Department	School of Computing
Supervisors	Kenny Mitchell
Project Title	Real-time Rendering Shape and Appearance with Compact Representations

PROJECT DESCRIPTION

We experience our world through interaction with objects taking a wide variety of forms and materials. Intricate animated details can be seen with the naked eye, but real-time rendered detail comes with a challenge of how to represent that detail for computer hardware accessed online with ultimately an energy efficient principled framework.

In offering this self-funded PhD programme, the successful candidate will develop a practical fundamental basis for shape and appearance rendering in real-time. Building the surfaces and objects of the world visually with graphics hardware acceleration to establish a new level of practicality of modelling and design with outcome of tools, prototypes and applications delivered with state of the art graphics hardware to reach potentially millions people everyday through eXtended reality (XR) and metaverse platform technologies.

Applications from potential part-time students are also welcomed.

Prospective applicants are encouraged to contact the Supervisor before submitting their applications. Applications should make it clear the project you are applying for and the name of the supervisor(s).

Academic qualifications

A first degree (at least a 2.1) ideally in Computer Science with a good fundamental knowledge of Computer Graphics Rendering.

English language requirement

IELTS score must be at least 6.5 (with not less than 6.0 in each of the four components). Other, equivalent qualifications will be accepted. Full details of the University's policy are available online.

Essential attributes:

- Experience of fundamental Mathematics for Rendering Algorithms
- Competent in Machine Learning
- Knowledge of Neural Rendering
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:

Programming in C++ and graphical shader languages, e.g. hlsl.
Familiarity with modifying and extending real-time graphics engines and offline rendering systems.

Indicative Bibliography	Jos Stam. 1998. Exact evaluation of Catmull-Clark subdivision surfaces at arbitrary parameter values. In Proceedings of the 25th annual conference on Computer graphics and interactive techniques (SIGGRAPH '98). Association for Computing Machinery, New York, NY, USA, 395–404. Y. Li, P. Wiedemann, and K. Mitchell 'Deep Precomputed Radiance Transfer for Deformable Objects', Proc. ACM Comput. Graph. Interact. Tech., vol. 2, no. 1, p. 3:1–3:16, 2019

	A. Schollmeyer and B. Froehlich, "Efficient and Anti-Aliased Trimming for Rendering Large NURBS Models," in *IEEE Transactions on Visualization and Computer Graphics*, vol. 25, no. 3, pp. 1489-1498 C. Koniaris, K. Mitchell, and D. Cosker 'Real-time variable rigidity texture mapping', in Proceedings of the 12th European Conference on Visual Media Production, New York, NY, USA, 2015 Santina, Rami. (2011). Resolution Independent NURBS Curves Rendering using Programmable Graphics Pipeline. 21st International Conference on Computer Graphics and Vision, GraphiCon'2011.
Enquiries	For informal enquiries about this PhD project, please contact k.mitchell2@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process