

**TUS**

**Technological University of the Shannon:
Midlands Midwest**
Ollscoil Teicneolaíochta na Sionainne:
Lár Tíre Iarthar Láir

POSTGRADUATE RESEARCH OPPORTUNITY

Project Title: *GuidedVSR: Video Super-Resolution Guided by Video Understanding using Deep Learning*

Project Description: In the domain of multimedia research, Video Super-Resolution (VSR) stands as a pivotal yet fraught area facing significant challenges. Conventional VSR techniques frequently employ end-to-end deep learning models that, while effective in certain contexts, manifest critical shortcomings: chiefly, semantic unawareness—defined as the model's lack of comprehension of the image composition in a semantic way. This unawareness is a double-edged sword; it not only complicates the training process but also poses limitations on the model's generalisation capabilities across complex scenes. Moreover, the opacity of these black-box models makes it challenging to offer performance guarantees, an issue further exacerbated by their semantic insensitivity. Addressing these complex challenges, this PhD project introduces **GuidedVSR**. Unlike its predecessors, **GuidedVSR** explores the uncharted territory of embedding content-specific semantic features—such as object segmentation, depth maps, and lighting conditions—directly into the VSR model. This incorporation aims to reduce the black-box nature of the model, thereby facilitating both faster convergence and more reliable performance, even when training data are sparse. This innovative approach seeks not only to advance the state-of-the-art in VSR techniques but also to open new avenues for understanding how semantic content can be leveraged to improve machine learning models in multimedia applications.

Duration of Project: **48 months**

Funding Agency: **TUS Presidents Doctoral Scholarship**

Type of Degree Offered: **PhD**

Minimum Qualifications/Experience Necessary/Any Other Requirements:

Candidates must hold a minimum of a 2.1 honours degree or its equivalent in Computer Science, Artificial Intelligence, Statistics, or a closely related Engineering/Applied Mathematics discipline. Essential qualifications include strong capabilities in using programming languages to address problems in linear algebra and probability. While not mandatory, a background in digital signal processing, image processing, deep neural networks, and multimedia is highly advantageous. Additionally, candidates must possess robust written and oral communication skills.

IELTS [International English Testing System] - [Applicants must have a minimum of 6.0 with no component score less than 6.0.](#)

Research Supervisors: Dr Yuhang Ye, Dr Yuansong Qiao, Dr Mark Daly, Dr Enda Fallon

For further information, please contact: Dr Yuhang Ye (yuhang.ye@tus.ie)

Download Application Form at

[Funded Postgraduate Research Opportunities - TUS](#)

Closing date for receipt of completed application forms is **5pm, 31st December 2023**.

Please submit your completed application: pro@tus.ie

Please reference **Project Title in all correspondence**.