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Objective

Seeking admission to a doctoral program in Computer Science to study programming languages, formal semantics, and formal methods. Interested in theoretical foundations of programming languages and practical applications of verified systems design.

Personal

Born in Texas, June 26, 1990. Currently attending School in Michigan.

United States Citizen.

Education

B.S. Computer Engineering, Michigan State University, Summer 2011 (*Expected*)

Currently completing third year in computer engineering.

Current GPA: 3.94/4.0

Relevant coursework:

Computer Science — All requirements for Computer Science major fulfilled, except for senior design class (completing Electrical Engineering Capstone instead).

Electrical Engineering — All circuits and electronics classes required by EE up to Junior level.

Digital Electronics — Many courses: digital design from digital logic through Electronic Design Automation, along with computer architecture.

Mathematics — Completed a number of courses such as Differential Equations, Linear Algebra, and Analysis I.

Graduate Classes — In both Decision Procedures and Logic

Employment

Michigan State University: Undergraduate Researcher.

Working under direction of Dr. **Subir Biswas** in Network Embedded and Wireless Systems laboratory since Freshman year.

Current — Constructing large (tens thousand lines or more) research framework for wireless content distribution in ad hoc networks. Implemented system on Android phone platform using Bluetooth stack. Researchers can implement their protocol and integrate it into the source tree without having to write an entirely new system.

Currently drafting paper on the IBCD (Interest Based Content Delivery) protocol developed over last year, coauthor with another student in the lab, Mahmoud Tagizadeh.

Summer 2009 — Hired as a student researcher to construct Desktop interface to ACEP (Ad hoc Content Exchange Protocol) system. The system implements a prototype publish subscribe network on TelosB motes using TinyOS for embedded systems design. I implemented the Java based driver to the wireless sensor node so that it could be used as a ZigBee dongle. I also implemented the GUI and desktop implementation of the routing protocol which communicates with the sensor nodes.

Microsoft Corporation, Redmond WA: Software Development Engineer (*Intern*).

Summer 2010 — Worked with Windows Driver Foundation (WDF) team under direction of **Praveen Rao** and **Kumar Rajeev**. Implemented CISR, a language for declaratively handling device interrupts in user mode device drivers for the User Mode Driver Framework (UMDF).

First implemented structure based declarative handler. Programmer "fills in" structures and pass them to the framework. The framework then acts as an interpreter.

Then implemented CISR language in F# to translate declarative handling language to the structure based language.

Independent Projects

Curent Project: GalSAT — A boolean satisfier which combines a genetic algorithm with DPLL. Instances of SAT may be very large, with thousands of variables and an even greater number of clauses. While these problems may not seem realistic, they are typical of automatically generated verification conditions from tools in Electronic Design Automation toolkits or optimizing compilers. GalSAT solves SAT using a *partial* assignment of variables, giving a greater fitness to potential models which assign more variables and result in less conflicts. After a certain number of variables are assigned the "solve" operator is used, which uses DPLL to investigate the rest of the search space. The result of DPLL is a set of learned clauses, which can be integrated into the clause database and implement Tabu search so *problematic* assignments do not force the genetic algorithm into a local maximum.

Honors project, sophomore year: MSU Prolog — Implemented simplistic Prolog interpreter in SML for honors project for discrete mathematics course at MSU. Wrote documentation behind interpreter internals, and implementation details unique to a functional language.

Honors project, junior year: Writing laboratory exercises — Wrote laboratory exercises on C programming language now used in ECE 331 (Microcontroller design) at Michigan State University.

Paper RSS — `http://paperboy.sourceforge.net/`, open source RSS aggregator written in C. Acted as project lead throughout high school career, two or three other developers over the years.

Previous project: Eagle automated theorem prover — Implemented theorem prover based on breadth first search for deciding formulas in First Order Logic.

Previous project, High school: Cimple programming language — Implemented Cimple programming language for studying optimization techniques in compilers. Project took **3rd place overall** in Intel International Science and Engineering Fair (with a **second place** award from the IEEE).

Organizations

Currently reviving *Association for Computing Machinery* chapter at Michigan State University:

Organized lecture series — Organized a "ACM Fall Activity series," a group of lectures and opportunities for students to learn interesting material *outside* of the classroom.

Presented inaugural lecture on "Programming the Android." **My lecture had over seventy attendees, including students, graduates, and faculty.**

Organized speakers for future involvement throughout the school year.

Institute for Electrical and Electronics Engineers:

Fall 2011: Secretary — Take meeting minutes, suggest ideas for laboratory exercises, and conduct business for executive board.

Research Interests

Highly interested in using formal semantics (type systems, programming languages, etc...) *and* verification based techniques (such as model checking) to implement secure and verified systems, as well as more robust programming languages.

Programming languages:

Formal semantics

Systems verification

Haskell Curry Correspondence

Compiler and systems design:

Using SMT solving to implement optimizations in compilers.

Developing new optimizations for cutting edge architectures.

Automated Reasoning:

Developing techinques and decision procedures for specialized logics.

Programming Experience

Experience with many software projects in the open source, research, and industrial realm.

Worked with many programming languages:

ML / OCaml / F# — **Striving** to become as good a developer as possible with functional languages. Have used for past few years.

Haskell — Worked with for a short time, intending to learn more.

C / C++ / Java — (*Very familiar*) Constructed many systems using the standard imperative languages. Understand C internals fairly well, slightly less so on C++ and Java but still some knowledge.

FSF Toolchain — Experience using the Autotools commonly used in projects with the Free Software Foundation.

Along with LaTeX :-).

Many small community service applications:

Wrote MSU Dining Services menu application for Android phone users on MSU campus.

Constructing informational program for smart phone users of Potter Park Zoo in Lansing, Michigan.

Awards

Selected as one of four nominees for Goldwater grant from Michigan State University.

Awarded **Honors College Professorial Assistantship**, an award that waives out of state tuition at Michigan State University, and provides a stipend and research position in the Network Embedded and Wireless Systems laboratory.

Deans list for all semesters at Michigan State University.

Last updated: November 13, 2010