CSE 492 Project Ideas

1) A RISC Compiler

This project aims to write a compiler for a RISC processor. The input of the compiler will be source codes written in a C-like programming language. The outputs of the compiler will be either optimized or unoptimized assembly and machine codes. For the compiler optimizations, some of the translations among loop unrolling, list scheduling, register renaming and software pipelining may be used. The results of the optimized code will be compared with the results of the unoptimized code in terms of CPU performance and static code size.

Tools: C, C++ or Java, Lex, Yacc or Bison

2) Design and Implementation of a Pipelined RISC processor on FPGA

The aim of this project is to design and implement a pipelined RISC processor on a FPGA board. At the end of the semester, this project may be integrated to the compiler project proposed above, enabling C-like codes running on this processor.

Tools: VHDL or Verilog, ModelSim, Xilinx ISE.

3) A RISC Processor Simulator with a GUI

In this project, a RISC processor will be simulated. The MIPS assembly code of several test applications will be provided to the simulator. Simulator will provide a GUI for showing the datapath traffic inside the processor. This project mainly focuses on a pipelined processor with 5 stages. However, if time allows, we will investigate a flexible implementation that accepts several pipeline parameters, such as the number of pipeline stages, number of ways of the processor, etc., as simulator inputs.

Tools: C, C++ or Java.

4) Academic Advisor Assistant

In this project, a portable assistant application for academic advisors will be designed and implemented. The server side will hold a database providing information for the upcoming semester. The client side, which will run on every advisor’s desktop machine, will provide information and generate a plan for each advised student, such as what courses the student must (or may) take, and what kind of options the student has.

Tools: Java, DBMS

5) TI Chronos Morse Code Translator

This project, focuses on the pressure sensor of the TI Chronos watches*. The user can write morse code by tapping his/her Chronos watch. Two modes of the application will be provided: the Text mode and the Command mode. In the Text mode, the user input will be displayed on the computer screen. In the Command mode, A variety of commands may be given to the application to control the GUI and even the computer’s host O/S.

Also look at: http://www.youtube.com/watch?v=yqMbdGptdfw
Tools: TI Chronos Watch, C, C++ or Java

6) Car Tracker

Various number of sensor data, including accelerometer, temperature, humidity and GPS, are collected from the travelling cars to a server site. In the server site, the collected data is processed and information about the quality of the road, congestion in the traffic and any other useful statistics are generated. Sensor readings are collected via SUN Spot, Chronos and/or Tmote Sky modules. The server connection may be supported by mobile devices.

(See CarTel Project in CSAIL/MIT)

Tools: C, C++ or Java, nesC, TinyOS, Android OS

7) Code Similarity Detector

This project focuses on detection of similarities in codes written in C programming language. The Winnowing algorithm given in a well-known paper will be implemented and tested.

Tools: C, C++ or Java

8) WSN Chat

This project integrates mobile devices with Android OS and Tmote Sky sensor devices. Assuming that all Android OS devices will have USB hosting feature, Tmote Sky devices are connected to Android devices via USB interface. The application running on the Android device communicates with other Android devices in close proximity by the help of Tmote Sky sensor device and underlying wireless sensor network.

Tools: Android, TinyOS, nesC, C, C++ or Java