**A GENERAL PURPOSE REAL-TIME SOC BASED MATRIX MANIPULATOR**

**Project**

**ECE 5730 –Embedded System Design Using FPGAs**

**Fall 2021**

**Cory Ness**

**Kokila Subramanian**

**Shivani Devatha**

**Oakland University**

**Abstract**

Matrix manipulation includes algebraic operations such as addition, subtraction, multiplication, division, and inverse and transpose operations on the array of data stored as rows and columns. It is an essential process used in diverse fields of science and commerce including but not limited to Computer technology, Optics, Geology, Cryptography, Network Theory, Robotics and Animations, and Finance. Real-time matrix operations include a large number of computations required for process control, data and signal processing, which directly impacts the system performance. Real-time matrix calculation becomes a bottleneck for performance of fast system applications as it takes large amount of computation power, memory and time. In this project, we present a design which is feasible and offers high computation performance for matrix manipulation using Intel DE1-SoC development board. It is implemented by integrating DE1-SoC FPGA and NIOS II processor embedded in the FPGA development board and the computed matrix is displayed in LCD display.

(Add few more points on NIOS –II and LCD display)