
Next Generations of IC Designers

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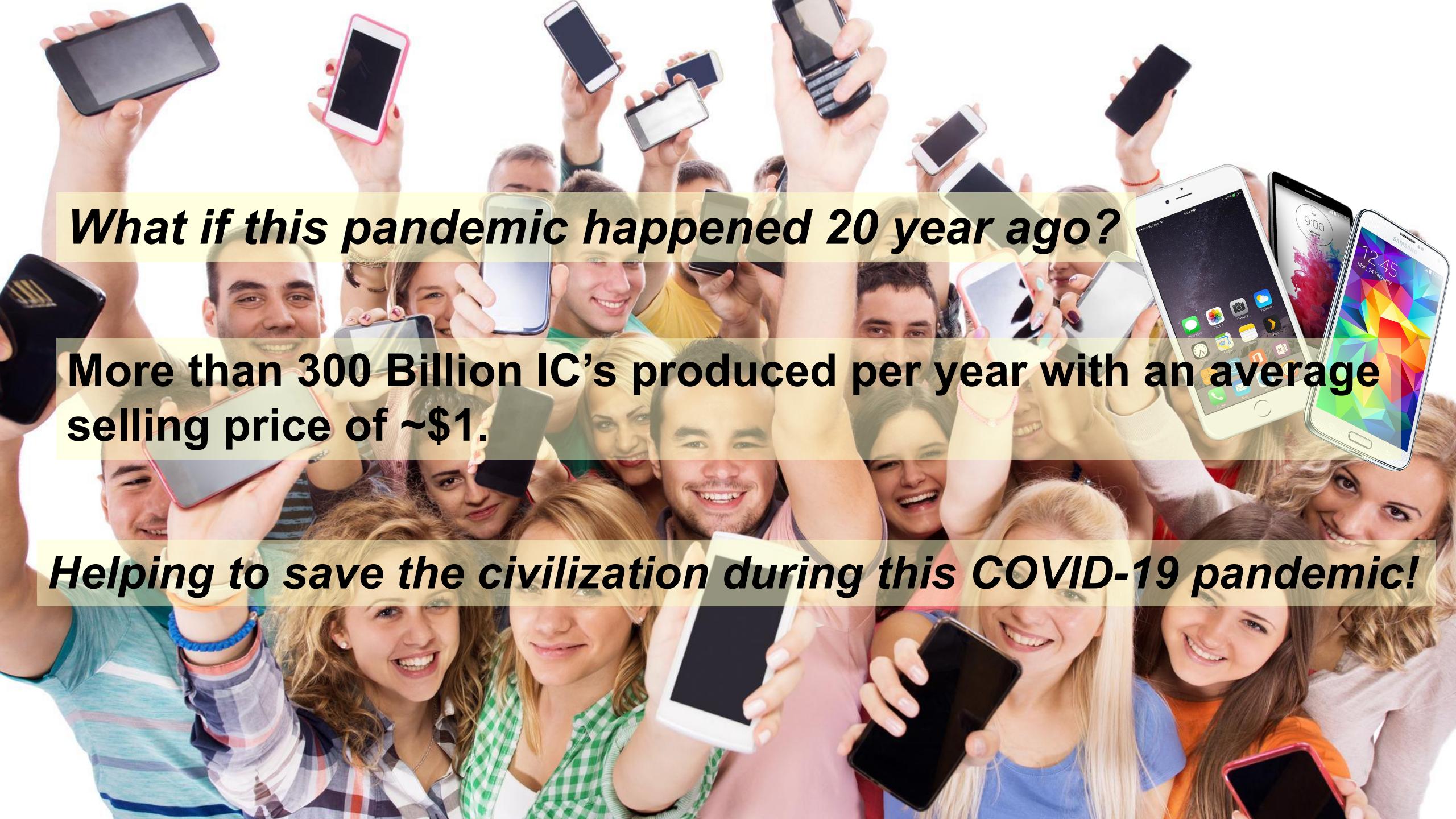
**University of Texas at Dallas
October 14th, 2021**

Next Generations of Integrated Circuit Designers

Need to compete for the attention of undergraduate and pre-college students: Help them discover passion for IC design.

Need to excite students in the ethnic and gender groups and from geographical regions under-represented in the IC design community: 5% of SSCS members are women. Hispanics and African Americans are similarly under-represented.

