

How to Make a Poster Presentation

CENG416 Seminar

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20.05.2025

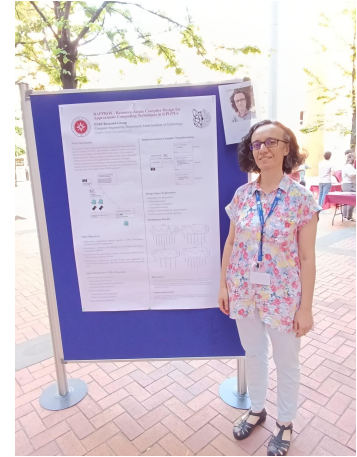
What is a Research Poster?

A summary of research/work

A visual display

Widely used in the academic community

A way to share ideas and generate discussion



Why Present a Research Poster?

Great experience for first time presenters

Experience presenting your work in a formal setting

Standard format used at many professional meetings

Get feedback from peers, faculty, and other experts

Share ideas and learn from others

Network in your area of study

Goals of a Research Poster

- Summarize every part of your work and your entire thesis to get an AA
- + Teach as many people as possible something you learned and a key result in your research

Poster Design

Meet the guidelines for the specific event

Match the audience knowledge base and interests

Focus your message – what is the one thing you want people to remember?

Convey your message visually

Be readable from about 1 - 2 meters away

Be clearly organized

Software

Microsoft PowerPoint

Latex

Adobe Illustrator, Photoshop

Fonts

Use large text (your text should be at least 18-24 pt; headings 30-60 pt; title >72pt.)

Do not use more than 2-3 font styles total

Use fonts that are easy to read (such as Times New Roman, Garamond, and Arial)

Text

Avoid jagged edges: left-justify text within text boxes or fully justify blocks of text

Avoid too much text (no more than 800 words max) and undefined technical jargon (depending upon your potential audience)

Organize and align your content with columns, sections, headings, and blocks of text

Layout/Graphics

White space is important to increase visual appeal and readability (this is the “empty” space between sections, columns, headings, blocks of text, and graphics)

Selectively incorporate charts, graphs, photographs, key quotations from primary sources, maps, and other graphics that support the theme of your poster. It is best to avoid using tables of data

Avoid fuzzy images; make sure all graphics are high-resolution (at least 300ppi) and easily visible

Content

What is the most important/interesting/surprising finding from your research project?

How can you visually share your research with attendees? Should you use charts, graphs, photos, images?

What kind of information can you convey during your talk that will complement your poster?

Content

Title (Use Big font, 10 words or less if possible) and Authors

Abstract/Summary

Background/Literature Review

Research Questions/Description of the Work

Materials, Approach, Process, or Methods

Results

Acknowledgements and References

Poster Presentation Examples

Detection and Mitigation of Anomalous Behavior in Embedded Automotive Networks

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ABSTRACT

Safety and security for drivers becomes crucial to the future of the automotive industry as advanced electronics permeate a vehicle's control systems. Electronic and wireless components within an embedded automotive network expose vulnerabilities to malicious attacks from internal and external sources. In order to combat a malicious attack on a vehicle's network, this work focused on using physical sensors embedded in a vehicle to classify normal driver behavior versus behavior resulting from an infiltration by an external agent. To investigate this method of intrusion detection, we accessed the raw communication data between various electronic control units (ECUs) and gathered pedal depression and steering wheel angle data from textile-based capacitive sensors. Our model for typical driver behavior includes comparison of the physical sensor readings of the steering wheel, brake pedal, and accelerator pedal to the data received from the ECUs. The resulting deployable attachment for an automobile's on-board diagnostics port detects and mitigates a variety of infiltrations from external agents, which serves to protect drivers from dangerous attempts to disrupt or disable electronic systems within their vehicles.

Introduction

State of Automotive Security

Consumers demand additional functionality. Automakers and government demand safety for their customers.

- Additional functionality includes Wi-Fi hotspot, GPS, Bluetooth, Internet applications, remote keyless entry, etc.
- Customer safety includes a variety of cyber-physical systems, such as Intelligent Parking Assist and Adaptive Cruise Control

Table of possible attack vectors due to safety-related cyber-physical systems

	Steering Wheel	Brake Pedal	Accelerator Pedal
Intelligent Parking Assist	X	X	X
Lane Keeping Assist	X	X	
Emergency Brake Assist		X	
Adaptive Cruise Control	X	X	X
Forward Collision Mitigation		X	

Previous Research



Vehicles used in previous research are 2010 Toyota Prius (left) and 2010 Ford Escape (right)

Advances in Automotive Networks and Control Units [1]

- Similar vehicles to previous research allows replication of attacks
- 2010 Toyota Prius → Dr. Nilanjan Banerjee's 2010 Toyota Prius
- 2010 Ford Escape → Sekar Kulandaivel's 2008 Ford Escape

