



COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

MSc Seminar

Thursday December 8, 2022 at 1pm in Reynolds 1101

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Constructing Orientable Sequences

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Abstract:

Imagine a robot or a scanning device moving up and down on a surface. The robot changes direction as it senses activity. Now consider this robot reading a periodic binary sequence, n bits at a time. By reading n consecutive bits, the robot will be able to determine its current position and orientation. Orientable Sequences are periodic binary sequences in which any n -tuple occurs at most once in a period in either direction. As mentioned, such sequences have potential applications in automatic position-location systems, where the sequence is encoded onto a surface and a reader needs only to examine n consecutive encoded bits to determine its location and orientation on the surface. Previous works on constructing orientable sequences were very complex. C. Mitchel and P. Wild have recently shown a fairly simple way to make periodic and aperiodic orientable sequences using a recursive method. The algorithms they have explained are simpler than previous works, but the results in terms of orientable sequence length are not as good as prior approaches.

In this project, we aim to either construct a simple, fast, and easy-to-implement algorithm or improve on previous approaches in order to be able to generate longer orientable sequences with a more efficient and practical technique in a reasonable amount of time. So far, we have tried a naïve tree with different traversal methods such as random choice, 0then1, prefer-same, prefer-opposite, and various greedy algorithms.