VIRGINIA MOUNTAIN SECTION
NEWSLETTER

IEEE Region 3, Council 09, Section 65 February 2009

Thursday, February 19, Holiday Inn Hotel Roanoke Airport
Student Papers Contest

Come hear from the future of the profession. We have five papers to be presented by undergraduate students from Virginia Tech and Virginia Military Institute. Titles, abstracts, and biographies are below.

Date: Thursday, February 19, 2008
Note the early start:
Social: 6:00 PM
Dinner: 6:30 PM
Talks: 7:30 PM
Cost:

Members & Guests	$20.00
Students	$10.00

Reserve by 5 PM Monday February 16, 2009

Dr. Wilbur Dale (540) 464-7547
dalewn@vmi.edu
Please specify the number of attendees.

Directions to Holiday Inn Hotel Roanoke Airport

2727 Ferndale Drive NW
I-581, Exit 3
Hershberger Rd West
1st Rt. onto Ordway Drive, ¼ mile, Rt. into parking lot.

"Standard Hardware Interface for Secure Hash Algorithms"

by Sergey Morozov from Virginia Tech

Abstract

Hashing algorithms produce a fixed length hash based on an arbitrarily large block of data and have many applications in secure communication systems. National Institute of Standards and Technology (NIST) and the cryptographic community is currently evaluating over 50 different hashing algorithms submitted in the fall of 2008 as part of an open competition to the develop the SHA-3(Secure Hash Algorithm) standard . Certain applications of hash functions require a higher throughput than can be achieved by software implementations even on the fastest processors. The solution is to implement the hashing algorithms as a hardware co-processor in either field programmable gate arrays (FPGAs) or application specific integrated circuits (ASIC). As part of the SHA-FPGA project, our research group at Virginia Tech has proposed a standard hardware hash. A test-bench for verification of hardware implementations with this interface was developed and applied to two algorithms. Despite the differences in operation of these algorithms, the interface and the test-bench prove sufficient to verify both implementations. Design tips for this hardware interface are also discussed.

Biography

Not available at press time.

"Tamper Resistant Software through Multi-Block Hashing and Encryption: An Implementation"

by Alexander W. Welch from Virginia Tech

Abstract

Malicious tampering with software is a major threat against confidentiality of intellectual property and anti-piracy techniques. Several proposals attempt to combat tampering and analysis, each offering their unique strengths and weaknesses. We propose not only a tamper resistance solution that melds existing concepts into a more robust framework, but attempt to implement our scheme to demonstrate its effectiveness against tampering strategies. We outline the structure of our framework, and the current implementation status of each

component. We then offer ideas to expand and complete our implementation.

Biography

Alexander Welch is a senior in Computer Engineering at Virginia Polytechnic Institute and State University (Virginia Tech). After graduation this spring, he is starting fulltime for Department of Defense.

"CodeSyn: A Visual Environment for Multi-Rate Data Flow Specifications and Code Synthesis for Embedded Applications"

By Jason Pribble and Lemaire Stewart from Virginia Tech

Abstract

CodeSyn is being developed to be a new environment for multi-rate data flow based specification, visual debugging, and code synthesis for embedded applications. The ultimate goal of this project is to automatically generate multithreaded code for safety-critical, real-time applications such as automotive control, avionics fly-by-wire control, etc. The program will be able to validate a specification in order to achieve provably correct code synthesis. This will reduce validation efforts drastically and will significantly reduce the time a programmer spends in writing code for embedded systems. We are currently developing CodeSyn with sequential code generation in mind and possible multi-threaded code extension in the future.
In order to accomplish this goal, we are developing a specification formalism called Multi-Rate Instantaneous Channel Connected Data Flow (MRICDF). This formalism allows the user to create a visual network that represents the data flow in an embedded system. Networks are constructed using four different kinds of primitive "Actors" (function, buffer, merge, and sampler). Each type of actor has a fixed type of inputs and outputs and manipulates the data that flows through it in different ways. Data is instantaneously transferred across connections between actors and input events are handled immediately. A combination of these primitive actors will form composite actors. Hierarchical networks can be built using composite actors. A fully connected MRICDF network is realized in terms of a visual specification which can be later used to test, debug and generate code for an embedded system.

