



Semiconductor
Research
Corporation

AMS-CSD Research Program Annual Review

Oct 17-20, 2023

UT Dallas, TX

Marcus Pan, Science Director

LaTanya Holmes, Research Program Coordinator

<https://www.src.org/calendar/e007770/>

Because the future can't wait, we bring the
best minds together to achieve the
unimaginable

Thank you!

On Behalf of the SRC,

Thank You!

- To all the industry members for their sponsorship and mentorship
- To all the Principal Investigators & their Students for the great research effort
- To LaTanya Holmes at SRC for the logistical support
- To all of you for being in-person and also online with us!



e-kickoff Reminders



Everyone will be participating in-person or online

Presenters should remember to speak clearly and keep within the allotted time.



Timing:
30 min (presentations, 25 min talks)

Presentations and Q&A will be live. Please be mindful, so watch the time to leave 5 minutes for Q&A!!!



Informal Presentations

Please indicate if you want the audience to interrupt with questions. Q/A will occur at the end.

Reminder: Invoicing and Deliverables



Regular invoicing

Invoice on regular basis: monthly is preferred

Excess money (calendar year) is considered profit and taxable!

Spending must occur within contract period

Invoicing expected to be at or above 90% invoiced at end of each contract period

Final invoice within 60 days after project ends



Submit deliverables on time: even 1 day is too late!

System will flag delinquencies

Late deliverables will stop invoices being paid and can jeopardize future funding

Contact SRC if there are issues with getting deliverables on time

All submissions will be done in Pillar Science



Pre-publication drafts must be deposited at SRC > 60 days before published

Best practice: deposit draft to SRC website when submitting to journal/conference (also thesis)

Update the draft on the SRC website with final paper after acceptance (select submit a new version)

Acknowledgement of SRC funding must be added to all publications

At minimum, the acknowledgement should read: "This work was supported in part by Semiconductor Research Corporation (SRC)."

Reminder: Send News Items to SRC

- Send noteworthy events and announcements that you and your team are involved in to SRC
- Send this information on a monthly basis. We use what we can in our SRC newsletter and monthly emails to the Advisory Board and liaisons
 - Best Paper Awards (who, award, title of piece, where, when and photos of students/faculty)
 - Papers, posters presentations, and/or conference talks
 - Professional Recognition Awards: IEEE, teaching awards, etc.
 - Professional activities such as workshops, tutorials, and invited talks
- All submissions must have a web link (URL) to the award, paper, etc.
 - If you have your own website that contains information pertaining to your research, share the link with SRC as well



More Than
17,000
subscribers!!



Resources that Help Academics Evaluate, Adopt, and Amplify Emerging Member Solutions

Member Resources

- SRC has collected information members provide for the academic community, including education, design, and prototyping
- SRC researchers and students are encouraged to take advantage of these resources in their research and education activities

Member Resources

SRC has collected information members provide for the academic community, including education, design, and prototyping. SRC researchers and students are encouraged to take advantage of these resources in their research and education activities

Intel

- Intel Open Data Center Diagnostic Project
- Intel Academic Compute Resource Environment (ACE)
- Intel Academic Program for oneAPI

Analog Devices

- Active Learning Program
- ADALM-SR1 Hardware
- ADALM-SR1 Switching Regulator Active Learning Module

ARM

ARM Academic Access
ARM Education

- ARM University Program Education Kits
- ARM Education Online Courses
- ARM Education Textbooks and Reference Books

Texas Instruments

Specific tutorial and curriculum for universities include:

- Texas Instruments University Program
- TI Robotics System Learning Kit
- TI Power Management Lab Kit
- TI Experimental Power Electronics Reference and Curriculum
- TI Precision Labs

IBM

- IBM tutorial and curriculum for universities
- IBM Skills Academy
- IBM + Coursera
- IBM PhD Fellowship Program
- IBM Quantum Computing - student opportunities
- IBM AI Hardware

NXP

- Rapid IoT Prototyping Kit

Siemens

- EDA Academic Products

Qualcomm

- University Relations Program



INFORMATION
About SRC
News
Contact
FAQs
Privacy Policy
Members & Partners
Contracts & IP
Management Charts
Corporate Annual Reports

