CENTRAL STATE UNIVERSITY

1887

Paid Intel Summer Internship

for Women and Underrepresented Minorities

June 3-July 26, 2024

Wright State University Campus

Scholarships

$5,000 stipend and food allowance

Paid housing at WSU campus

Online Application

https://shorturl.at/fnJSU

Deadline: March 29

https://www.centralstate.edu/semiconductors/Intel

intel®

WRIGHT STATE UNIVERSITY

Contents

Program Overview

Welcome to the Intel-Sponsored Summer Internship Program, an innovative collaboration between Central State University (CSU) and Wright State University (WSU), generously supported by Intel. This program is uniquely tailored for undergraduate and high-school students from female and underrepresented minority backgrounds. Our mission is to engage and empower talented individuals from diverse communities by providing them with a comprehensive learning experience in the field of microelectronics. Participants will have the opportunity to develop essential skills and gain in-depth knowledge through hands-on projects and mentorship, led by expert faculty. By the end of the program, interns will be well-prepared to contribute to the semiconductor industry and will have developed a strong foundation for future career opportunities with Intel in Ohio. We are dedicated to fostering an inclusive environment where every student feels valued and inspired to achieve their full potential. This program not only aims to bridge the gap in representation within the technology sector but also strives to build a skilled workforce that meets the growing demands of the semiconductor industry. Join us in this exciting journey of innovation, learning, and growth.

Program Details

The Intel-Sponsored Summer Internship Program, hosted by Central State University, will take place at the Wright State University Campus from June 3 to July 26, spanning a comprehensive 8-week period. This exciting and enriching program is open to all students, providing a unique opportunity to gain hands-on experience in the field of microelectronics. No prior experience in microelectronics is necessary; however, a basic understanding of high school mathematics is required to ensure participants can fully engage with the program's content. Participants will have the opportunity to work with academic experts, engage in a variety of activities designed to foster both theoretical knowledge and practical skills and interact with professionals from Intel to build connections and learn about career opportunities.

Scholarship Benefits

Selected participants in the Intel-Sponsored Summer Internship Program will receive a comprehensive scholarship package designed to support and enhance their internship experience. Each intern will receive a combined amount of $5,000 to cover both their stipend and food allowance. This financial support is intended to cover personal expenses and ensure access to nutritious meals throughout the internship period. Additionally, paid accommodation will be provided at the WSU guest houses, offering a comfortable and convenient living arrangement for the duration of the internship. These benefits are aimed at fostering an environment where interns can focus on their professional growth and make the most of the learning opportunities provided by the program.

Organization Teams

| Central State University	
Mohammadreza Hadizadeh, PhD	Semiconductor Education & Research Program Director
Mahmoud A. Abdallah, PhD	Chair of the Manufacturing Engineering Department
Emdad Ahmed, PhD	Assistant Prof. of Computer Science
Abayomi J. Ajayi-Majebi, PhD	Prof. of Manufacturing Engineering
Tina A. Castonguay	Associate Director of OSP&R
Deng Cao, PhD	Chair of M&CS Department
Mubbashar Altaf Khan, PhD	Research Assistant Prof.
Morakinyo A.O. Kuti, PhD	VP for Research & Economic Development
Arunasalam Rahunanthan, PhD	Dean, College of Engineering, Science, Technology, & Agriculture
Wright State University	
Subhashini Ganapathy, PhD	Dean, College of Graduate Programs and Honors Studies
Fathi H.M. Amsaad, PhD	Assistant Prof. of Computer Science and Engineering
Darryl K. Ahner, PhD	Dean, the College of Engineering and Computer Science
Travis E. Doom, PhD	Associate Dean of College of Engineering & Computer Science
Billy Kelley	PCB Fabrication & Design Instructor
Ahsan Mian, PhD	Prof. of Mechanical & Materials Engineering
Ivan Medvedev, PhD	Chair of Physics Department
Saiyu Ren, PhD	Prof. of Electrical Engineering
Daniel Sim, PhD	Microelectronics Fabrication Instructor

4

Application & Selection

Online applications for the Intel-Sponsored Summer Internship Program were invited via the following application link with a deadline of March 29, 2024: `https://shorturl.at/fnJSU`. The table below shows a summary of the application and selection data.

