Project 1:
A virtual reality platform for exploring human collision perception in prosthetic vision

Description:
Vision restoration devices such as retinal prostheses (or bionics eyes) and sensory substitution devices seek to provide patterned displays of the scene to the blind and severely vision impaired. Most commonly, such devices encode information about the scene from images initially captured by a head-mounted camera, but are impeded by severe display constraints such as resolution, dynamic range and field of view (among others). This motivates the application and development of computer vision and image processing algorithms to extracting and augment pixel data to ensure information crucial to specific tasks is perceivable in the final display. To test and evaluate proposed algorithms and scene visualisations, simulations are often employed using immersive virtual reality, allowing experiments to be conducted with normal-sighted participants (viewing or experiencing simulated prosthetic vision) under controlled and repeatable conditions. In this project you will setup and validate a virtual reality based experiment platform using the Oculus Rift DK2 to explore how scene visualisations in prosthetic vision might improve the perception of the scene. Particular focus will be on the perception of looming objects that pose an imminent threat of impact with the observer. This project is well suited to students with an interest in pursuing further work as part of an honours, or PhD.

Supervisor:
Chris McCarthy

NICTA Co-Supervisor:
Assoc Prof Nick Barnes (NICTA CVRG, Bionic Vision Australia)

Requirements:
C/C++ proficiency essential. Experience developing for virtual reality, and/or computer vision/image processing applications a plus.