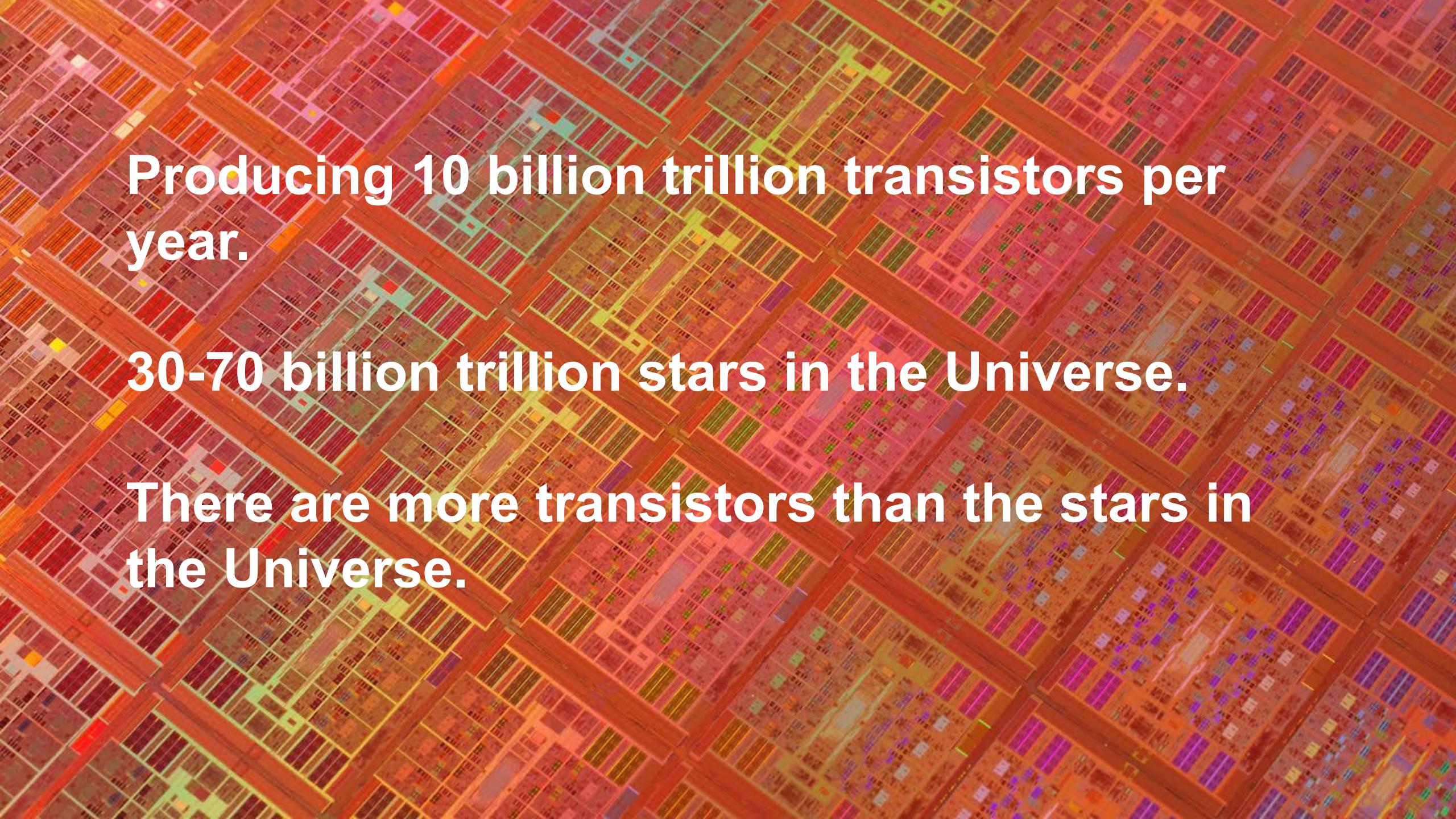
This could make huge impact.



What if this pandemic happened 20 year ago?

More than 300 Billion IC's produced per year with an average selling price of ~\$1.

