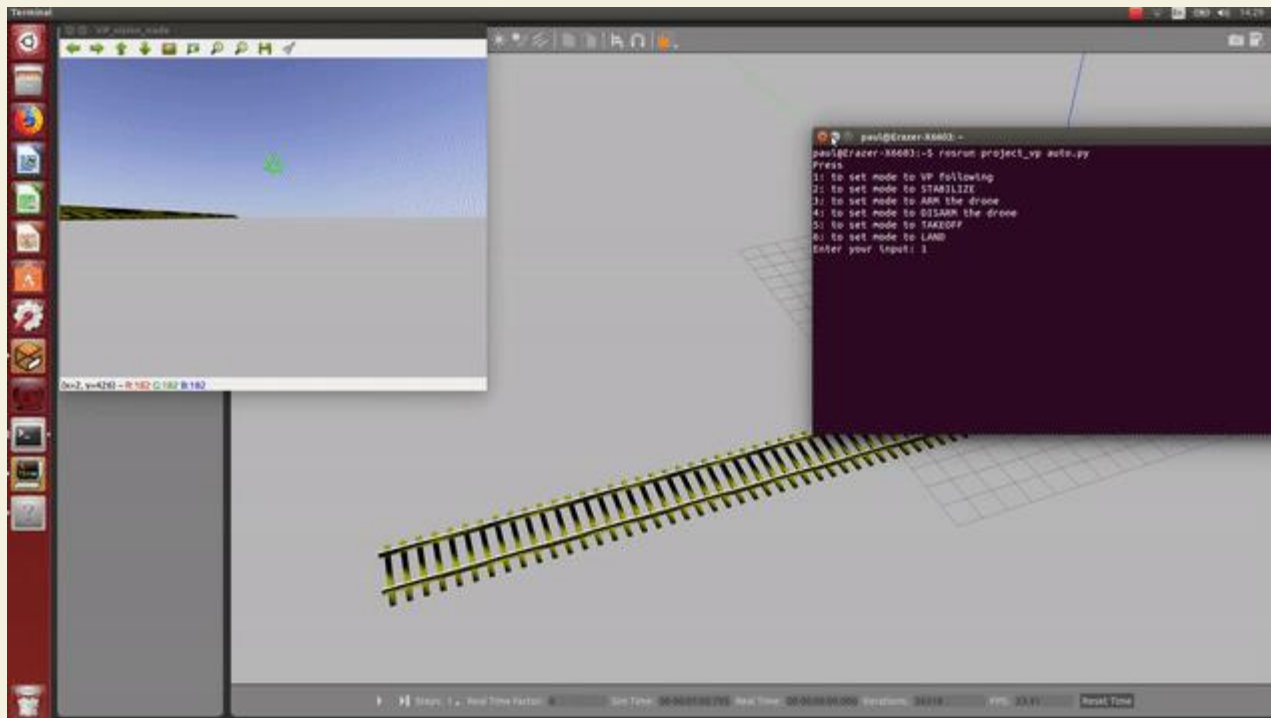
Funded by Lloyds Registry Foundation
via International Consortium of
Nanotechnologies (LRF-ICON).



Selected Research Projects

- **Autonomous AI-Enabled UAVs for Predictive Maintenance in the Railways and Roads**