	Applications	Selected Applicants
#	284	39 (14%)
Gender Distribution		
Male	159 (56%)	20 (51 %)
Female	118 (42%)	17 (44 %)
Others (Non-binary, transgender, etc.)	7 (2%)	2 (5 %)
Race Distribution		
Black or African American	159 (56 %)	31 (79%)
White	56 (20 %)	6 (15 %)
Asian	56 (20 %)	1 (3 %)
Hispanic	7 (2 %)	1 (3 %)
Others	6 (2 %)	0 (0 %)
School Distribution		
Central State University	99 (35 %)	22 (56%)
High School	54 (19 %)	5 (13 %)
Wright State University	23 (8 %)	2 (5 %)
University of Cincinnati	18 (6 %)	1 (2.6 %)
The Ohio State University	14 (5 %)	2 (5 %)
University of Dayton	12 (4 %)	1 (2.6 %)
Miami University	7 (2 %)	1 (2.6 %)
Stark State College	7 (2 %)	2 (5 %)
Sinclair Community College	5 (2 %)	1 (2.6 %)
Cedarville University	1 (0 %)	1 (2.6 %)
Columbus State Community College	1 (0 %)	1 (2.6 %)
Others	43 (15 %)	0 (0 %)

The following figures provide a visual comparison between the distribution of all applicants and those selected for various demographics, including gender, race, and academic institution.
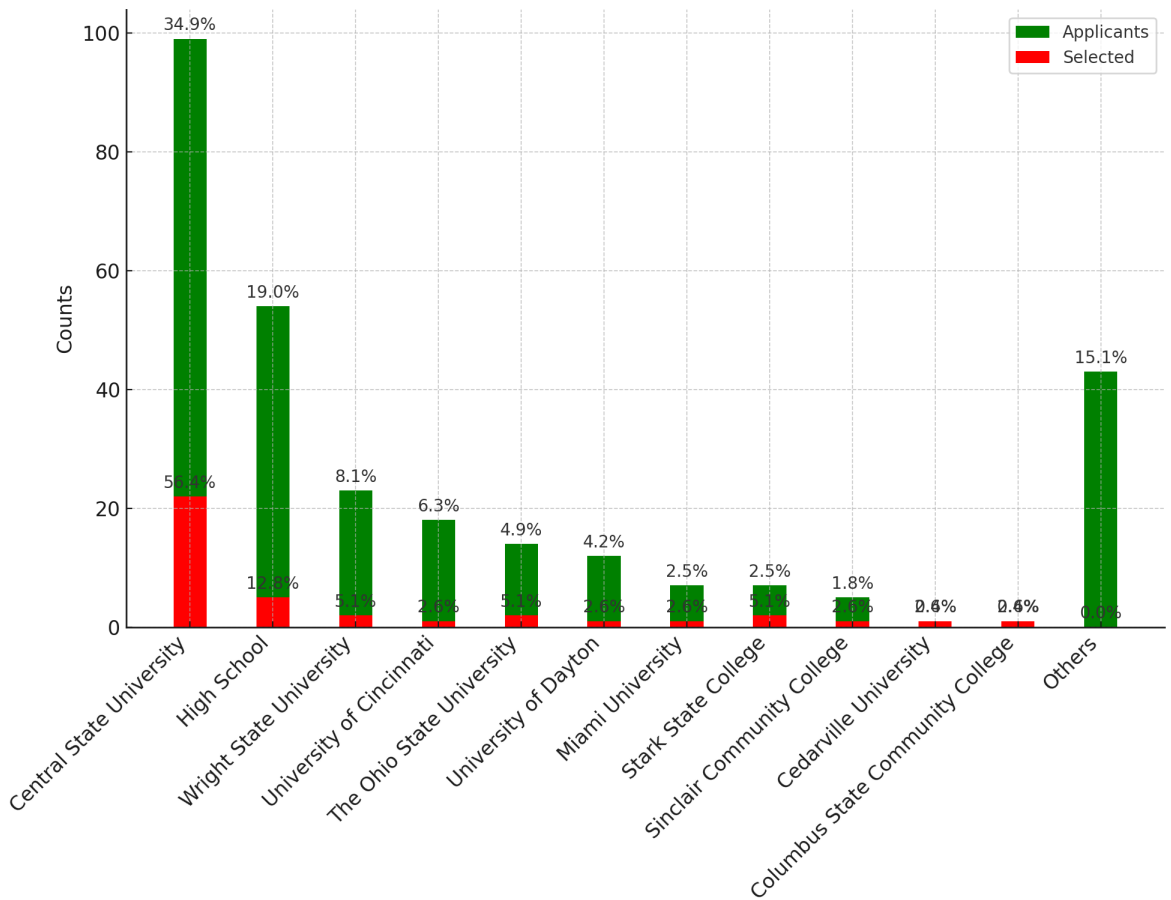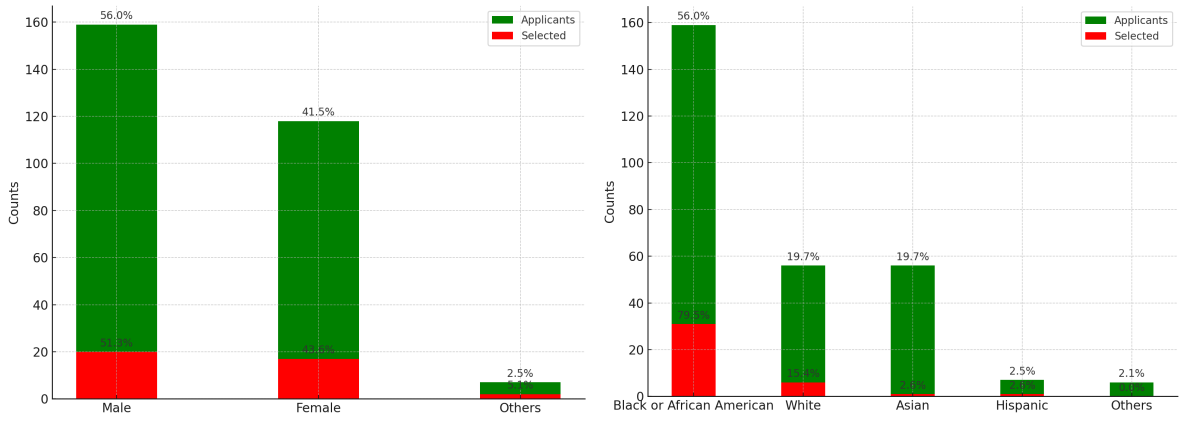
The selection process for the internship program shows a strong representation of women and underrepresented minorities, with a particular emphasis on Black or African American candidates. The selected interns represent 10 higher education institutions (with the majority from Central State University) and 5 regional high schools. This reflects the program's goals to enhance opportunities for these groups. It should be noted that among the 286 applicants, 189 (67%) are U.S. citizens or permanent residents, 94 (33%) are international students, and one is a DACA recipient.

