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Mapping Out the Most Complex Terrain: The Mind

An interview with **Manu Madhav**, Biomedical Engineer, University of British Columbia
Assistant Professor, UBC School of Biomedical Engineering

My lab is Neural Circuits for Computation, Cognition and Control Lab, and we look at navigation from the perspective of engineering. But we look at biological navigation, so we we look at how animals and humans navigate and how they create representations or maps in their brain, how they fuse information from their surroundings in order to create these maps, and how they use these maps in order to navigate their environment. And this has applications in robotics, it has applications in human health, and our understanding of how the brain works.

The brain is an extremely complex machine and we as neuroscientists are just starting to scratch the surface of that type of complexity. We're talking about billions of neurons talking to each other to through trillions of synapses. And when we see a difference in the output, that is the behaviour of the animal or the human, it is hard to go back and trace through what neurons cause that, what circuits cause that, what regions of the brain cause that. And that's where the challenge lies.

The one thing that I'm really excited about, and our sort of long-term plan, is to try to see how navigation degrades with aging and with neurodegeneration. So when you have diseases like dementia, including Alzheimer's, your neurons start to die, they start to degrade, neuronal connections start to break. We know that that impacts memory, but that also impacts our ability to navigate.

