



COLLEGE of ENGINEERING  
AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

## Qualifying Examination

Thursday December 21, 2023 at 10AM online via Zoom (remote)

Yukun Shi

*High-Resolution Multi-view Stereo: From Heuristic-Based to Learning-Based*

**Chair:** Dr. Stacey Scott

**Advisor:** Dr. Minglun Gong

**Advisory:** Dr. Fei Song

**Non-Advisory:** Dr. Simon Yang [SoE]

**Non-Advisory:** Dr. Neil Bruce

### Abstract:

Multi-View Stereo (MVS) plays a vital role in 3D reconstruction, transforming multiple images from known positions and viewpoints into three-dimensional geometries. The primary objective of MVS is to deduce the spatial correspondence of each image pixel when the camera's internal and external parameters are known.

Traditionally, MVS research has primarily focused on methods such as Voxel-based MVS, Mesh-based MVS, and the widely adopted Depth Map-Based approaches. Recently, deep neural networks have been used increasingly in tackling MVS issues, demonstrating remarkable results. The impressive image representation abilities of deep learning-based MVS techniques have allowed them to surpass the performance of traditional methods, even in the presence of occlusions, varying lighting conditions, and textureless regions.

Despite significant advancements in MVS technology, several persistent challenges continue to preclude its complete resolution. These challenges encompass interruptions in visibility due to obstructions among varying viewpoints, the absence of sufficient texture details, complications arising from non-Lambertian surfaces that reflect light diffusely, and the high computational costs needed for processing high-resolution data.

Our objective is to develop accurate and detailed 3D models using images. To achieve this goal, we will explore both traditional and learning-based approaches. The focus will be on innovating and refining techniques to attain state-of-the-art performance, especially in overcoming challenges posed by high-resolution images.