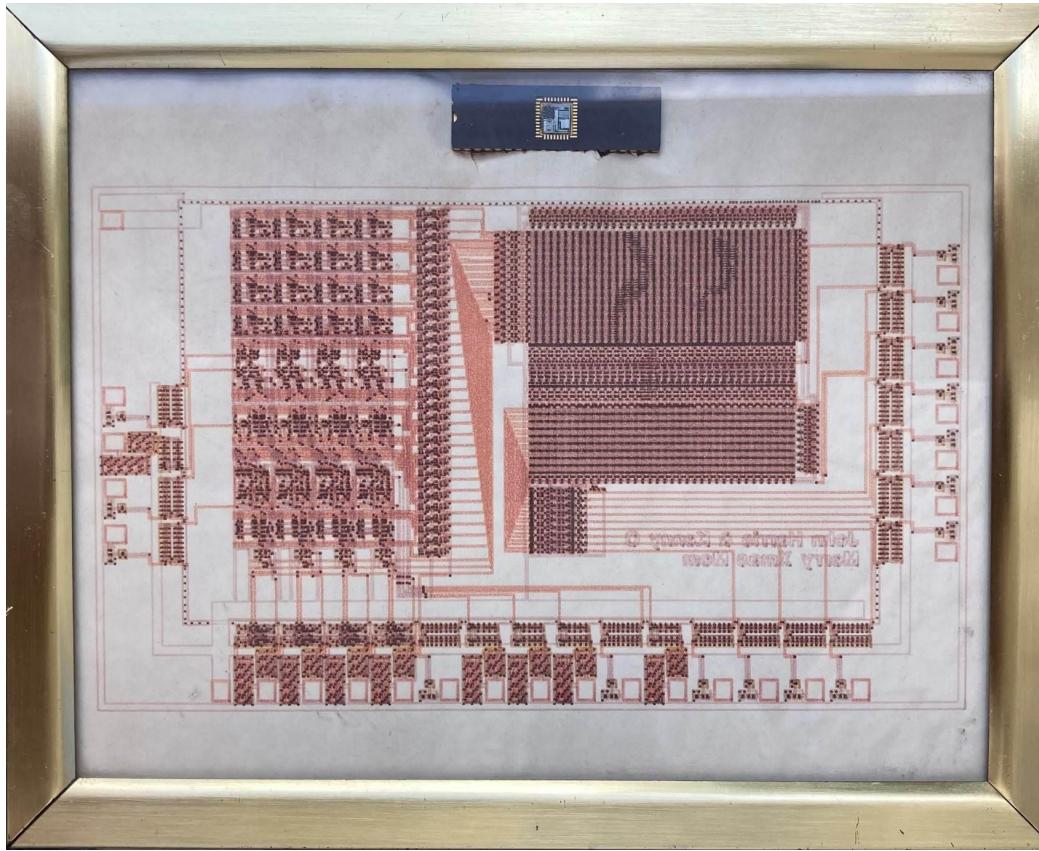
Helping to save the civilization during this COVID-19 pandemic!



Producing 10 billion trillion transistors per year.

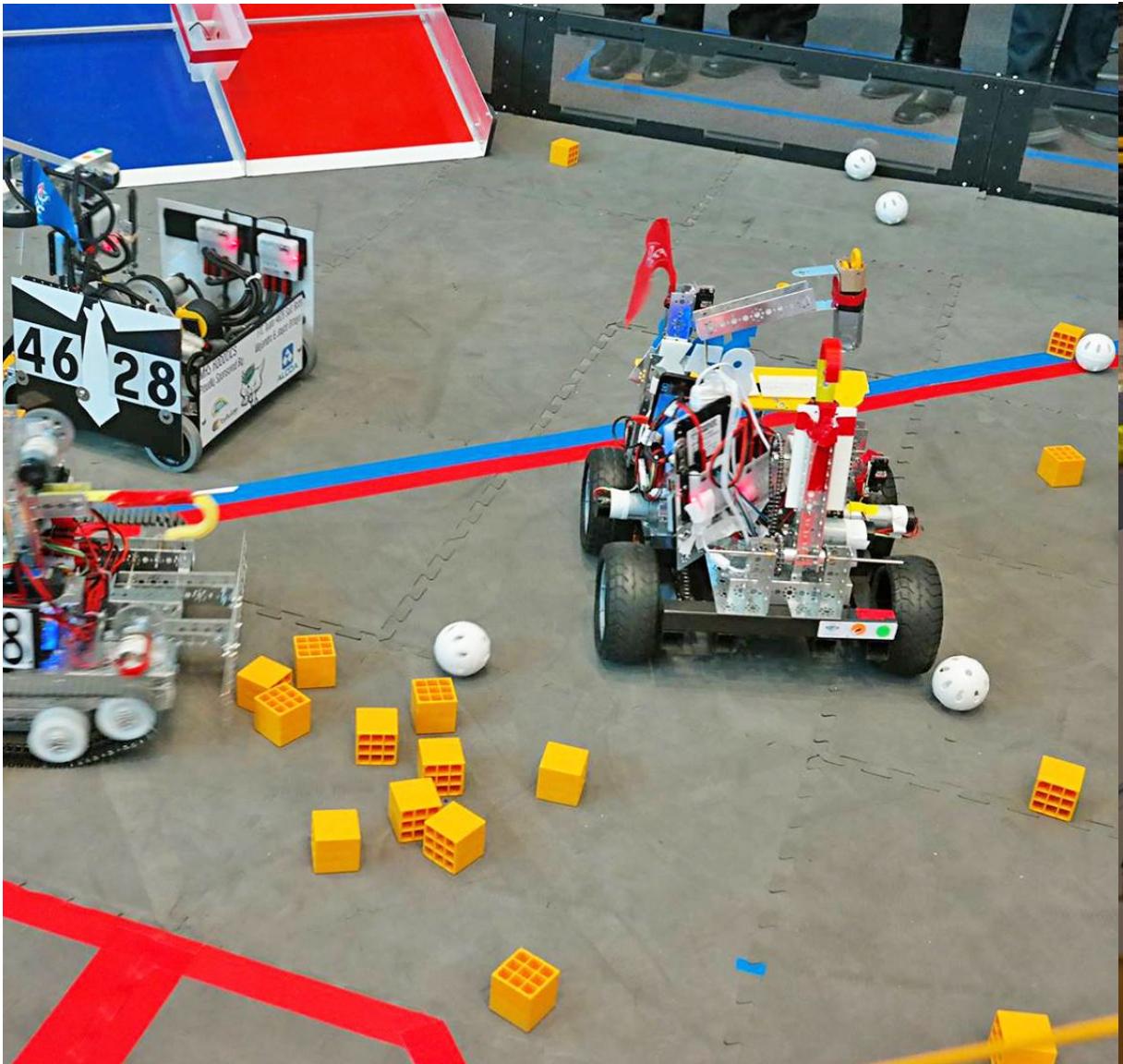
30-70 billion trillion stars in the Universe.

