Representative MS Projects and Publications in Research Areas of Secure Coding, Secure Software Engineering, Formal Methods in Secure Software Engineering, Software Architecture, Computer-Aided Software Engineering (CASE), and Programming Language Paradigms

A. Secure Coding

Project 1: Secure Coding Assistant: Enforcing Secure Coding Practices using the ECLIPS Development Environment (Ben White, completed)


Project 2: Enhancing Secure Coding Assistant with Error Correction and Contract Programming (Chen Li, completed)

Publication: Chen Li, Benjamin White, Jun Dai and Cui Zhang, "Enhancing Secure Coding Assistant With Error Correction and Contract Programming," Proceeding of the National Cyber Summit 2017, Huntsville, AL, June 6-8, 2017

Project 3: Enforcing Secure Coding Rules for the C Programming Language Using the Eclipse Development Environment (Victor Melnik, completed)


Project 4: Combining Design by Contract and Programming Logic to Enhance Secure Coding Assistant System (Wenhui Liang, completed)

B. Secure Software Engineering, Formal Methods in Secure Software Engineering, and CASE

Project 1: An Enhancement to Java for Programming with Assertions Design and Implementation (Lucy Yuhong Zheng, completed)


Project 2: Computer Aided Development of Reliable C++ Programs -- An Improvement to C++ (Satish, completed)

Project 3: Making Design by Contract Available on Internet (Ching Yen Ho, completed)

Project 4: Support for Design by Contract in the C# Programming Language (Rachel Henne-Wu, completed)


Project 6: Formal Specification of a Communication Protocol (Vincent Botz, completed)


Project 7: Generating Java Skeletal code with Design Contracts from Specifications in a Subset of Object Z (Sowmiya Ramkarthik, completed)

Project 8: Enhancement to the Automated Conversion from Object-Z to Java Skeletal Code with Dynamical Checkable Design Contracts (Sherri Sanders, completed)


Project 9: Generating Skeletal Spec# Code from Specifications in a Subset of Object-Z for Both Dynamic and Static Verification (Xiufeng Ni, completed)


Project 10: Automating the SEI SQUARE Process for Eliciting, Categorizing, and Prioritizing Security Requirements for Software Systems and Applications (Gordon Yip, completed)


Project 12: Formal Specification in the Z Notation for Secure Query Processing in Deductive Database Systems (Ketul Rajanikant Patel, completed)

Project 13: Automating the SEI SQUARE Process with the Extensions of Formal Methods Support and Web Availability (Hadil Abukwaik, completed)


Project 14: Inferring Likely Design Contracts in Existing Code (Brian Bell, completed)

Project 15: Automating the SEI SQUARE Process for Privacy and Security (Alan Lai, completed)

**Project 16:** Enhancing a Design-by-Contract Tool using Inference Rules of Programming Logic (Nuha Aldausari, completed)


**C. Software Architecture and CASE**

**Project 1:** Enhancing ACME to Support Aspect Oriented Software Architecture (Tuong Le, completed)

**Project 2:** Automated Tool Support for the Architecture Tradeoff Analysis Method (Brad Liouberger, completed)


**Project 3:** A Tool to Connect Quality Attribute Requirements and Software Architecture Design Tactics (Ihsan Abdulsamed, completed)

**Project 4:** A Framework for Adding Design by ContractTM to the .NET Object-Oriented Programming Languages (Jennifer Pandolfo, completed)


**Project 5:** A Framework for Converting Formal Specifications in Object-Z to Dynamically Checkable Design Contracts in the .Net Programming Languages (Nixon George, completed)

**Publication:** Nixon Sunny George, Cui Zhang and Anne-Louise Radinsky, “FOZCIL: A Framework for Converting Formal Specifications in Object-Z to Design Contracts in OO Programming Languages,” *Proceedings of the IEEE International Conference on Information Reuse and Integration, pp. 218-221, Las Vegas, August 3-5, 2011*

**Project 6:** A Tool Support for the Cost Benefit Analysis Method (Lisa Darville, completed)

**D. Aspect Oriented Programming**

**Project 1:** Adding Aspect Oriented Programming Features to Microsoft C# (Wrote Channiti, completed)

**Project 2:** Adding Aspect Oriented Programming Features to Microsoft Visual Basic .NET by using the Multidimensional Separation of Concerns (MDSOC) Approach (Haryono, completed)


**Project 3:** Extending Visual Basic.NET Environment for Aspect Oriented Programming Using AspectJ Approach (Santhosh Balraj, completed)

**Project 4:** Adding Aspect Oriented Programming Features to C# using Hyper/J Approach (Angela Hantelmann, completed)


**E. Functional Programming Languages, Data-Flow languages, and Concurrent Programming Languages**

**Project 1:** A Graphical and Syntax-Directed Programming Environment for SML (Bin He, completed)

**Project 2:** A Visual Programming Environment for a Subset of Functional Programming Language ML (Brian Jesse, completed)

**Project 3:** A Dataflow Computer and Language (Malone Wong, completed)


**Project 4:** Extending C# in .NET with High Level Features for Concurrent Processing (Shimol Shah, completed)

**Project 5:** A Graphical Environment for both SML/NJ and MLj (Shivakumar Pillai, completed)
Project 6: A Debugging Tool for SML (Emilie Sholomytska, completed)

F. Programming Languages, XML, and Databases

Project 1: Implementing an Abstract and Hierarchical Data Structure in Java (Holly Jajlil, completed)


Project 2: Extending Java with an Abstract and Persistent Data Structure for Facilitating Database Processing in a Client/Server Environment (Brietta O'Leary, completed)


Project 3: An Extension and Experimental Implementation of An Abstract and Persistent Data Structure in an Multiple Client/Server Environment (Li Shao, completed)


Project 4: RDBMS Based XML Database Management System (Hongling Sun, completed)

Project 5: Generic XML Structure for Database Applications in any Type of Programming Language (Mahima Mallikarjuna, completed)

G. Other areas of Computer Science and/or Software Engineering

Project 1 (collaboration with faculty member at UC Davis): Embedding Ch into Apache Web Server for Dynamic Web Pages (Chia-Hsin Huang, completed)
**Project 2** (collaboration with faculty member at UC Davis): Design and Implementation of Ch/Tk for Interpretable Portable GUI in C/C++ (Wei Sun, completed)

**Project 3** (collaboration with faculty member at UC Davis): Integration of Mathematical Notation in OpenRCT (Christy Bouma, completed)

**Project 4**: A Computer Assisted Instruction Tool (Suzanne Minton, completed)

**Project 5**: An Improvement to an Open Source Tool for UML (David Lin, completed)

**Project 6**: A Tool Support for the Metrics of Agile Software Projects (James Gennoy, completed)

**Project 7**: A Demonstration System for the Generation of Web Site Accessibility Compliance Metrics Using Disparate Testing Tools (Dale Fletter, completed)