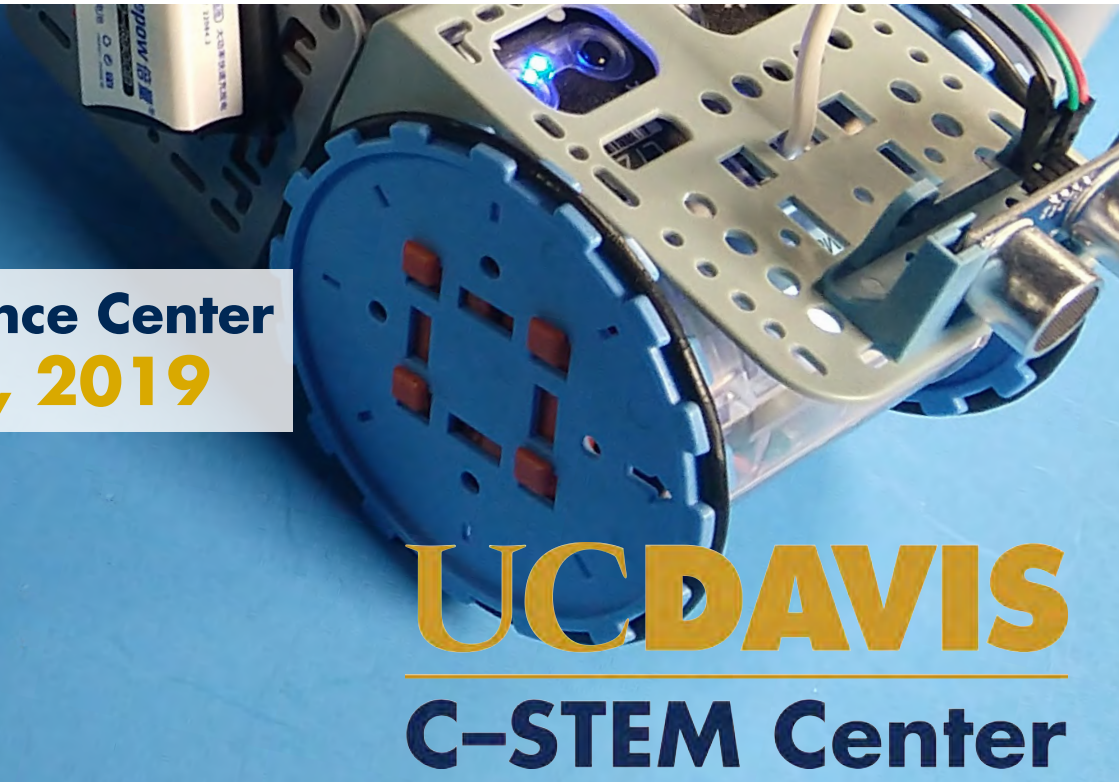# 9th Annual Conference
on Integrated Computing and STEM Education