Internship Schedule

Throughout the 8-week internship, participants will engage in a structured daily schedule, consisting of instructional lectures each morning and hands-on laboratory sessions in the afternoons, Monday through Friday. This format offers interns an in-depth exploration of microelectronics, covering both theoretical concepts and practical applications, thereby equipping them with a well-rounded understanding of the field.

Summer 2024 Internship Program: Schedule and Topic Overview

June 3 9:00–13:00	Kickoff Event	
June 3-14	Introduction to Microelectronics Design	
11:00–15:00	Dr. Saiyu Ren Wright State University	saiyu.ren@wright.edu
June 17-28	Introduction to Microelectronics Security	
11:00–15:00	Dr. Saiyu Ren Wright State University	saiyu.ren@wright.edu
July 1-12	Introduction to Printed Circuit Boards Fabrication and Design	
11:00–15:00	Kelley Billy & Matthew Kijowski Wright State University	billy.kelley@wright.edu & matthew.kijowski@wright.edu
July 15-19	Introduction to Microelectronics Fabrication	
TBD	Dr. Daniel Sim Wright-Patterson AFB & Wright State University	daniel.sim@wright.edu
July 22-26	Introduction to Additive Microfabrication of Electronics	
11:00–15:00	Dr. Ahsan Mian Wright State University	ahsan.mian@wright.edu
July 26 15:00–16:00	Completion & Certification Ceremony	

First Day Agenda

09:00 – 09:30   Registration
09:30 – 09:45   Welcome from Wright State University Leadership
09:45 – 10:00   Welcome from Central State University Leadership
10:00 – 10:30   Overview of the Program
10:40 – 12:00   Lab Tours
12:00 – 13:00   Lunch

Topics Outline

1.) Introduction to Microelectronics Design

- Real-world analog signals and communications,
- Strengths and weaknesses of analog communications,
- Importance of Digital Signals and Microelectronics,
- Bridge components for analog and digital communications,
- Microelectronic device architecture and operating system,
- Digital number systems and conversions,
- Basic digital implementation technique, Basic Boolean algebra theory and logic gates, Basic digital arithmetic operations,
- Microelectronics vulnerability, security and counterfeit.