FOR MEMBERS
My Company @ SRC
Liaisons

SRC VALUE
Awards Programs
Patents
Recruiter Guide
SRC Timeline

ACADEMIA
Researcher Resources
Funding Opportunities
Career Opportunities
Participating Universities
Education Alliance



4819 Emperor Blvd, Suite 300 Durham, NC 27703



Voice: (919) 941-9400 Fax: (919) 941-9450



<https://www.src.org/program/grc/guide/researcher/guidelines/>

SRC Student Platform on LinkedIn

- What is the **SRC Research Scholars Program**?
 - SRC provides undergrads, graduate students, and postdoctoral researchers with a unique education consisting of traditional course work, cutting-edge research, and direct interaction with the semiconductor industry
 - These Research Scholars work on industry-relevant research with SRC-funded faculty who are recognized experts in their fields
 - Through our extensive community of academics and industry personnel, we nurture the evaluation of the talent pipeline for our industry and beyond
 - Our alumni have become industry leaders and renowned faculty researchers, creating a virtuous cycle where mojo begets mojo

**Join Now!
And add
them to
Pillar Science**

Get LinkedIn with SRC

SRC uses a special LinkedIn Affiliate page for the SRC Research Scholars Program. Undergrad, graduate students, and postdoctoral researchers participating on SRC research add their SRC Research Scholars experience to their LinkedIn profile. This allows Scholars a way to professionally showcase their talent and experience. It also simplifies how recruiters, engineers, and even other Scholars can find SRC Research Scholars, using either the LinkedIn Search* or LinkedIn Recruiter*.

**SRC Research Scholars
Program***



By being part of our community, Research Scholars will have a unique opportunity to get to know professionals with careers in the semiconductor industry or government, top researchers in their fields, and other students with similar interests.



SRC encourages all undergrads, graduate students, and postdoctoral researchers to join this program!!!

<https://www.src.org/student-center/handbook/linkedin/>

Pillar Science Common Issues & Links for Academics

- There are lots of help articles in Pillar Science which can help answer these questions.



- Here's an article about logging into Pillar Science
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/11198322803099-How-To-Login-to-Pillar-with-SRC-org-Credentials>
- Here's an article about update your profile in Pillar Science
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/10330492961563-How-to-Edit-Your-Profile>
- Here's an article about adding students, administrators, or other academics to your project
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/10330872380187-How-to-add-Students-Admins-or-other-Academics-to-Your-Project>
- Here's an article about submitting projects results and deliverables
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/11213311626139-How-to-Submit-Project-Results-previously-known-as-publications->
- SRC hosted a live demonstration for academics on January 31, 2023, and the recording is available
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/12543067480091-Pillar-Science-Demonstration-for-Academics-Video-Recording->



Pillar Science Common Issues & Links for Industry

- There are lots of help articles in Pillar Science which can help answer these questions.



- Here's an article about logging into Pillar Science
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/11198322803099-How-To-Login-to-Pillar-with-SRC-org-Credentials>
- Here's an article about update your profile in Pillar Science
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/10330492961563-How-to-Edit-Your-Profile>
- Here's an article about adding yourself as a liaison
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/10092535189403-How-To-Add-Yourself-As-A-Liaison>
- Here's an article about how to find research projects of interest
 - <https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/9194403647131-Using-Projects-Page>
- There was 2 industry demonstrations for industry on February 14 and 21
 - The recordings can be found on the SRC.org website at : <https://www.src.org/pillar/>



<https://semiconductorresearchcorporation.zendesk.com/hc/en-us/sections/11366772078235-How-Tos-for-Industry>

Guidance for Depositing Supporting Code and Data with Pre-Publications

As part of our move to Pillar Science, there is the ability to collect not just the pre-publications PDF's but also arbitrary file formats (.mp4, .ppt, etc.) as well. This new capability enables a new way for SRC programs to facilitate technology transfer to our sponsors.