There are more transistors than the stars in the Universe.

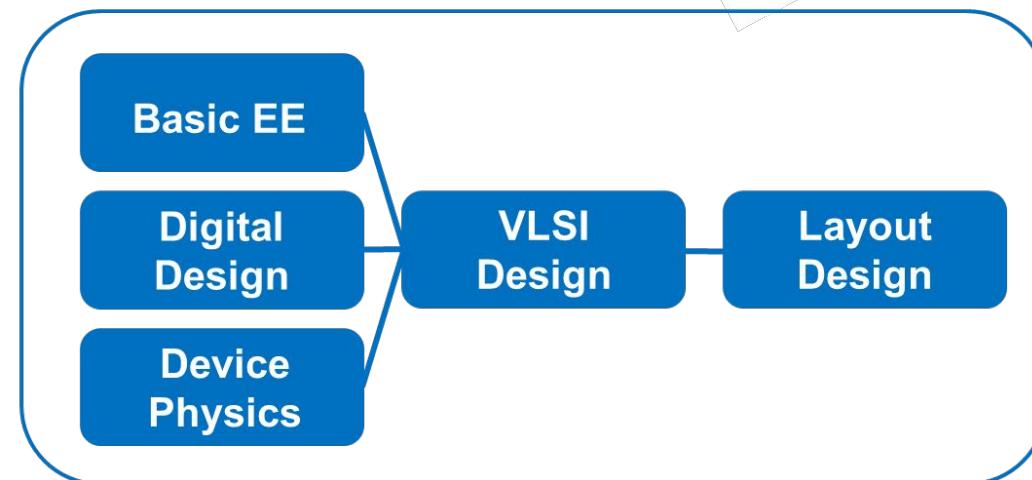
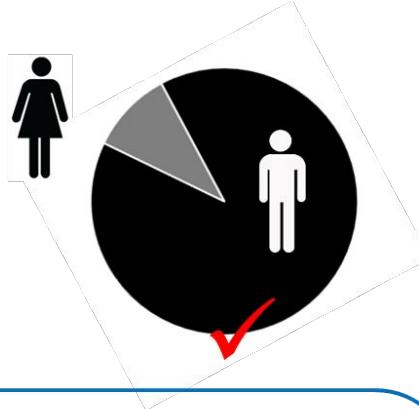
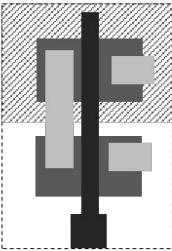


- IC design, technically the most exciting part of our community is largely missing in undergraduate curriculum.
- Helped to shape the career directions of two undergraduate students.

Can we have competitions that college and pre-college students participate?