2.) Introduction to Microelectronics Security

- Basic microelectronic circuit design, performance evaluation and measurement (delay, power, area, etc.),
- Use of industry-standard design tools to create micro-chip level layout for fabrication including design checks and performance evaluations,
- Micro-chip fabrication process and clean room operation,
- Microelectronic supply chain system & Security risks:
  - Microelectronics vulnerability – Potential Security risk (Counterfeit microelectronics, Intellectual Property protection, data integrity, etc.),
  - Potential cyberattacks in each stage of the design/fabrication process (Hardware Trojans and side-channel attacks).

3.) Introduction to Printed Circuit Boards Fabrication and Design

- Introduction to PCB fabrication,
- Introduction and demonstration of a basic microelectronic system on a printed circuit board,
- Difference between Printed Wiring Board (PWB) and PCB with examples,
- Introduction to chemicals and other materials used in building PCB,
- PCB Types:
  - Single Sided (Single Layer) & Multi-Layer(Double Layer)
  - Importance of PCB in embedded systems in Industries like Intel and Air Force Research Lab,

- PCB Design process using CAD tool (KiCad, EDAA Cross Platform, and other Open-Source Electronics Design Automation Suite like Proteus and Altium).

4.) Introduction to Microelectronics Fabrication

This course will provide students with the basic physics and chemistry associated with microfabrication tools and techniques, and the fabrication of semiconductor devices. The following topics are covered in this course:

- Basic metallization, including thermal evaporation and plating,
- Wet-chemical processing, including metal lift-off, etch-back, and anisotropic deep etching,
- Annealing, wire bonding, and other contact technologies.
- Cleaving, dicing, and related chip generation,
- Lapping and polishing down to 100 microns or less (depending on the material) using diamond-grit and other slurries,
- Reactive-ion etching, including plasma ashing capability
- Sub-micron analysis and imaging capabilities using a Dektak profilometer, Rudolph ellipsometer, Infinity metallurgical microscope, or Phenom scanning electron microscope.

Microfabrication cleanroom training sessions will take place in the Microfabrication Science Cleanroom Facility, located within the Neuroscience Engineering Collaboration (NEC) Building. This facility features around 1100 square feet of space devoted to fabricating, packaging, and integrating semiconductor devices. The NEC Building houses a Class 1,000 cleanroom (835 SF) suitable for generic chemical processing and thin-film creation. It also accommodates a Class 100 cleanroom (260 SF) for basic photolithography down to approximately a 1.0-micron scale. This includes equipment for spinning, UV patterning (both flood and contact printing), and development.

5.) Introduction to Additive Microfabrication of Electronics

- Introduction to additive manufacturing (AM) processes
    - Discuss all AM processes,
- Direct-write technologies for microfabrication
    - Nozzle dispensing: material extrusion,
    - Nozzle dispensing: Inkjet printing,
    - Nozzle dispensing: Aerosoljet printing,

- Additive manufacturing of electronics
  - Combination of 3D printing and direct write technologies to create structural electronics involving microelectronics devices, interconnects, finish electronic products,
  - For example, Additive Manufacturing can offer many advantages to companies in the electronics industry, including faster time to market, the manufacturing of full prototypes of pilot and small production series parts, and quick implementation of customer-specific solutions.