Going forward, we will be requiring that all code and supporting data below a certain size threshold to reproduce a pre-publication also be uploaded to Pillar Science.

•SRC's reasons for doing this are:

1. **To more fully document the research output of our programs to demonstrate to our sponsors the breadth and depth of the funded work**
2. The full value of code and data is not often found with its original author but when used across a wider scientific community like our sponsors
3. By having better data and code visibility in our programs, our sponsors will have a better understanding how to connect with researchers

Historically, there has been concern amongst researchers that the code and the data are not "camera ready" for distribution at the pre-publication state. **While these concerns are valid, perfect is the enemy of accomplishment.**

- SRC seeks to obtain a snapshot of your code at the state it was in when you submitted your publication to the SRC repository.
- If your code and data are not in a state that you would want to post on an open code repository like GitHub, that is acceptable. Our sponsors employ trained professionals who have the experience to handle and interpret idiosyncratic legacy code and documentation.
- SRC would also like the data collected and used to generate publications to be submitted to Pillar Science as well.
- Preferably in a single compressed file in an open format marked with the publication's name followed by data so that it read like this, "[Publication Name]_data.ZIP".**

The submission of data to SRC is a direct ask, although it is a right granted by terms of the sponsored research agreement.

- Contained within that compressed file should be the data used to generate figures, any code developed for that publication as well as any experimental data acquired if the file size is below 10 Mb.**
- If the data file is in a proprietary file format as often happens with analytical instruments, please convert it to an open format before uploading
- If you are not able to convert from proprietary file format to an open file format, please include it in the compressed data file anyway.
- If the data was acquired from an open depository like the UCI Machine Learning Repository, a notification of that along with a dated weblink in a .txt file should be included.



<https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/14019093083163-Guidance-for-Submitting-Supporting-Code-and-Data->

Key Performance Indicators (KPI) Process



- KPI instruction video is available: <https://www.src.org/src/guide/kpi/>

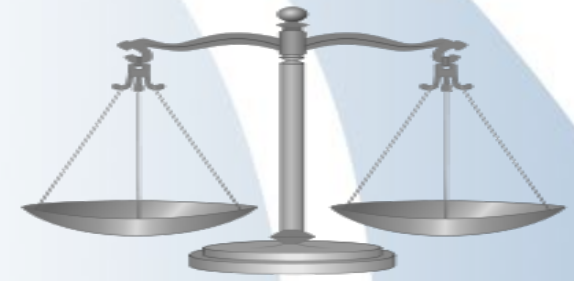


We moved KPI process flow to Pillar Science this year and make KPI process visible to SRC members to maximize research experiences with meaningful Technology Transfers.



<https://semiconductorresearchcorporation.zendesk.com/hc/en-us/articles/15056064943771-How-to-edit-and-manage-your-Key-Performancer-Indicators-KPI-card->

Intellectual Property Statement



- The information provided by researchers during this annual review
 - Is the property of the university and of the researchers presenting this information
 - May include research results sponsored by and provided to the funding members
 - May include intellectual property rights belonging to the university and SRC, to which sponsors may have license rights
- By attending or viewing this review, you are agreeing
 - Not to use this information for purposes unrelated to the review unless and until approved by SRC
 - To keep this information in confidence until the university and SRC have evaluated and secured any applicable intellectual property rights
- After any intellectual property rights have been secured, the SRC encourages the University and researchers to publish and freely disseminate this information and results of the sponsored research program.
 - Worldwide patent rights are waived if publication or public dissemination occurs prior to filing a corresponding U.S. provisional or utility patent application



General Data Protection Regulation

- Applies to SRC
- Personal data regulations
- Involves privacy notices, consent, and security
- SRC Privacy Policy



AMS-CSD Annual Review Agenda (Tuesday)

