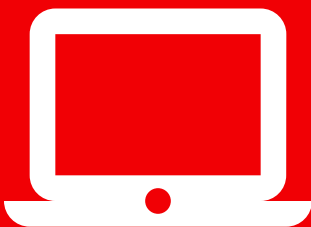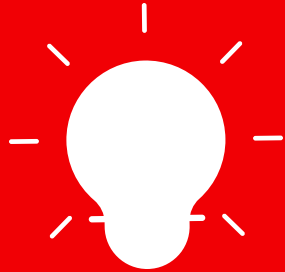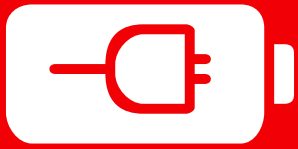# 15th Annual Graduate Research and Capstone Design Conference

CDC 2019

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Dr. Len Trombetta

COURSE FACILITATORS
Dr. Dmitri Litvinov
Dr. Steven Pei

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Dr. Steven Pei
Dr. Desiree Phillips
Dr. Rohith Reddy
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ECE would like to acknowledge the generous sponsors who support the 2019 Graduate Research and Capstone Design Conference
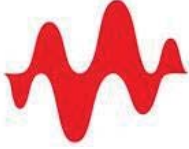
UNIVERSITY of HOUSTON | ENGINEERING
Department of Electrical & Computer Engineering

15th Capstone Design Conference

April 26, 2019
The Hilton UH Hotel & Conference Center
Houston, Texas

7:00 - 7:35 am	Registration, Conrad N. Hilton, Lobby
7:35 – 7:40 am	Opening Remarks by Dr. Steven Pei, Conrad AB Ballroom
7:40 - 10:00 am	Technical Program – Oral Session A, Conrad AB Ballroom
10:05 -10:30 am	Welcoming Remarks, Plaza Room

- Dr. Badri Roysam, Chairman, Electrical and Computer Engineering
- Dr. Claudia Neuhauser Associate Vice President/Associate Vice Chancellor for Research and Technology Transfer
- Dr. Suresh Khator, Associate Dean, College of Engineering

10:30 - 10:45 am	*Coffee Break,* Conrad N. Hilton, Lobby
10:45 - 11:45 am	Technical Program – Oral Session B, Conrad AB Ballroom
11:50 - 12:45 pm	Lunch, Waldorf Astoria, Ballroom
12:30 - 1:15 pm	Keynote Presentation: **"Engineers are from Mars, Students are from Neptune"** *Dr. Douglas Verret,* IEEE Lifetime Fellow, Chair of ECE Industry Advisory Board
1:15 - 2:15 pm	Technical Program – Oral Session C, Conrad AB Ballroom
2:15 - 2:30 pm	*Coffee Break,* Conrad N. Hilton, Lobby
2:30 - 3:30 pm	Technical Program – Oral Session D, Conrad AB Ballroom
3:30 - 5:30 pm	Technical Program – Poster Session, Conrad CD Ballroom
4:55 - 5:30 pm	Break for Team Preparation
5:30 - 6:00 pm	Elevator Talks by CDC students, Conrad AB Ballroom
6:00 - 6:30 pm	Awards Ceremony and Reception, Conrad AB Ballroom

Capstone Design Presentations

CDC 2019

The Hilton UH Hotel & Conference Center

April 26, 2019

7:35 – 7:40 am   **Opening Remarks by Dr. Steven Pei, Conrad AB Ballroom**

Session A: Oral Presentations

Poster #

Time: 7:40-10:00 am, Conrad AB Ballroom
Faculty Chair: Dr. Steven Pei

7:40 – 8:00 am   **MOTION KAYAK**   A1
Roger Canales, Vincent Collier, Cameron Gandy, and Jeffrey Sy

8:00 – 8:20 am   **REMOTE DATA EXTRACTOR**   A2
Thomas Brzezinski, Marinela Kane, Amir Kashefi, and Bryan Rothchild

8:20 – 8:40 am   **SMART BAR**   A3
Shihua Cai, Aaron Hollaway, Christopher McGinniss, and Martin Sillero

8:40 – 9:00 am   **SAFEHOME**   A4
Yash Desai, Nisha Ganeshan, and Tripi Shrivastava,

9:00 – 9:20 am   **ANDROID APP-CONTROL SMART LOCK**   A5
Abdul Asif, Lee Davis, William Gerwin, and Sean White