CodeSyn environment consists of a graphical user interface that provides tools for users to construct networks and provides feedback for visual debugging and error detection. The visual specification is transformed into a XML format that can be saved and reopened for modification. This XML file is then used by the backend of the program to get the network information and to test for any errors and to debug them. After this stage, there will be a step to estimate the feasibility of the model using a "Rate Analysis" step. This will point out any discrepancy in the rates of interconnected multi-rate models. Finally the ANSI sequential C code is generated for the MRICDF model from the visual specification.

Biographies

Jason Pribble is a junior Computer Engineering major from Richmond, VA. He expects to graduate in May 2010 and work full-time thereafter.

Lemaire Stewart is a Senior Computer Engineering major at Virginia Tech and is from Jamaica. He expects to graduate in may 2009 and work for Booz Allen Hamilton.

"Production and Implementation of Commercial Optoelectronics "

by Rob Allen, Racheal Toman, and Brian Mayberry from VMI

Abstract

We researched the use of dielectric pastes in unison with ITO substrate coated material as a way to display commercial advertisements. As a subcomponent of this research, our project was to design and fabricate a working "advertisement".

The "advertisement" model itself is composed of a battery operated circuit with a 120 volt output which is connected to the dielectric paste assembly, and mounted in a clear frame.

Biographies

Rob Allen was born Boulder, Colorado and is a junior in Electrical and Computer Engineering at VMI. He plans to commission into the United States Navy after graduation from VMI.

Racheal Toman is from Richmond, Virginia. She is also a junior in Electrical and Computer Engineering at VMI. After graduating from VMI, Racheal plans to attend graduate school.

Bryan Mayberry is a sophomore in the ECE Department at VMI and was born in Lynchburg, Virginia. He plans to commission in the United States Army after graduation.

"The Design of a Robotic Lawnmower Using Behavioral Robotics Techniques"

by Richard Newkirk from VMI

Abstract

The purpose of this research was to study robotic behaviors. We analyzed how autonomous mobile robots react to the surrounding environment while attempting to accomplish the task assigned to them. We set out analyzing how an autonomous "robot lawnmower" may react to its surrounding environment and defined the behaviors that would be required for the lawnmower to mow a lawn with obstacles and boundaries. Motor control and serial interfacing were studied as well.

Constructing the chassis and other hardware necessary to build the lawnmower would have taken a considerable amount of time and money. To test our ideas we simulated behaviors on an IROBOT Create. With the Create, our focus was on programming the required behaviors and an arbitration scheme that would allow the robot to accomplish its required tasks. While no physical product was constructed, the necessary behaviors were successfully developed and tested.

Biography

Richard Newkirk is a senior in the ECE Department at VMI and was born in Albany, NY. He plans to commission in the USAF and work in research and development/ electrical engineering at the Air Force Labs in Rome, NY.

Student Chapter Websites

VMI: **http://ieee-vmi.org**
VT: **http://www.ieee.vt.edu**

Electricity Merit Badge Technical Manager Needed for Jamboree

The 100th Anniversary of the Boy Scouts of America will attract 40,000 young people from the USA and several other countries to Ft. A. P. Hill, VA for the 2010 National Scout Jamboree. The IEEE emeritbadge.org Project, which started in the IEEE Richmond Section in 1981, is sponsoring the Electricity Merit Badge Booth and the Electronics Merit Badge Booth at the Jamboree. The Jamboree will be held 26 July 2010 – 4 August 2010 at Ft. A. P. Hill, VA. A volunteer is needed to serve as the Electricity Merit Badge Technical Manager at the Jamboree. If you are interested in this volunteer position, please contact Ralph W. Russell, II at emeritbadges@ieee.org or (804) 291-7667.

NEWLY ELECTED VMS OFFICERS

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dalewn@vmi.edu **464-7547**

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