ECE 454 Lab 2 Report

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Explanation of the final implementation of rotate() and why it performs well:

- Improved mathematical index calculations with LCIM (loop invariant code motion)
- Moved the calculations out of as many loops as possible reducing unnecessary calculations
- Reordered loop to traverse the array in row major order, changing the majority of cache misses from write misses to less expensive read misses
- Used tiling for better cache performance
- Chose tiling size depending on experimental results to further reduce the cache misses
- Unrolled the tiling double loop, improving mathematical calculations and allowing the compiler to optimize the register usage
- Loop unrolling also allows the compiler to optimize better for pipelining hazards and instruction ordering