— Robotics for Creative Problem Solving

UC Davis Conference Center
November 2, 2019

UCDAVIS
C–STEM Center

Conference Overview

Time	Event	Location
8:00am–8:30am	Registration and Coffee	Conference Center Lobby
8:30am–8:40am	Welcome and Introductions Dr. Harry Cheng, Professor & C-STEM Center Director, UC Davis	Ballroom A, B, C
8:40am–8:50am	C-STEM Update Dr. Harry Cheng, Professor & C-STEM Center Director, UC Davis	Ballroom A, B, C
8:50am–9:10am	Keynote Speech: The Impact of Creative Problem Solving With Robotics on K-12 STEM Education Dr. Barbara Nemko, Napa County Superintendent of Schools	Ballroom A, B, C
9:10am–9:50am	Plenary Address Panel: Hands-on STEM with Robotics from the Perspective of Teachers, Schools, and Districts Moderator: Merry Kim, Associate Dean, CTE, Coastline College Dr. Judy Fancher, Allen Thoe, Melissa Hale, Julie Lovie, Dr. Roy Rogers	Ballroom A, B, C
9:50am–10:20am	Award Ceremony Teacher of the Year, Administrator of the Year, Service Award Moderator: Daniel Ryan, Education Service Manager, UC Davis C-STEM Center Presenters: Representatives from the California Department of Education Representatives from California Senator Bill Dodd's Office and California Assemblymember Aguiar-Curry's Office Dr. Harry Cheng, Professor & C-STEM Center Director, UC Davis	Ballroom A, B, C
10:20am–10:35am	Coffee Break	Conference Center Lobby
10:35am–11:45am	Breakout Session 1 (Details Pages 8-9)	Ballroom A, B, C, Conference Room A1
11:45am–1:05pm	Lunch and Keynote Speech: Robotics Research and its Applications Moderator: Dr. Harry Cheng, Professor & C-STEM Center Director, UC Davis Professor Bahram Ravani, Department of Mechanical and Aerospace Engineering, UC Davis	Ballroom A, B, C
1:05pm–1:15pm	Break	Conference Center Lobby
1:15pm–2:25pm	Breakout Session 2 (Details Pages 10-11)	Ballroom A, B, C, Conference Room A1, B1
2:25pm–2:40pm	Cookie Break	Conference Center Lobby
2:40pm–3:40pm	Breakout Session 3 (Details Pages 12-13)	Ballroom A, B, C, Conference Room A1, B1
3:40pm–4:00pm	Networking and Raffle Announcers: Dr. Larry Lagerstrom, Chief Academic Officer, Barobo, Inc. Heather Young, Office and Production Coordinator, Barobo, Inc. 5 Arduino Starter Kits, 1 Linkbot Starter Kit, 1 Linkbot Super Kit, 1 Linkbot Advanced Kit	Ballroom A, B, C

| WiFi Instructions | 1. Connect to ucd-guest (registration page will open) | 2. Register a temp ucd-guest account | 3. Log in with texted/ emailed credentials | @ucdcstem |

Dear C-STEM Conference Attendees,

Welcome to the 9th Annual Conference on Integrated Computing and STEM Education, themed **Robotics for Creative Problem Solving!**

The Annual C-STEM Conference provides a forum for K-14 educators, administrators, researchers, and partners to share their experiences with preparing all students for universities and careers in STEM-related fields.

Our keynote speaker, Dr. Barbara Nemko, Napa County Superintendent of Schools, will share her perspective on how creative problem solving with robotics impacts K-12 education. We will also feature a plenary session with teachers and administrators who will discuss how to get started with the C-STEM program, share their experiences on integrating coding and robotics into their regular STEM courses with a focus on math, and describe its impact on students. UC Davis Distinguished Professor Bahram Ravani is our lunchtime keynote speaker. He will present robotics research and its applications as well as for K-12 STEM education. Additionally, we are pleased to honor outstanding C-STEM teachers, administrators, and volunteers for their extraordinary effort on integrated computing and STEM education.

The C-STEM team is excited to announce that we have completely overhauled our middle school math curriculum, adding separate Common Core compliant Math 7 and Math 8 textbooks to our collection, as well as added sensor-based robotics curriculum. As always, the curriculum and activities integrate seamlessly with our latest version of C-STEM Studio. You can explore and learn about these updates in our breakout sessions as well as our Expo and Makerspace.

The C-STEM program continues to inspire all students through exciting, hands-on, interdisciplinary curriculum with a focus on math with coding and robotics; we encourage you to take advantage of the strategies and resources presented today to enhance creative problem solving with robotics in your classrooms and beyond. We have a wide variety of breakout sessions providing insights on topics such as teaching and pedagogy, technology, inclusion, and higher education partnerships.

Whether you are new to C-STEM and looking forward to seeing our technology in action, or you have been with us for years and looking for more tips on inspiring creative problem solving, our Expo and Makerspace provides the perfect opportunity to ask technical questions and experience how your students can explore their creativity and imagination with hands-on activities for building, making, and realizing physical models. We even have a new breakout session dedicated to building your own STEAM Makerspaces in your school that blend creativity and problem solving.

We look forward to continuing to serve all of you in this new school year to engage students through creative problem solving with robotics.

