# Development, verification and validation of automotive interior cabin noise models using coupled multi-physics approach based on 'Aero-Vibro' acoustics.

### How to apply

Applicants must email a postgraduate application form (including a 1500 word proposal) to meri@shu.ac.uk by 12 noon on Friday 24 February 2017.

Your application form should clearly indicate the project you are applying for and outline:

a) why you are interested in doing PhD research on this topic
b) how your skills and experience to date (including your undergraduate and/or masters dissertation, if relevant) prepare you to embark on the project
c) any challenges that you foresee in conducting the research and how you might approach or solve them

Where English is not your first language, you must show evidence of English language ability to the following minimum level of proficiency: an overall IELTS score of 7.0 or above, with at least 6.5 in each component or an accepted equivalent. Please note that your test score must be current, i.e. within the last two years.

Please view our eligibility criteria before submitting an application.

### Selection process

Successful applicants will be required to attend an interview where you will be asked to talk through your research proposal.

### Project details

Supervisors: Dr. Harish Viswanathan (Sheffield Hallam University), Dr. Kevin Chow (HORIBA MIRA) and Dr. Sam Dakka (Sheffield Hallam University)

Materials and Engineering Research Institute

External partner: HORIBA MIRA

*Project description:*

In recent years, predicting audible noise in automotive applications has gained significant interest from vehicle manufactures and tier 1 suppliers. Especially during driving conditions, noise propagation inside the cabin is of interest due to vehicle comfort and safety leading to irritable situations and dizziness, causing uneasiness that can lead to accidents. Noise is generated out of various sources during driving such as, but not limited to, the engine, sloshing inside fuel tanks and HVAC units, and more recently, the drivetrain components of electrified vehicles (e.g. e-

motor whine). One of the most important sources of noise generation is wind, especially during motorway driving, and is particularly noticeable on windy days. These head-on or cross winds experienced during driving interfere with vehicle components such as windscreen, side mirrors and side glazing; wipers also generate turbulence-induced aerodynamic noise.

These wind-driven noise sources generated due to turbulence propagate as compression waves and, due to the oncoming wind, these waves will interfere with the side glazing or the windscreen by subjecting them to a harmonic response, leading to a fluid-structure interaction problem. This turbulence on the vehicle exterior excites the glazing, and the vibrating surfaces of the glazing displace air parcels on the interior of the vehicle, generating acoustic waves and eventually making the noise audible to the driver.

This project is in collaboration with HORIBA MIRA, a global provider of automotive engineering expertise. In this project, our efforts at Sheffield Hallam University and HORIBA MIRA will be targeted at developing a computationally intensive, coupled multiphysics model to predict noise propagation due to the oncoming wind, and the transmission of this noise into the cabin. The outcome of this project would provide significant insight for vehicle manufacturers and vehicle test facilities on the data required for designing interior cabins and glazing from NVH perspective which would otherwise have to be obtained from very expensive testing. The development of a simulation process would also allow aero-acoustic effects to be evaluated earlier in the design phases of a vehicle development programme, instead of later in the prototype testing stage, flagging up problems earlier, ultimately resulting in a more refined vehicle design.

For further information, please contact Dr Harish Viswanathan (H.Viswanathan@shu.ac.uk)