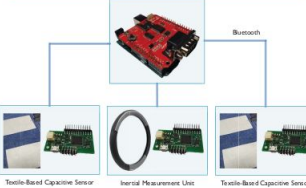
INTRUSION DETECTION SYSTEM

Steering Wheel Position and Pedal Depression ECU Network



Arduino Uno Microcontroller with CAN Bus Shield

Physical Sensors for True Position and Depression Values



Analyzing CAN Bus Traffic on Prius and Escape

Message IDs Found in Miller & Valasek Paper and in Our Vehicles

- Messages for 2010 Toyota Prius
 - CAN ID 0025 → Steering Wheel Angle
 - CAN ID 0224 → Brake Pedal Position Sensor
 - CAN ID 0320 → Brake Sensor
 - CAN ID 0245 → Accelerator Pedal Sensor
- Messages for 2008 Ford Escape
 - CAN ID 0080 → Steering Wheel Angle
 - CAN ID 0200 → Brake and Accelerator Pedal Sensor

DISCUSSION

CAN ID 0224 Byte-Field Description for 2010 Toyota Prius [1]

CAN ID	0024
Description	Brake pedal position sensor
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Poster Presentation Examples

Practical Considerations in designing High-Inductance, High-Voltage IGBT Circuits

*Julian Lolocono, Professor Fow-Sen Choa;
University of Maryland, Baltimore County, Baltimore, MD

Introduction

Insulated-gate bipolar transistors (IGBTs) are high-power switches with application in

- Electric vehicles
- Multi-phase inverters
- Induction ovens
- Transcranial Magnetic Stimulation (TMS)

Our project involves the latter, TMS, which is the science of stimulating the deep brain with high-power electromagnets. Early in the project, we ran into a major problem.

WHY DO OUR IGBTs KEEP DYING?

To determine the reason, we reviewed the papers of our model project, *Peterchev et. al* [1], and eventually implemented these distinct circuit elements: the snubber, the gate driver, and Litz wire. Equivalent implementations of Peterchev's work were developed by economical means.

Methodology

Circuit elements from the circuit depicted in Fig. 1 were removed one at a time to test the individual effectiveness of each on the related para-meter. Because of time and usage constraints, the Litz wire was only partially re-placed by solid doorbell wire. Snubber values were initially determined from Eqn. 1 and 2 [2].

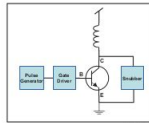


Figure 1

$$C_{sn} = \frac{L_s I_{ce}^2}{(V_{ce} - V_{ce1})^2} \quad R_{sn} = \frac{1}{6 C_{sn} f_{sw}}$$

Equation 1 Equation 2

Results

Gate Driver Effect Over Entire Pulse

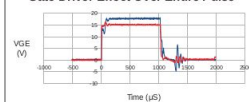


Figure 2a

Gate Driver Effect at Turn-On

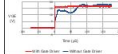


Figure 2b

Gate Driver Effect at Turn-Off

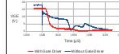


Figure 2c

Snubber Effect Over Entire Pulse

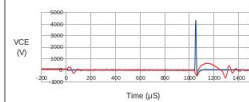


Figure 3

Litz Wire Effect at Turn-Off

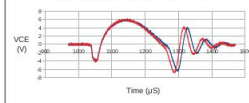


Figure 4

The Elements

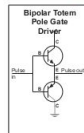


Figure 5

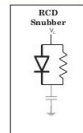


Figure 6



Figure 7

Conclusions

The following can be inferred from the results column:

- The gate driver (Fig. 5) effectively reduces both turn-on and turn-off time (Fig. 2).
- The snubber (Fig. 6) effectively reduces the kick-back voltage spike over the IGBT (Fig. 3).
- The Litz wire (Fig. 7) has a small effect on the oscillation speed of V_{ce} at turn-off (Fig. 4).

Further study would involve a more rigorous testing of the effect of the Litz wire with higher power, in which all stray wire is replaced by doorbell wire. Furthermore, study into the efficacy of our custom Litz wire versus commercially available equivalents would be very valuable

Acknowledgments

This research has been funded in part by a University of Maryland, Baltimore County Undergraduate Research Award, and by the Maryland Psychiatric Research Center



Sources:
[1] A.S. Peterchev et al., "A Transcranial Magnetic Stimulator Inducing Near-Rectangular Pulses With Controllable Pulse Width (of TMS)", IEEE Transactions on Biomedical Engineering, Vol. 55, No. 1, January 2008
[2] Y. Zhang et al., "Snubber Considerations for IGBT Applications", International Rectifier Corporation, Application Note 94-001

Poster Presentation Examples



A Data Management Planning Tool for
Understanding and Reporting Data about Data
Joshua E. Massey and Dr. Kimberly A. Tryka
National Institute of Standards and Technology



Introduction

When conducting a research project, it is essential to have a method for collection, maintenance and preservation, and publication of all associated data. Many research scientists compile this information in the form of a data management plan.

