

Student name: Nicholas Salay

Faculty mentor names: Dr. Gyorgy Csaba and Dr. Wolfgang Porod

Project Title: Non-Boolean computing using nanodevices

Skills I have acquired during summer research:

The most notable skill I acquired was the ability to create multiple programs on three devices that could successfully communicate with each other. This allowed me to create a system in which I could automate testing.

Practical application of research:

This research can be used to create a multi-state non-boolean system for data management. This can be used to replace old binary systems by representing more data in a single burst. This is both more power efficient and faster.

Project Summary:

In modern computers, the most common method of storing and managing data is in a binary format. This format gives a large factor of noise immunity to the system. However, it is also very power inefficient and slow when compared to other data formats. This leads to power waste when handling 'big data' such as data for photos or videos, where an entire string of binary data is required to generate just one pixel of one frame.

This project explores multi-state and analog systems which have the advantage of being able to represent large strings of data in a single burst. This research thusly experimented with coupling oscillators together via capacitors to represent analog data based on frequency or phase. During this 10-week research, it was discovered that depending on the size of the capacitors and under what kind of load the coupling circuit experienced, oscillators affect each other rather than the output alone. More specifically they would lock in phase with each other, or in a phase equidistant from each other (eg. 3 oscillators would be locked 120 degrees from each other, see **Figure Below**). This also has the effect of altering the frequency of other oscillators.

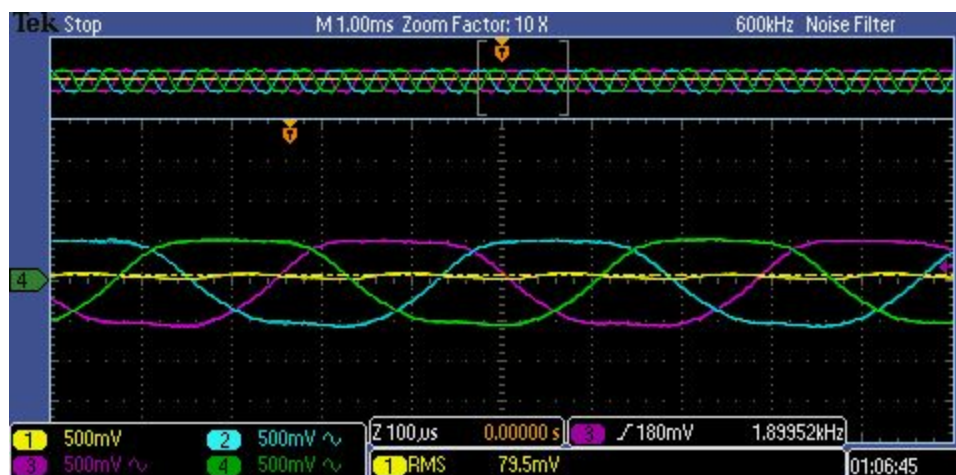


Figure - 3 Oscillators in 120 degree phase from each other

Publications: Poster - Non-Boolean Computing using Coupled Oscillators