List of Participants

Name	Affiliation	Email Address
List of Group 1 (35 Interns) Receiving Training at Wright State University		
Nibras Alshammari	Central State University	nalshammari.csu@centralstate.edu
Treyvon Anderson	Central State University	tanderson5.csu@centralstate.edu
Ahmed Ata	The Ohio State University	ata.7@buckeyemail.osu.edu
Gabriel Bailey	High School	kbailey@centralstate.edu
Lavaija'Nae Berry	Central State University	lberry.csu@centralstate.edu
Michael Bohman	Columbus State CC	mbohman@student.cscc.edu
Nour El Islam Boussaha	Sinclair CC	nour.boussaha@sinclair.edu
Benee Byers	Central State University	bbyers.csu@centralstate.edu
Desmond Carpenter	Central State University	dcarpenter1.csu@centralstate.edu
Jailla Davis	Central State University	jdavis15.csu@centralstate.edu
Aaron Drumwright	Central State University	adrumwright1.csu@centralstate.edu
Andrew Drumwright	Central State University	adrumwright.csu@centralstate.edu
Gavin Finley	High School	gavin.finley@sinclair.edu
Mariah Francis	The Ohio State University	francis.632@osu.edu
Marcus Gigandet	Wright State University	gigandet.16@wright.edu
Jayden Hayes	Central State University	jhayes4.csu@centralstate.edu
Amaurion Hodges	Central State University	ahodges.csu@centralstate.edu
Mkiya Huland	Central State University	mhuland1.csu@centralstate.edu
Tochi Ibe	University of Cincinnati	ibeti@mail.uc.edu
Marlyn Kahi	Miami University	kahima@miamioh.edu
Andrew Kacapyr	Cedarville University	kkacapyr@cedarville.edu
Kodjo Kouassi	High School	25kouassik@wcsrams.org
Diego Lamboy	High School	diegolamboy45@gmail.com

Cato Mayberry	Central State University	cmayberry1.csu@centralstate.edu
Benjamin Motz	University of Dayton	motzb1@udayton.edu
Braden Nold	Stark State College	bnold0411@starkstate.net
Camryn Nadir	Central State University	cnadir.csu@centralstate.edu
Julianne Scott	Central State University	jscott1.csu@centralstate.edu
Matthew Sweeting	Central State University	msweeting.csu@centralstate.edu
Aleyah Trammell	Central State University	atrammell.csu@centralstate.edu
Ka'mya Wade	Central State University	kwade.csu@centralstate.edu
Angel Wilson	Central State University	awilson9.csu@centralstate.edu
Dorcas Wilson-Anoumou	Wright State University	wilson-anoumou.2@wright.edu
Kora Woolf	Stark State College	kwoolf0216@starkstate.net
Angela Zhang	High School	angela.zhang1213@gmail.com
List of Group 2 (4 Interns) Receiving Training at SUNY-Binghamton		
Kayvon Adderley	Central State University	kadderley.csu@centralstate.edu
Samantha Charles	Central State University	scharles.csu@centralstate.edu
Shellisa Johnson	Central State University	sjohnson11.csu@centralstate.edu
Dashawn Newbold	Central State University	dnewbold.csu@centralstate.edu

Useful Information

Internship Location

The internship is scheduled to be hosted at the RUSS Engineering Center, located on the campus of Wright State University.

- **Physical address:** 3640 Colonel Glenn Hwy, Fairborn, OH 45324.
- **Google Maps link:** https://goo.gl/maps/nTPa76MzoBp5MGG37

The following image provides an overview of the parking facilities at the RUSS Engineering Center.

You will come in off Colonel Glenn Hwy on to Center Park Rd.
Go straight through the first stop sign, then turn left into Lot 16. Drive alongside White Hall, then park in Lot 17.

405 Russ Engineering Center, Wright State University
3640 Colonel Glenn Hwy
Dayton, Ohio 45324

Dining Options

As part of the internship program, you will have the flexibility to manage your own lunch arrangements. The University offers an excellent Dining Facility that you might want to consider. It provides a wide variety of foods and caters to various dietary preferences and restrictions. Here, you can enjoy a balanced meal and converse with fellow interns and even university students, which can potentially lead to enriching discussions and new connections. We recommend that you use this lunch period to not only satiate your hunger but also to immerse yourself in the community, make new friends, and enjoy your time here at Wright State University. If you'd prefer to step out, you have numerous options in the vicinity of the campus as well. There are a variety of local restaurants nearby, serving diverse cuisines.