9:20 – 9:40 am   **COOGSTHETIC: ADAPTIVE PROSTHETIC FOR KIDS**   A6
Kiyah Brooks, Miguel Carrera, Osakpolor Evbuomwan, and Nikita Prasad

9:40 – 10:00 am   **INTERFACING NETWORK INFRASTRUCTURE TO**   A7
PERFORM UDP-BASED COMMUNICATION USING LIGHT
FIDELITY (LIFI)
Alexander Crosby, Juana Magaña, Jaskaranpreet Singh, and Jayson Varughese

10:05 – 10:30 am   **Welcoming Remarks, Plaza Room**

- Dr. Badri Roysam, Chairman, Electrical and Computer Engineering

- Dr. Claudia Neuhauser Associate Vice President/Associate Vice Chancellor for Research and Technology Transfer

- Dr. Suresh Khator, Associate Dean, College of Engineering

10:30 – 10:45 am   Coffee Break, Conrad N. Hilton, Lobby

Session B: Oral Presentations
Time: 10:45 – 11:45 am, Conrad AB Ballroom
Faculty Chair: Dr. Dmitri Litvinov

10:45 – 11:05 am   **SOLID-STATE RELAY MONITORING SYSTEM**   B1
                         Shayan Ghani, Ethan Hitchcock, Daniel Meza, and Audrey Wang

11:05 – 11:25 am   **HEY GOOGLE, PLAY MY CD**   B2
                         Gerard Barrientos, Nicholas Jagdeo, Ebrahim Meky, and Syed Naqvi

11:25 – 11:45 am   **KNUCKLES, THE ASSISTIVE ROBOTIC ARM**   B3
                         *Rym Benchaabane, Andrew Blanchard, Paola Hernandez, Matthew
                         van Zuilekom*

11:50 - 12:45 pm   **Lunch**, Waldorf Astoria, Ballroom

12:30 - 1:15 pm   **Keynote Presentation**, Keynote Presentation:
                         "Engineers are from Mars, Students are from Neptune"
                         Dr. Douglas Verret, IEEE Lifetime Fellow, Chair of ECE Industry Advisory
                         Board

Session C: Oral Presentations
Time: 1:15 – 2:15 pm, Conrad AB Ballroom
Faculty Chair: Dr. Len Trombetta

1:15 - 1:35 pm   **SWARMATHON IV**   C1
                         Jenny Duong, Ryan San Miguel, Jordan Perez, and Robert Phu

1:35 – 1:55 pm   **AUTONOMOUS DELIVERY DRONE**   C2
                         Ashita Bhojwani, Joel Kenneth, Nikhil Prajapati, and Steban Soto,

1:55 – 2:15 pm   **MULTI-INPUT GENERATOR**   C3
                         Drew Lawyer, Alexander Nguyen , Natasha Roberts, and Juan Sanchez

2:15 – 2:25 pm   *Coffee Break*, Conrad Balloom, Lobby

Session D: Oral Presentation
Time: 2:25 – 3:45 pm, Conrad AB Ballroom
Faculty Chair: Dr. Len Trombetta

2:25 – 2:45 pm   **MOBILE ROBOTIC VIDEOGRAPHER (MRV)**   D1
                         Ramsey Daou, Rhema Ike, Farah D. Luba, and Henry Nguyen

2:45 – 3:05 pm	**AUTOMATIC POWER FACTOR CORRECTION SYSTEM**	D2
	Ben Avner, Binh Duong, Jon E. Games, and Rakshak Talwar	
3:05 – 3:25 am	**SHASTA ADVERTISER MOBILE ROBOT**	D3
	Matt Anguiano, Jaime Juarez, Brandon Kain, and Matt Metoyer	
3:25 – 3:45 pm	**AUTOMATING A ROBOTIC ARM TO SORT AND ORGANIZE RESISTORS USING A PROGRAMMABLE LOGIC CONTROLLER (PLC)**	D4
	Tobiloba Atewologun, Michael Bittar, Edgar Castaneda, and Enrique Favela	

Session E: POSTER PRESENTATIONS
Time: 3:45 – 5:30 pm, Conrad CD Ballroom

All posters will match talks presented by the undergraduate students in the oral sessions.

