EECS 314: SAMPLE TOPICS FOR PROJECT
Computer Architecture
Spring 2011

- Write a performance simulator in MIPS. Your program will take an input program and output the number of cycles MIPS takes to execute the program. It should be able to account for the data dependencies, control hazards and interrupts. Assume MIPS32 architecture we have learnt in the class.

- Implement a "calculator" for a set of arithmetic and logical operation (add, subtract, mul, div, gcd, and, or, x^y, x^(1/y)) with larger than 32-bit inputs (i.e. for arbitrarily large numbers).

- Implement a scheme for low power processor design. Your strategy for low power design will be to apply clock-gating. Clock gating is a technique to turn off the clock in certain sections of the processor when it is not used for a predefined number of cycles (say N cycles). You need to develop the scheme and write a small routine, which will calculate the number of cycles in a program for which the ALU can be turned off.

- Implement a wrapper to MIPS for performing basic string operations (select functions found in string.h header of "C") for both

uppercase and lowercase characters e.g. strcmp, strcasecmp, strcat, strlen, strchr etc.

- Implement a routine for JPEG image compression. JPEG image compression is based on discrete cosine transform (DCT) and can be performed using a set of arithmetic operations in sequence. Your program should be able to compress an input raw binary image into a compressed form and output the compressed image along with a compression ratio.

- Implement a routine for MP3 decoding. You should take the basic MP3 decoding algorithm and implement it to decode any mp3 encoded audio file into uncompressed sound.

- Implement a MATLAB-like wrapper to MIPS. Your program will able to handle some basic functions in MATLAB including sort, max of a list of numbers and basic matrix operations.