<https://www.src.org/calendar/e007770/>

Tuesday, October 17th

8:00 - 8:30 am	Registration Breakfast	
8:30 - 8:45 am	Welcome / Introduction	Marcus Pan / SRC
8:45 - 9:15 am	Task 3160.017 - Multi-phase Sub-100fs Jitter Ring-oscillator-based Clock Multipliers for Beyond 100Gb/s Links	Pavan Hanumolu / Mahmoud Khalil (student) Univ. of Illinois / Urbana-Champaign
9:15 - 9:45 am	Task 2810.061 - Two-Stage Vertical Power Delivery and Management for Efficient High-Performance Computing	Hanh-Phuc Le (remote) / Hieu Pham (student) University of California - San Diego
9:45 - 10:45 am	Task 2810.092 - Battery-Charging CMOS Voltage Regulator for Resistive Low-Voltage DC Sources	Gabriel Rincon-Mora (remote) / Xi Li (Student) Georgia Institute of Technology
	Task 3160.024 - On-the-Go Battery Charging/Battery Monitoring SIMIMO Voltage Regulator	Gabriel Rincon-Mora (remote) / Linyuan Cui (Student) Georgia Institute of Technology
10:45 - 11:00 am	Break	
11:00 - 11:30 am	Task 2810.067 - Highly Efficient Extreme-Conversion-Ratio Buck Hybrid Converters	Deukhyoun Heo Washington State
11:30 - 12:30 pm	Task 2810.065 - Power-Efficient and Reliable 48-V DC-DC Converter with Direct Signal-to-Feature Extraction and DNN-Assisted Multi-Input Multiple-Output Feedback Control	Mingoo Seok Columbia University
	Task 3160.016 - MODO: Hybrid SIMO-DLDO DC-DC Converter for Multi-Core Microprocessors and System-on-Chips	
12:30 - 1:30 pm	Lunch	
1:30 - 2:00 pm	TxACE Overview	Kenneth O University of Texas - Dallas
2:00 - 2:30 pm	Task 2810.056 - Millimeter Wave Packaging Research - Antenna in Package	Rashaunda Henderson / Students: Aditya Jogalekar; Oscar Medina; K. Nambiar University of Texas - Dallas
2:30 - 3:00 pm	Task 2810.075 - Hybrid Step-Down DC-DC Converter with Large Conversion Ratios for 48V Automotive Applications	Hoi Lee / Jin Liu University of Texas - Dallas
3:00 - 3:30 pm	Task 2810.079 - High-Power-Density In-Package SIMO Converters for Next-Generation Microprocessors	Cheng Huang / Lei Zhao (student) / Junyao Tang (student) Iowa State University
3:30 - 4:00 pm	Task 3160.027 - Information-Centric Secure Conversion Interfaces for Energy-Efficient Wireless Systems	Rabia Yazicigil / Timur Ziriloglu (student) Boston University
4:00 - 4:15 pm	Break	
4:15 - 6:00 pm	TAB Caucus	
6:00 - 8:00 pm	Dinner: Ten50 BBQ, 1050 N Central Expressway, Richardson TX	
8:00 pm	End of Day 1	

All Times in Central Time
(Texas, Dallas)



Virtual connection is available

AMS-CSD Annual Review Agenda (Wednesday)