“Introduction to Circuits & VLSI Design” for High School Students



- Collaborated with Fort Collins High School to offer “Introduction to Circuits & VLSI Design” class
- Curriculum included multiple subjects condensed into a 1 semester class: Focus on intuitive, physical understanding of devices and circuits

- Created in 1999 to address 3 challenges at **Hewlett-Packard in Fort Collins, CO** by John Wuu (now AMD):
 - Shortage and cost of high quality layout designers
 - Difficulty in recruiting top VLSI graduates willing to relocate far from family
 - Low female enrollment in university VLSI courses; limited diversity candidate pool

“Introduction to Circuits & VLSI Design” for High School Students

- At semester's end, students can interview for layout internship positions
- **Technical interviews are exactly the same as those given to professional layout designers**
- Top qualified students hired for internship positions (~3 per year)
- Can immediately contribute productively as layout designers upon hiring
- In addition, because of their training in circuit design, most expanded quickly into engineer assignments



Katie Hirschey
Program Manager
HP Inc
Boise, Idaho



Tommy Miles
MTS Design Engineer
AMD
Fort Collins, CO



Daniel Hand
IP Development Engineer
Intel
Fort Collins, CO



Matt Unangst
Senior Director
AMD
Austin, TX



Ali Black
Component Design
Engineer (previously)
Intel (previously)
Fort Collins, CO



Katherine Carlson
Undergraduate Intern
Intel
Fort Collins, CO

- Program produced many VLSI engineers across HP, Intel, AMD, Lincoln Labs...etc
- Program passed from HP to Intel in 2006 due to organization divestiture; continues to present day
- Now run and taught by program alumni who became Intel Engineers **(22 years and going)**
- **~300 junior and senior students have taken the class.**
- **~25% female students.**

Can we teach high school students to design mixed signal circuits?