- **On Campus Dining Options:**

    - Student Union: 10am – 2pm
    - Starbucks in Dunbar Library: 8am – 1pm

- **Off Campus Dining Options:**

    - Tik's Thai Express LLC, 2808 Colonel Glenn HWY, Fairborn, OH 45324
    - Rapid Fired Pizza, 2800 Colonel Glenn Hwy, Fairborn, OH 45324
    - Hoshi Ramen, 2820 Colonel Glenn HWY, Fairborn, OH 45324
    - Yaffa Grill, 2844 Colonel Glenn HWY, Fairborn, OH 45324
    - El Rancho Grande, 3070 Colonel Glenn HWY, Fairborn, OH 45324
    - Penn Station East Coast Subs, 3800 Colonel Glenn HWY 100, Fairborn, OH 45324

The organizers of the internship will arrange group lunches every Friday, which will be attended by all interns and instructors.

Remember, lunchtime is your own time - enjoy it as you wish!

WiFi Accesses

Free WiFi will be available during the internship. The WSU also provides access to an eduroam network.

- **WiFi: Public Domain (WSU_EZ_Connect)**

Housing at Wright State University

Check-in
WSU housing office is open Monday – Friday from 9am - 4pm.

The Hub | 2000 Zink Road Fairborn, OH 45324

When you arrive, we will need to verify your ID. Then, we will issue you your key packet which contains: a front door apartment key, your bedroom key and a mailbox key for your shared apartment mailbox.

Weekday After-Hours Check-In
If you are unable to check-in during normal office hours, please reach out to us immediately to arrange an after-hours arrival. Late arrivals can be accommodated by our on-call staff if coordinated in advance.

Weekend Check-In
We kindly request that plan to arrive between 9AM-9PM. Please give our on-call staff a courtesy text or call approximately 30 minutes to an hour before you arrive. They will meet you at your assigned apartment.

On-call staff | 937.409.0901

Parking
Parking permits must be purchased for all vehicles on campus. Please touch base with your coordinator to ensure a pass has been purchased for your vehicle. Parking passes can be purchased through the Parking Pass Purchase Site.

Linens (if applicable)
Linens are an optional service, only available upon request. If you are interested in reserving linens, please reach out to guest housing staff for rate information. If you have reserved linens for your stay, they will be placed in your room. Upon your departure, please leave all linens in your room.

Of course, do not hesitate to contact us should you have any questions!

Residence Life & Housing
Wright State University | (937) 775-4172
housing_guest@wright.edu
wright.edu/residence-life-and-housing/guest-housing

14

Acknowledgment

About the Semiconductor Education & Research Program at Central State University (SERP-CSU)

At Central State University, we are proud to lead SERP-CSU, a collaborative initiative with five other esteemed Ohio universities: Cedarville University, Stark State College, The Ohio State University, Wright State University, and Youngstown State University. This partnership, funded initially by a three-year seed grant from Intel, is designed to train the technical workforce in the field of semiconductors.

Program Highlights

- **Curriculum Development:** We have introduced two new online academic offerings: *Online Certificate in Semiconductor Processing:* A comprehensive 30-credit program open to students globally, including those from CSU and other academic institutions. *Online Minor in Computer Hardware Technology:* A specialized 14-credit program available exclusively to CSU students enrolled in a major, enhancing their technical expertise in the burgeoning field of computer hardware.

- **Laboratory Development:** Our facilities have seen notable expansion to support practical learning and innovation: *Semiconductor Simulation Lab:* Provides a virtual environment for students to simulate and analyze semiconductor processes. *Microfabrication Lab:* Equipped for hands-on learning in measuring and evaluating the electrical characteristics and performance of semiconductor devices during development and manufacturing. *FPGA/VR Multipurpose Lab:* Currently under development, this lab will offer advanced resources for work with Field-Programmable Gate Arrays and Virtual Reality applications.

- **Experiential Learning & Internships:** Our program highlights real-world experience and hands-on training through our structured internship programs. *Summer Internship Program:* Launched in 2023, this 8-week program trained 20 students and is set to expand in 2024 and 2025, by training 39 students in 2024. It covers vital topics in microelectronics design, fabrication, and security. The internship is available to all undergraduate students from CSU, our partner institutions, and other Ohio universities, as well as high school students.

At SERP-CSU, we are committed to fostering an innovative and inclusive environment that prepares the next generation of engineers and researchers to lead advancements in the semiconductor industry. Join us in shaping the future!

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https://www.centralstate.edu/semiconductors