

Fire Engineering Research Topics 2024

Supervisor(s)	Degree	Preliminary title of research project	Brief description of project	Scholarship per year
Dr Natalia Flores-Quiroz	MEng[RI] / [S]	Evacuation and human behaviour for developing world hospitals	During COVID 19 many hospitals around the world burnt down, but especially in developing countries. This project will focus on understanding and enhancing fire safety for hospitals by studying human behaviour and evacuation.	
Dr Natalia Flores-Quiroz	MEng[RI] / [S]	GIS modelling of wildland urban interface fires in South Africa	The destruction of many buildings at UCT was an example of how wildland fires are affecting towns and cities in SA more frequently. Using GIS and available software engines develop fire spread models for SA wildland fires.	
Dr Natalia Flores-Quiroz	MEng[RI] / [S]	Understanding and improving prescribed/controlled burns in SA	Prescribed/controlled burns are used all around the world as a technique for fuel management. However, these interventions can be extremely challenging. Understanding Prescribed/controlled burns operations will allow to identify the main challenges, and try to find ways to overcome it. These include but are not limited to: community interventions, monitoring of fire spread rates and overall fire behaviour during a controlled burn, studying the efficiency of the operations.	
Mr Dirk Streicher	MEng[RI] / [S]	Development of a cost efficient heat flux sensor	Measuring heat flux is a complicated task. High precision heat flux gauges are expensive and get broken easily. Develop a low-cost heat flux sensor for experimental testing and lab work.	
Mr Dirk Streicher	MEng[RI] / [S]	Error propagation in fire testing	When conducting fire tests each sensor and piece of equipment has certain tolerances and levels of accuracy. When calculating results based on these uncertainties the error may be magnified, or reduced. Study how fire tests, sensors, measurements and calculations affect the calculated results from tests.	
Mrs Courtney Devine	MEng[RI] / [S]	Fire safety systems for bulk plastic recycling facilities	Bulk plastic recycling facilities process and store thousands of tons of combustible products. Find innovative detection, suppression and fire safety systems to make these high-risk facilities safer. Analyse how to reduce risk using such systems.	
Mrs Courtney Devine	MEng[RI] / [S]	Fire safety systems for Li-Ion battery energy storage systems (BESS)	The fire safety of BESSs is without a doubt a concern to the insurance and commercial industry as Li-ion batteries are increasingly catching alight. Find innovative detection, suppression and fire safety systems to make these systems safer. Analyse how to reduce the risk using such systems.	
Prof LA Gibson	MEng[RI] / [S]	Geospatial tools for fire safety in vulnerable communities	Geospatial tools / GIS have largely been underexplored in understanding fire risk in informal settlements. Using an existing project in an informal settlement of Cape Town, the student will be able to explore geospatial data and investigate the potential impact of a fire reduction intervention on fire spread through field work and spatial analysis.	
Prof RS Walls / Prof AJ Babafemi	MEng[RI] / [S]	Fire resistance of 3D printed concrete	SU has developed both normal 3D printed concrete and 3D printed concrete incorporating waste plastic. Test at elevated temperature such mixes to determine how their material properties change in fire.	
Prof RS Walls	MEng[RI] / [S]	Fire spread modelling for informal settlements	Develop models for analysing the spread of fire in informal settlements during disasters. Existing models have been developed at SU and these can be enhanced, validated and implemented.	
Prof RS Walls	MEng[RI] / [S]	Smouldering behaviour of hempcrete	Smoke some hemp in the lab to study how smouldering affects hempcrete. Hempcrete is a mix of hemp and limestone that has good fire resistance properties. However, it has been found to exhibit smouldering behaviour which needs to be quantified to enhance fire safety and reduce risk for hempcrete buildings.	
Prof RS Walls	MEng[RI] / [S]	Influence of green systems on fire dynamics and smoke emissions	Green construction systems which incorporate materials such as crumb rubber, waste plastic aggregate and biomass produce smoke and contribute to heat release rates when exposed to fire. Investigate the contribution of such systems to fire risks in buildings and what limitations must be placed to ensure safety is not compromised.	

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Prof RS Walls	MEng[RI / IS]	Fire safety for green hydrogen systems	Around the world billions of Rands are being committed to the development of green hydrogen systems for energy. However, hydrogen is explosive and has a wide flammability range. Investigate the fire risks associated with the production and distribution of hydrogen, especially catalysis.	