RFIC2016

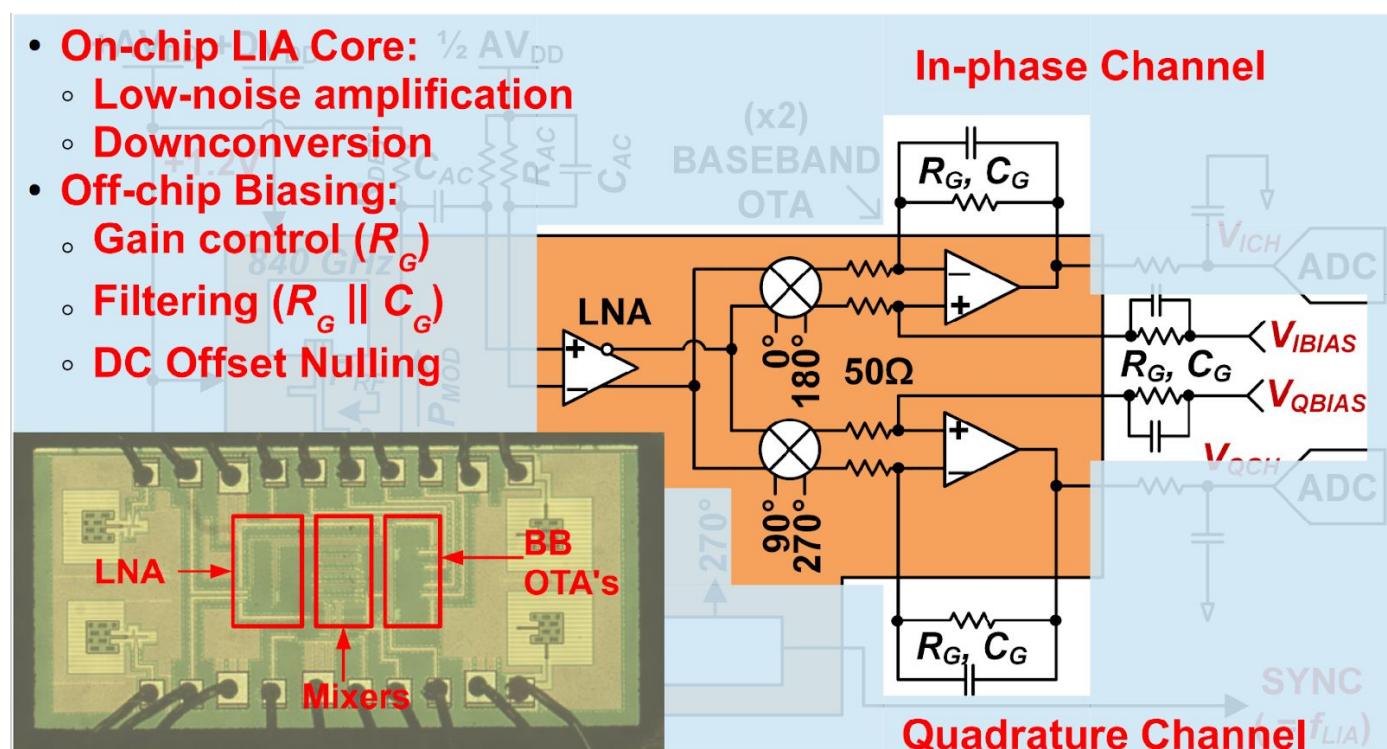
IEEE
MTT-S

RMO3A-3

0.84-THz Imaging Pixel with a Lock-in Amplifier in CMOS

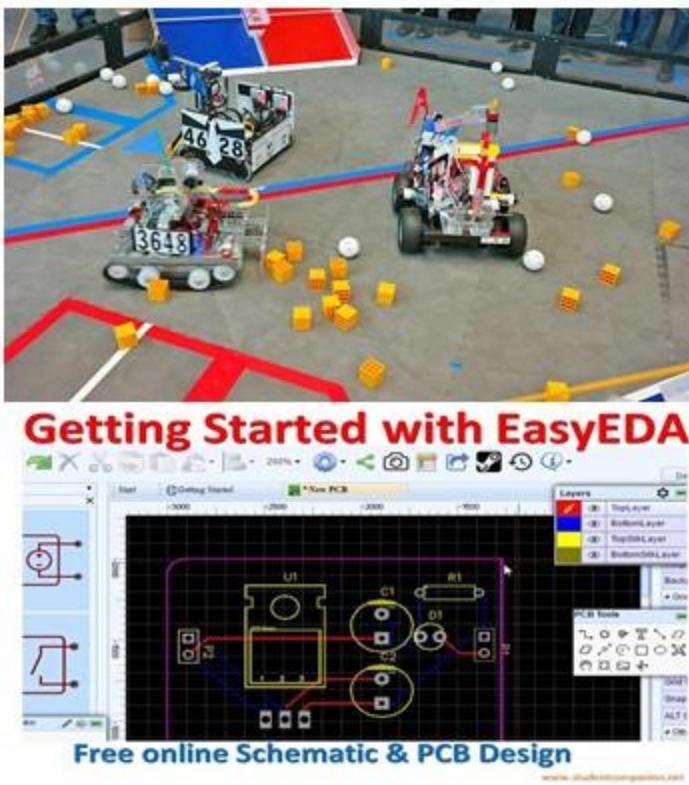
- Designed by a student in the senior year of Plano High School.
- Tested and published in the 2nd year of college.

- **On-chip LIA Core:**
◦ Low-noise amplification
- **Off-chip Biasing:**
◦ Gain control (R_G)
◦ Filtering ($R_G \parallel C_G$)
◦ DC Offset Nulling



The World Has Changed

- And semiconductors have enabled much of that change!
- New generations thrive on **collaborative** HW/SW maker culture



Platform for IC Design Outreach (PICO)



Through its Platform for IC Design Outreach (PICO) program, the SSCS is working with the rapidly growing open-source community to help accelerate the construction of the required ecosystem. Our goal is to help build and connect to new communities that share our excitement about IC innovation and its democratization toward a new wave of global impact.

The Solid-State Circuits Society is committed to improving diversity, inclusion, and accessibility in integrated circuit (IC) design. We envision a future in which chips can be designed through a web browser, by anyone, anywhere, and through open worldwide collaboration.