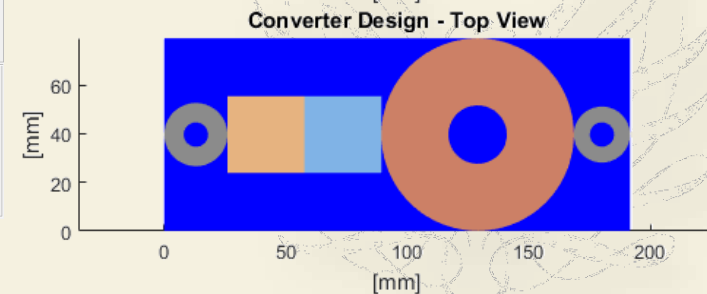
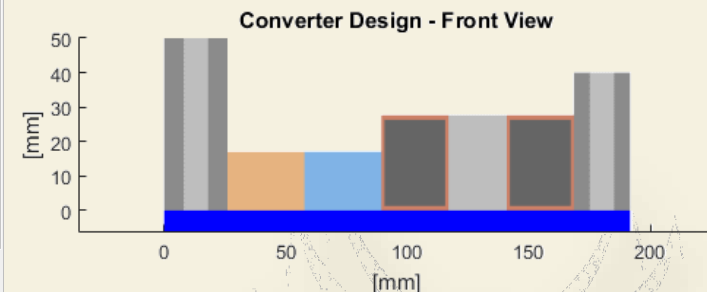
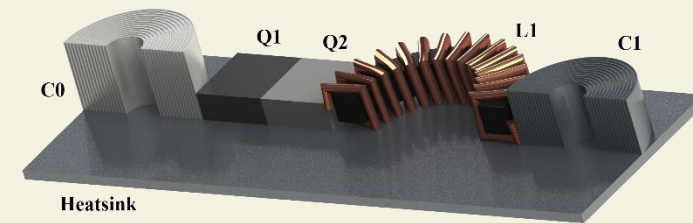
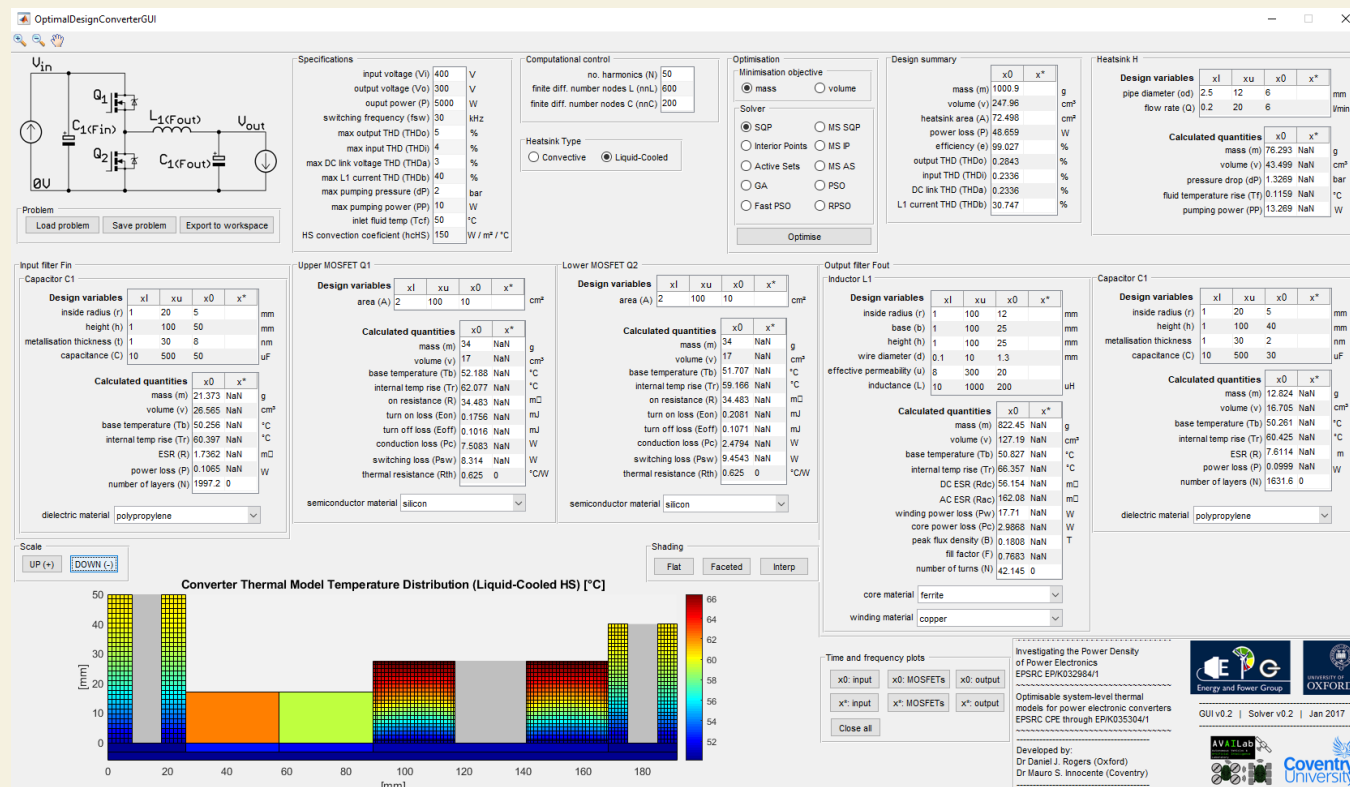
Funded by Coventry University via Trailblazers' Award Scholarship.