<https://www.src.org/calendar/e007770/>

Wednesday, October 18th

8:00 - 8:30 am	Registration Breakfast	
8:30 - 8:40 am	Welcome / Introduction	Marcus Pan / SRC
8:40 - 9:10 am	Task 3160.015 – ULP Receivers	David Wentzloff (remote) / Michael Flynn / Trevor Odelberg (student) University of Michigan
9:10 - 10:10 am	Task 2810.070 - Early and Late Life Failure Prediction Methods for Analog and Mixed-Signal Circuits	Chris Kim University of Minnesota
	Task 3160.013 - Energy-Efficient Circuits and Architectures for Cryogenic Operation	
10:10 - 10:40 am	Task 3160.022 - Domain-Voltage Regulator Co-design for Enhanced SoC Energy Efficiency	Vivesh Sathe Georgia Institute of Technology
10:40 - 10:55 am	Break	
10:55 - 11:25 am	Task 3160.021 - Automated Generation of Comprehensive Voltage/Frequency Domains - Logic+PLL+Voltage Regulation	Visvesh Sathe Georgia Institute of Technology
11:25 - 11:55 am	Task 2810.060 - Intelligent, Learning ADCs for the Post Figure-of-Merit World	Michael Flynn / Evelyn Ware (student) University of Michigan
11:55 - 12:25 am	Task 2810.062 - Multi-Carrier DAC-Based Transmitter Architectures for 100+Gb/s Serial Links	Samuel Palermo / Sebastian Hoyos Texas A&M University - College Station
12:25 - 1:30 pm	Lunch	
1:30 - 2:00 pm	Task 3160.009 - 100+GS/s Time-Domain Analog-to-Digital Converters	Samuel Palermo Texas A&M University - College Station
2:00 - 2:30 pm	Task 2810.063 – Analog and Digital Assist Techniques to Improve Mixed-Signal Performance	Rohit Rothe student of Dennis Sylvester & David Blaauw University of Michigan
2:30 - 3:30 pm	Task 3160.008 - High-Speed DAC with High Output Power and Linearity	Shuo-Wei Chen / Soumya Mahapatra (student) University of Southern California
	Task 3160.010 - Design Automation of Low Phase Noise PLL	
3:30 - 3:45 pm	Break	
3:45 - 5:15 pm	TAB Caucus	
5:15 - 6:15 pm	Poster Session	
6:15 - 8:15 pm	Dinner: On-site @ Axxess Atrium Lobby Area in ECSW Building	
8:15 pm	End of Day 2	

Virtual connection will be available

All Times in Central Time
(Texas, Dallas)



AMS-CSD Annual Review Agenda (Thursday)

Thursday, October 19th

8:00 - 8:30 pm	Registration Breakfast	
8:30 - 8:40 am	Welcome / Introduction	Marcus Pan / SRC
8:40 - 9:10 am	Task 2810.076 - High Precision Positioning Techniques Based on Multiple Technologies and Frequency Bands	Murat Torlak / Shamman Shoudha (student) / Jayson Van Marter (student) University of Texas - Dallas
9:10 - 9:40 am	Task 2810.081 - Development of 70-95 GHz Terabit Beamformer	Huei Wang (remote) / Tian-Wei Huang (remote) / Kun-You Lin (remote) National Taiwan University
9:40 - 10:10 am	Task 2810.082 - Adaptive Digital Cancellation of Dynamic Error from Clock Skew, Component Mismatches, and ISI in High-Resolution RF DACs	Ian Galton University of California - San Diego
10:10 - 10:40 am	Task 2810.064 - Characterization and Tolerance of Ageing in Integrated Voltage Regulators	Saibal Mukhopadhyay / Shida Zhang (student) Georgia Institute of Technology
10:40 - 10:55 am	Break	
10:55 - 11:25 am	Task 3160.019 - Mixed-Domain High-Performance CT- $\Delta\Sigma$ ADCs	Nima Maghari University of Florida
11:25 - 11:55 am	Task 2810.068 - Active EMI Filtering with Switch-Mode Amplifier for High Efficiency	Alex Hanson University of Texas - Austin
11:55 - 12:25 pm	Task 2810.071 - Accurate Compact Temperature Sensors for Thermal Management of High Performance Computing Platforms	Randall Geiger / Degang Chen (remote) Iowa State University
12:25 - 1:30 pm	Lunch	
1:30 - 2:00 pm	Industry Talk: Workforce Development for Analog IC Design in USA. It's Time to Act	Gabriele Manganaro MediaTek
2:00 - 2:30 pm	Task 3160.012 - Small-area Low-power DAC Designs with In-field Digital Calibration Ensuring Lifetime High Linearity	Degang Chen (remote) / Is Iowa State University
2:30 - 3:00 pm	Task 3160.018 - Pseudo-Static Storage Circuits for Extreme Low Voltage Cryo-CMOS Applications	Jaydeep Kulkarni University of Texas - Austin
3:00 - 3:30 pm	Task 2810.066 - Demonstrably Generalizable Compact Models of ESD Devices	Elyse Rosenbaum Univ. of Illinois / Urbana-Champaign
3:30 - 3:45 pm	Break	
3:45 - 5:30 pm	TAB Caucus	
5:30 pm	End of Day 3	

Thanks for Gabriele @ MediaTek to give us industry talk!