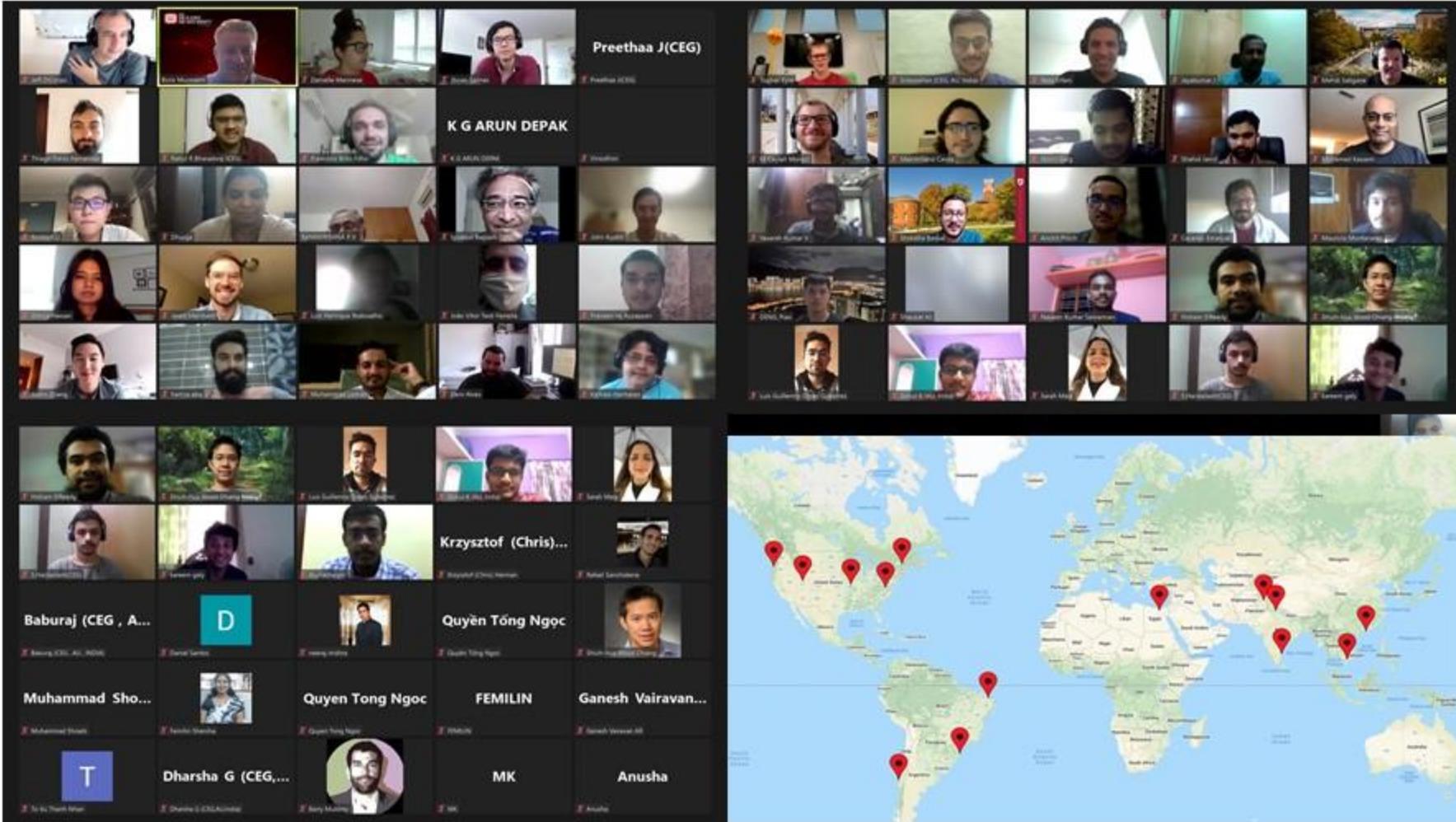
<https://sscs.ieee.org/about/solid-state-circuits-directions/sscs-pico-program>

PICO Design Contest (Ongoing)

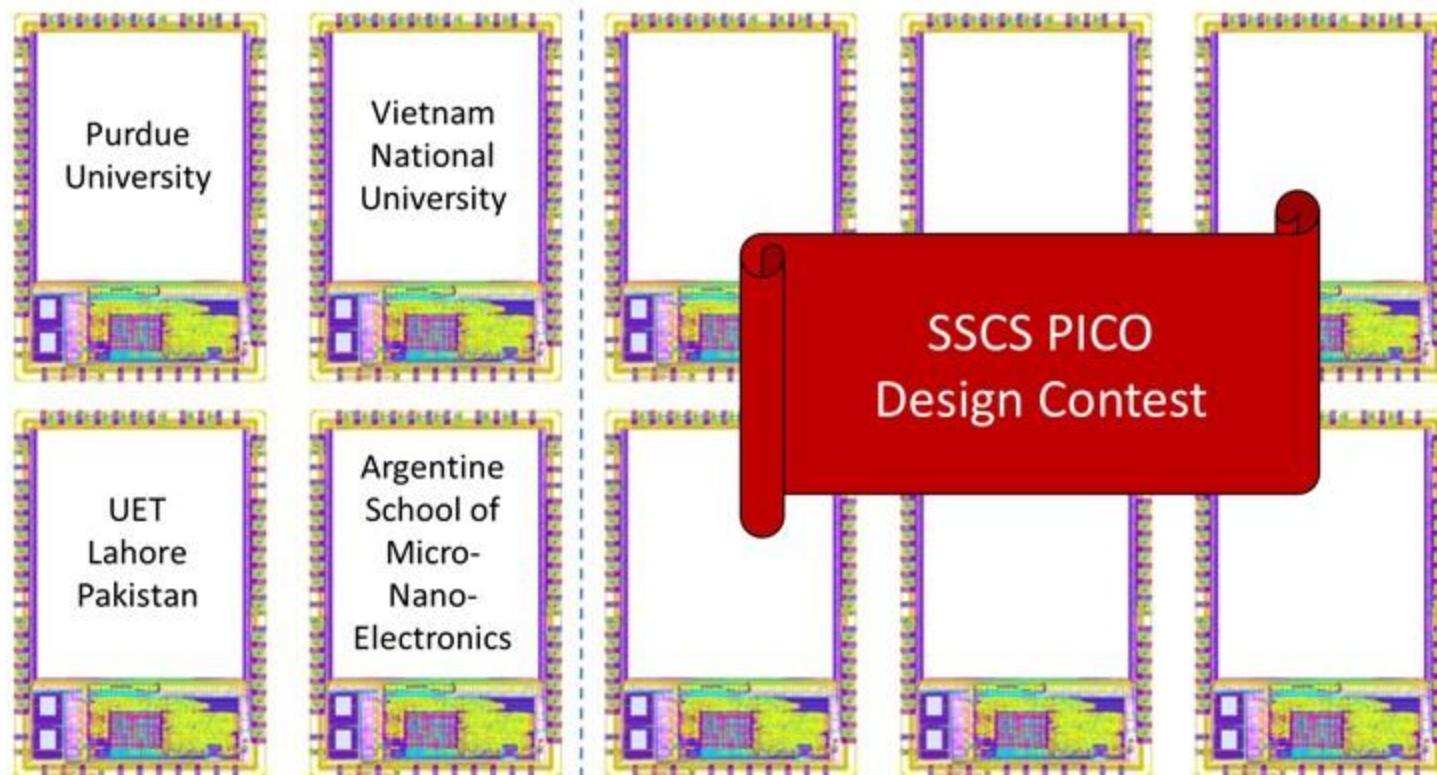
- July 30, 2021: Proposal deadline
 - Received 61 proposals
 - https://efabless.com/projects/shuttle_name/SSCS-21
- August 2-7: Round 1 selection process (volunteer jury)
- August 9, 2021: Announcement of ~15-20 round 1 teams
 - Selected 18 proposals
- August 18 - October 15: Weekly online meet-ups
- September 24: Selection of round 2 teams
 - Identify who has a chance to hit tapeout deadline
 - Merge designs to fill 6 tape-out slots
- October 15: Tapeout deadline
- January 31, 2022: Silicon delivery
- February 7 - March 7, 2022: Weekly online meet-ups