Selected Research Projects

• Design Optimisation of 2nd Order Converter

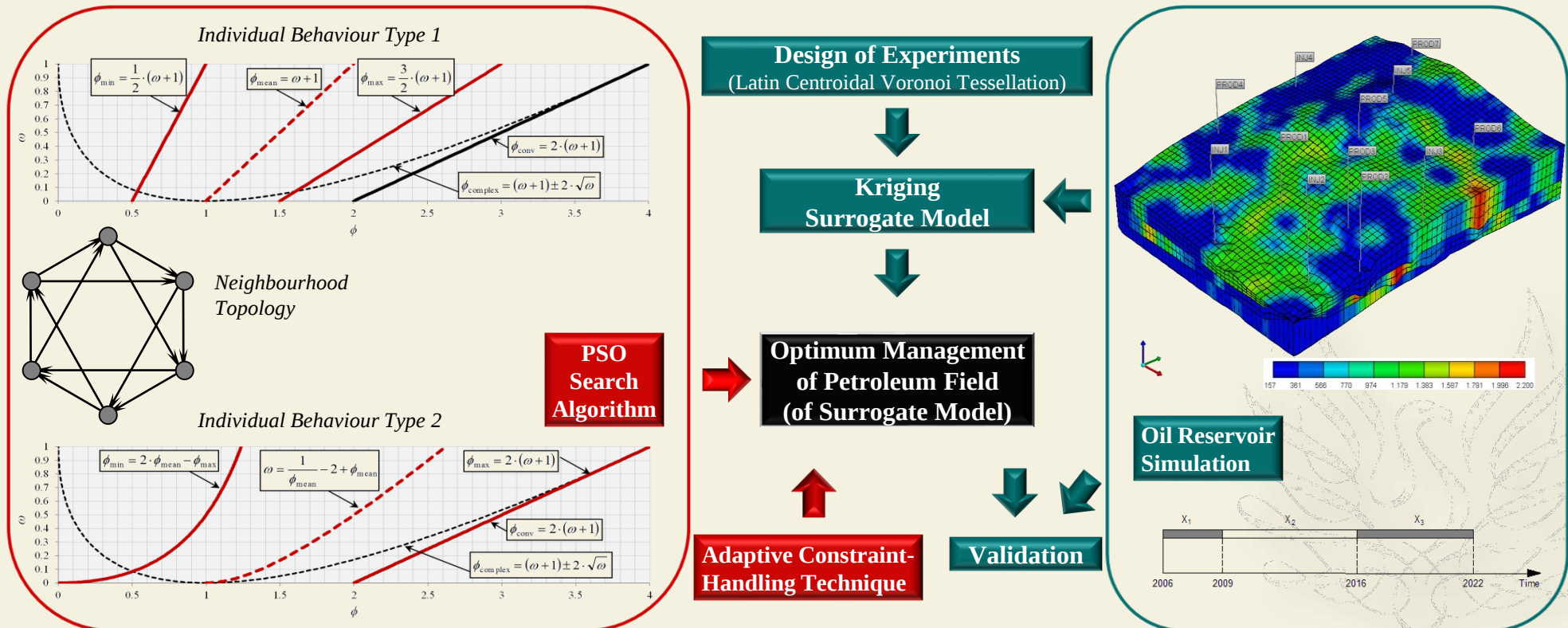
Funded by EPSRC via Centre for Power Electronics (EPSRC-CPE) Early-Career Researchers Award.



