

Roshan Achal

PhD

Department of Physics,
Faculty of Science

Image created in CCIS at the
University of Alberta

Images of Research Competition
University of Alberta

Why was the hard drive full?...It 8-bits

Semi-finalist (2019)

As our lives become increasingly intertwined with technology, the amount of digital information created every day grows substantially. Massive data centres handle the current demand for storage; however, these buildings can have large footprints, requiring swaths of dedicated physical space. One method to minimize their impact, and the creation of additional data centres, is to increase the amount of information that can be stored in a given area. Research here at the University of Alberta has made significant headway towards realizing this solution. We have demonstrated the densest solid-state memory ever created. We can now store one bit of information by moving just one atom of hydrogen on the surface of a silicon chip. Here, the first 24 notes of the Mario theme song were stored by moving only 62 atoms. Each well in the image is a location where a hydrogen atom has been removed in order to write the musical information, which can then be read using specialized equipment. The atoms can be brought back to fill the wells, allowing the memory to be rewritten. With such a dense memory, all the 42 million songs on iTunes could eventually be stored on the surface of just one quarter.