Universidade Federal Rural do Semi-Árido	Brazil
Universidade Federal de Santa Catarina	Brazil
University of Sherbrooke, Quebec	Canada
University of the Bío-Bío, Concepcion	Chile
Cairo University	Egypt
The Chinese University of Hong Kong	Hong Kong
Anna University, Chennai	India
Anna University, Chennai	India
Anna University, Chennai	India
IIT Roorkee	India
FAST National University, Islamabad	Pakistan
FAST National University, Islamabad	Pakistan
FAST National University, Islamabad	Pakistan
Oregon State University, Corvallis, Oregon	USA
University of Missouri, Columbia, Missouri	USA
University of Virginia, Charlottesville, Virginia	USA
Brigham Young University, Provo, Utah	USA
HCMC University of Technology and Education	Vietnam

Design Contest Meetup



Seats Purchased by the SSCS



Collaborating with FOSSI Foundation.
Efabless Remote Design Platform and ChipIgnite Program.

Achieve mastery through challenge

Improve your skills by training with
others on real code challenges

[SIGN UP](#)

To join you must first prove your skills.
Choose your language to begin...

 Clojure	 CoffeeScript	 C	 Coq	 C++
 C#	 Crystal	 Dart	 Elixir	 F#
 Go	 Groovy	 Haskell	 Java	 JavaScript
 Kotlin	 Lean	 Lua	 NASM	 PHP
 Python	 Racket	 Ruby	 Rust	 Scala
 Shell	 SQL	 Swift	 TypeScript	

Additional Languages



*These languages are currently in beta. Once you enlist you will have an opportunity to train with them.



Sharpen your skills

Challenge yourself on kata, created by the community to strengthen different skills. Master your current language of choice, or expand your understanding of a new one.



Train on kata

Solve the kata with your coding style right in the browser and use test cases (TDD) to check it as you progress. Retrain with new, creative, and optimized approaches.



Gain collaborative wisdom

Compare your solution with others after each kata for greater understanding. Discuss the kata, best practices, and innovative techniques with the community.

Earn ranks and honor

Kata are ranked to approximate difficulty. As you complete higher ranked kata, you progress through the ranks so we can match you with relevant challenges.

Create your own kata

Author kata that focus on your interests and train specific skillsets. Challenge the community with your insight and code understanding.

Next Generations of Integrated Circuit Designers

- Organization that enables design of integrated circuits through a web browser by anybody, anywhere, anytime through open collaboration to promote collaborative learning to improve IC design skills: **Must be scalable!!**
- Teaching classes
- Organizing camps
- Organizing contests: **World championship!!**