Selected Research Projects

• Optimum Management of Water Flooding in Petroleum Fields

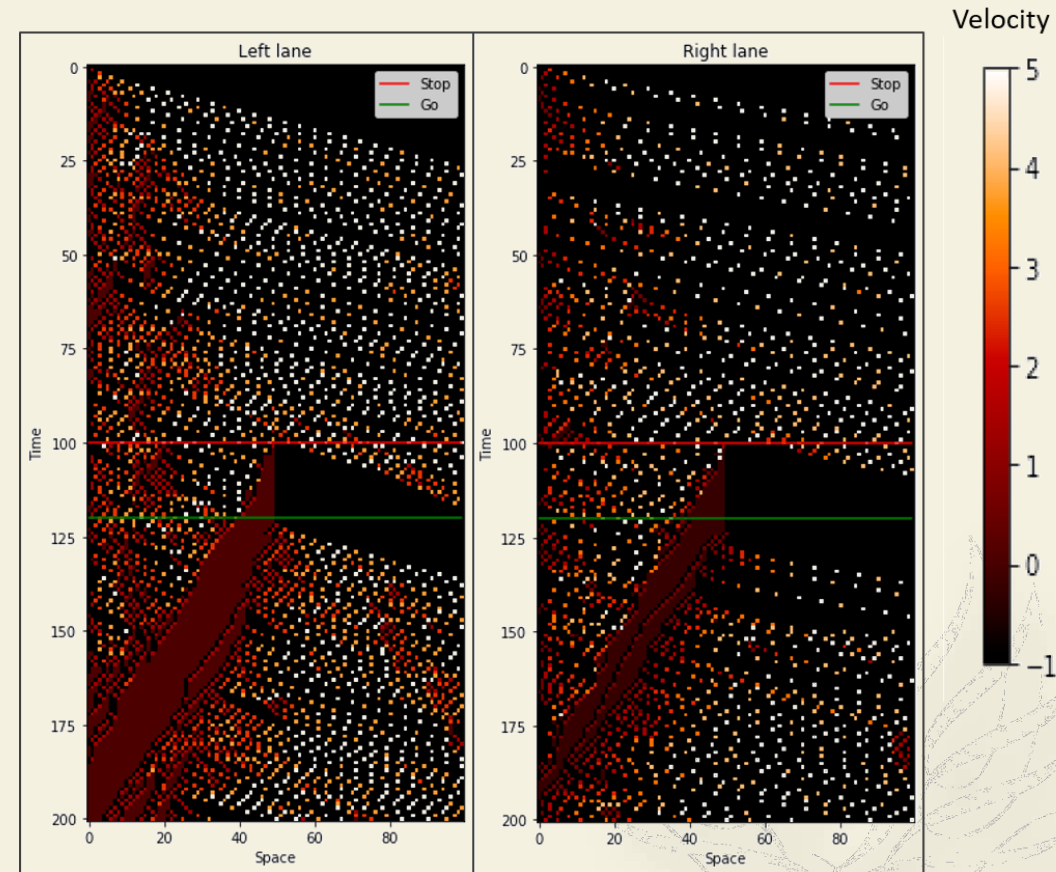
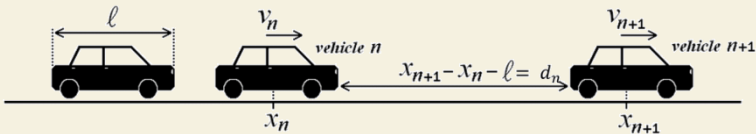
- High-Fidelity Commercial Simulator simulates oil extraction from reservoir.
- DoE (Latin Centroidal Voronoi Tessellation) used to train Kriging Surrogate model offline.
- PSO + Adaptive Constraint-Handling Technique used to seek optimum management.



Selected Research Projects

- **Microscopic Traffic Modelling Using Cellular Automata**

- Pilot project.
- Based on *Nagel and Schreckenberg's model* (NaSch), with some additional features incorporated.
- 1D model.
- No junctions.
- Two lanes, one traffic light.





Thank you
for listening.

Any questions?

Dr Mauro S. Innocente