5:30 – 6:00 pm   **Elevator Talks by CDC Students**, hosted by Dr. Len Trombetta, Conrad AB Ballroom

6:00 – 6:30 pm   **Awards Ceremony and Reception**, Conrad AB Ballroom

Plenary Speaker: Douglas Verret, Ph.D.
"Engineers are from Mars, Students are from Neptune"

This talk is about the state of engineering education in the modern age and the challenges that educators and students will face in a dynamic and fast-changing environment. The global population of engineers has been growing for decades and is forecasted to continue through the next decade and beyond. Except for BSEEs this trend is evident in the US as well. The largest percentage growth of technical professionals has been outside North America and Western Europe. There will be a growing commoditization of technical professionals globally. The average length of a 'technical career' is diminishing, which increases the need for continuing education to prepare people for mid-career job shifts or simply to update people in their current jobs. *The need for and interest in technical information is increasing dramatically.*

There is increasing emphasis on conserving natural resources and on developing renewable energy sources as alternatives to oil and coal. There will be a continuing shift of world influence from present developed nations to developing nations. There will be a continuing "flattening" of the world as the internet allows people to be easily connected around the globe to conduct business. This will be especially true in areas of information and knowledge access *which will influence* business and *education competitiveness*. Centers of technology excellence (*e.g.* universities) have spread rapidly across the flat world.

There is a greater disconnect between individuals and employers. Engineering will continue to become more interdisciplinary. Employers are expecting immediate value contribution. Changing age demographics will pose a threat of knowledge loss as the "baby boom" generation's more experienced professionals retire. There will be a need to identify gaps in *practical knowledge* in transfer from one generation to the next.

Because of the ubiquity of mobile devices technical information is available pretty much anywhere at any time. Current boundaries between various disciplines, including science and technology are less distinguishable. There is greater activity in biological and medical systems and interaction with engineering. Many enterprises are awash in data of many different types at high velocity (2.5×10^{18} bytes/day[1]) and uncertain veracity, some needing rapid analysis. Public perception of the security of data is low. Everything that can be is being made "smart" via artificial intelligence.

Given this climate and the state of the profession, we will provide some perspectives about what this implies for engineering schools and their students, which challenges are present in the current university structure (cost, value, insularity, competition) that will have to be overcome or mitigated and what students will need to do to prepare for this environment beyond what is in the current curriculum. The perception of the student experience is often perceived by industry as "other worldly" as if students inhabit another planet. An attempt will be made to describe the "real world" environment of engineering practice in contrast with the orderly academic environment.

1. Bernard Marr, www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/#6d2f7aa160ba

Dr. Douglas Verret

IEEE Life Fellow
Texas Instruments Fellow Emeritus
Chairman of the *Industry Advisory Board* for the Department of Electrical and Computer Engineering.

Dr. Douglas Verret is a world recognized expert in microelectronics with lifetime achievements in the semiconductor industry⋯a physicist and an engineer in action to create better electronics. He was an architect and leader in developing many new generations of silicon devices and processes for electronic circuits and systems, since he first joined Texas Instruments Inc in 1979. Terms such as double-level metal (DLM) process for Low Power Schottky TTL devices, polysilicon emitter, deep trench isolation and planarized metal technologies in TI digital Bipolar and BiCMOS circuits and many others have now an important meaning as pioneering steps in the development and progress of microelectronics. The teams he led created numerous Integrated Circuits (ICs) still in use today and sold by companies such as Apple Computer, IBM, Intel, Bosch, Sirius XM and Delphi among others.

Dr. Verret's career in microelectronics includes multiple managerial positions at TI and also in SEMATECH, a consortium of fourteen US semiconductor companies and the US government residing in Austin TX where he was the Director of Manufacturing Techniques and Standards and developed their 0.5um CMOS technology. His most recent positions included Program Manager of 65nm eflash technology followed (in 2012) by Manager of TI's next generation embedded flash technology. The 65nm technology was the first and still is the only 65nm embedded flash technology in the automotive and safety markets.

Dr. Douglas Verret's contributions to science and technology are well recognized by his numerous editorial positions in IEEE journals and conferences, program and leadership committees and by his membership in truly many council and advisory, educational and science boards at several foundations, schools and universities. He holds sixteen patents.

He is married to Ellen Verret Ph.D., who is a psychologist in Fort Bend Independent School District and they are the proud parents of Sybil Lincecum Au.D and Laurence Verret, MBA, CPA. They are also the fawning grandparents of four granddaughters. In his spare time he is a student of comparative mythology and alternates between playing the guitar badly and the trumpet miserably.

CDC AUTHOR INDEX

Thank you for joining us at the 2019 Graduate Research and Capstone Design Conference!