All Times in Central Time
(Texas, Dallas)



Virtual connection will be available

AMS-CSD Annual Review Agenda (Friday)

Friday, October 20th

8:00 - 8:30 am	Registration Breakfast	
8:30 - 8:40 am	Welcome / Introduction	Marcus Pan / SRC
8:40 - 9:10 am	Task 2810.059 - Ultra-Low-Power Robust SAR ADC for PMCW Automotive RADAR	Yun Chiu University of Texas - Dallas
9:10 - 10:10 am	Task 2810.074 - Thermal Performance Characterization and Degradation Monitoring of LDMOS based Integrated Power IC with On-Die Temperature Sensors	Bilal Akin University of Texas - Dallas
	Task 2810.090 - Motor Health Monitoring	
10:10 - 10:40 am	Task 3160.011 - G-Band CMOS mm-Wave Imager and Sensor for Biomedical Applications	Ali Niknejad (remote) Univ. of California - Berkeley
10:40 - 10:55 am	Break	
10:55 - 11:25 am	Task 2810.077 - Increasing Lifetime of Nano-Scale CMOS Circuits	Kenneth O / Yiorgos Makris University of Texas - Dallas
		Chris Kim University of Minnesota
11:25 - 12:15 pm	Task 3160.020 - Transient Reliability and Condition Monitoring of GaN HEMTs	Bilal Akin University of Texas - Dallas
	Task 3160.030 - Study of Active Discharge and Efficient Driver Architecture for High Power Systems	
12:15 - 12:35 pm	Task 3160.029 - Arrayed Texas Instruments DMD and PLM for Advanced Solid-state Lidar and Holographic Display	Yuzuru Takishima / Yushi Kaneda University of Arizona
12:35 - 12:55 pm	Task 3160.028 - 0.5-degree Angular Resolution Submillimeter Electromagnetic Wave Radar Imaging using a 9-cm Diameter Electronically Steerable Reflector	Kenneth O University of Texas - Dallas
12:55 - 1:05 pm	Break / Grab-n-Go Box Lunch	
1:05 - 2:35 pm	TAB Caucus (Working Lunch)	
2:35 pm	End of Annual Review	



All Times in Central Time
(Texas, Dallas)

Virtual connection will be available

Thank You!



Opens?



SRC Liaison Program

Maximizing the Value of Participation

Move Yourself, Your Company and the Next Generation Forward

Develop the Workforce

- Provide relevant guidance for industry challenges
- Prepare students to enter industry or pursue future academics

Contribute to Research

- Encourage technology exchange between university and industry
- Bridge the conventional gap between academia and industry

Academia Contributes to Industry

- Provide an out of the box approach to current problems which enhance industry research and development enables a differentiated product for the marketplace
- Provide an outside perspective adding diversity to the thought process of how best to attack a challenge

Access New Technology

- Gain valuable insights into problems and solutions that will ultimately impact industry competitiveness
- Provide an effective way to deliver actionable research results directly into their companies

Identify the Best

- Identify the most compelling research from current and recent research

Expectation to have regular PI-Liaisons calls at least one every 4-8 weeks



SRC's Amazing Community

Academics solving meaningful problems
Increase of tech transfer to industry
Clear investment Return Of Investments

SRC Program Manager

- Runs Advisory Board and aligns research
- Educates PI about requirements and responsibilities
- Encourages Liaison participation
- Finds opportunities for further engagement

University Principal Investigator

- Pursues ambitious, ground-breaking research
- Schedules regular calls, every 4-8 weeks
- Arranges meet-ups at conferences
- Presents research at annual reviews

Research Scholar

- Leads meetings
- Presents findings
- Aims to present at TECHCON
- Is knowledgeable about SRC members

Industry Liaison

- Provides industry perspective to PI
- Transfers technology & people into company
- Advocates for SRC research
- Coordinates with Advisory Board