A data management plan (DMP) is a document that describes all aspects of a research project including a description of the project, methods used, how the project's data will be recorded, and how the results will be preserved and made available for future reference. Many funding sources and all federally-funded research projects require a DMP.

Components of a NIST DMP



Figure 1. This figure depicts the four major sections of a NIST data management plan: 1) The Summary of Activities details the steps taken throughout the project; 2) The Preservation Plan explains how data will be collected and maintained for future use; 3) The Public Access Plan states how the data will be released to the public; 4) Data Types and Data Classification provide information about formats. Additionally, the DMP collects information about instrumentation and equipment used and a specific Description of Data Set information (such as the creation date and title of the data set).

The MML Data Management Planning Tool
In Spring 2015, the Office of Data and Informatics (ODI) of the NIST Material Measurement Laboratory (MML) created a data management planning tool to be used for the laboratory. It was established as a centralized location where MML researchers could enter details about all of their projects and research activities. The tool also serves as a way for MML management to monitor the activity of the divisions and groups. In fall 2015, the tool was given the permanent name *Mimir*.

Project Goals:

1. Develop a reporting tool to better understand content of the MML Data Management Plans.
2. Analyze and interpret results to understand how researchers interact with the DMP tool so that it can be improved upon.

Reports

The main aspect of the project was to create an algorithm that output query results in a format from which reports could easily be generated. Two of the reports that were generated include a divisional summary and an employee summary.

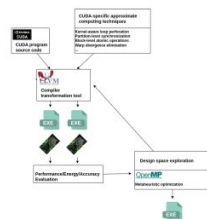
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Poster Presentation Examples



Work Description

Novel approximate computing techniques by considering architecture-specific features of GPUs and develop a compiler framework to perform those techniques automatically for the target CUDA program. Optimum Pareto solutions using a systematic design space exploration methodology to choose the approximate computing techniques. Parallel metaheuristic techniques which generate better results in reasonable times by considering energy consumption, performance, and accuracy rates of the approximate CUDA programs.



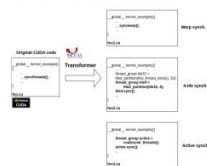
Main Objectives

1. Approximate computation methods specific to GPU architectures considering GPGPU applications
2. Developing a compiler tool applying the developed approximate computation methods
3. Evaluation of the performance, energy, and accuracy values by running candidate program versions
4. Metaheuristic method that performs design space exploration by evaluating the approximate calculation methods and different parameters

Approximation for CUDA Programs

1. Kernel-aware loop perforation
 - Kernel launch/perforation
 - Kernel launch configuration perforation
 - Inner-kernel loop perforation
2. Relaxed synchronization
 - Partition-level synchronization
 - Block-level atomic operations
3. Warp divergence diminution

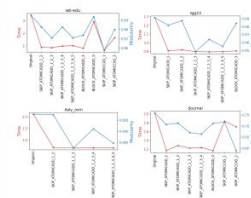
Source-to-Source Compiler Transformation



Design Space Exploration

- Multiobjective optimization
 - High performance
 - Low energy consumption
 - Acceptable accuracy
- Solution representation for target programs
- Problem-specific variation operators

Preliminary Results



References

- [1] S. K. S. "Bringing CUDA-aware approximate computing techniques to RISP-24: The 1st workshop on Resource-Awareness of Systems and Security (RASP-24)", March 2024.
- [2] B. K. T. and S. K. S. "GPURun: GPU runtime system performance and power monitoring tool". In: *Proc. 2023 Parallel Processing Workshop: Euro-Par 2023 International Workshops*. Springer, 2023.

Acknowledgements

This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK) Grant No. 122Y001. The work is partially supported by CERIC/AS COST Action CA1910 funded by COST Association.

CENG416 Poster Tips

Poster size: A0 vertical

Poster templates: Examples to be given

Poster printing: In campus or any other print centers

May 27 in our department

Multiple stands in open spaces

Timing and further details to be announced

How to Present Poster?

Put your posters on provided boards; hardware demos or laptops may sit nearby

Stand by the poster display while other participants can come and view the presentation and interact with the team

30-second talk to anyone who stops

2-3 minute walkthrough, pointing to visuals, answering questions

How to Present Poster?

Prepare and practice for common open-ended questions

Tell me about your research

How does this relate to the field?

How will this research impact your future research?

Be enthusiastic about your work

Practice projecting your voice (Have water)

Dress so you feel confident

References

<https://www.youtube.com/watch?v=WCKhmKeAXY0>

https://www.youtube.com/watch?v=kD_zCBT3GUk

<https://onurferhat.com/ismailari.com/blog/akademik-poster-hazirlama-2/index.html>

<https://ur.umbc.edu/poster-presentation-examples/>