Sincerely,
Harry H. Cheng
Professor and C-STEM Center Director

Conference Organizing Committee

Dr. Tom Adams, Former Deputy Superintendent, Teaching and Learning Support Branch, California Department of Education

Dr. Teresa W. Aldredge, Board President, Umoja Community Education Foundation

Jared Amalong, Information and Communication Technologies Coordinator, Sacramento County Office of Education

Dr. Brittney Beck, Assistant Professor, CSU Bakersfield

Sue Brothers, Assistant Superintendent, Travis USD

Deborah Bruns, Yolo County Office of Education

Dr. Harry Cheng, Professor and Director, UC Davis C-STEM Center

Dr. Zhe Chen, Professor, Department of Human Ecology, UC Davis

David Damico, Executive Director of Innovation and Achievement, Napa Valley USD

Jesus Esquibel, Lecturer, CSU Bakersfield

Brooke Haag, Senior Business Development Manager, Microsoft

Lisette Estrella-Henderson, Solano County Superintendent of Schools

Dr. Judy Fancher, Assistant Superintendent of Curriculum, Instruction, & Assessment, PreK-12, Hacienda La Puente USD

Shauna Hawes, Technology Teacher, East Bay CUE (EBCUE) President, Valley View Middle School

Merry Kim, Associate Dean, CTE, Coastline Community College

Dr. Larry Lagerstrom, Chief Academic Officer, Barobo, Inc.

Dr. Peg Maddocks, Executive Director, NapaLearns

Dr. Jennifer Mullin, Faculty, Department of Biological and Agricultural Engineering, UC Davis

Dr. Barbara Nemko, Superintendent of Schools, Napa County

Roberta Pace, Director of College and Career Readiness, Jurupa USD

Gary Page, Education Programs Consultant, Career Technical Education Leadership Office, CDE

Dr. Binsen Qian, Technology Officer, UC Davis C-STEM Center

Daniel Ryan, Education Service Manager, UC Davis C-STEM Center

Kristen Sandler, Coordinator, Secondary Mathematics, Fontana USD

Leslie Silbernagel, Science Curriculum Specialist, Northwest Local School District

Dr. Kenneth Wagner, Assistant Superintendent, Redlands USD
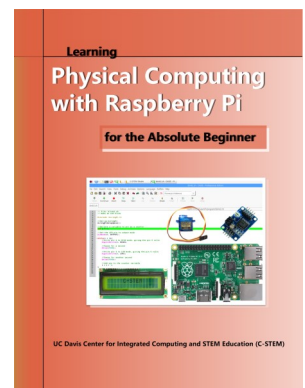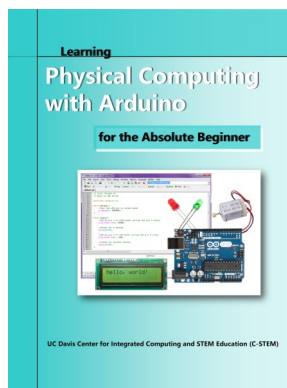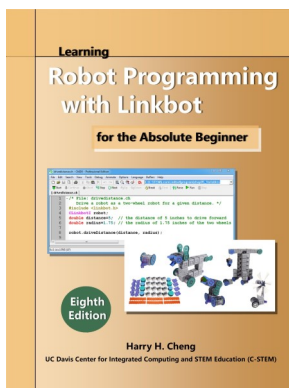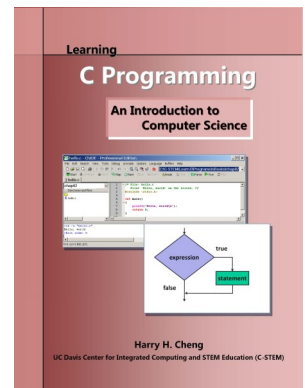
C-STEM Math-ICT Curriculum

https://c-stem.ucdavis.edu/curriculum

C-STEM (Computing, Science, Technology, Engineering, and Mathematics) is a UC Approved Educational Preparation Program for Undergraduate Admission for both K-12 and Community College students to all UC campuses. The A-G approved C-STEM courses at the UCOP web site can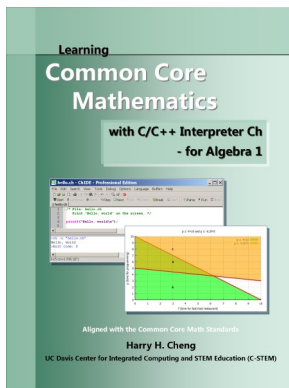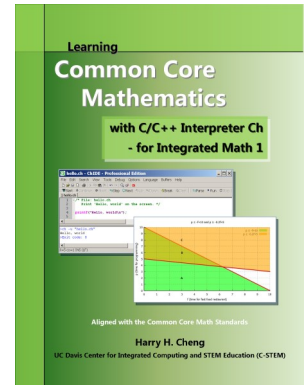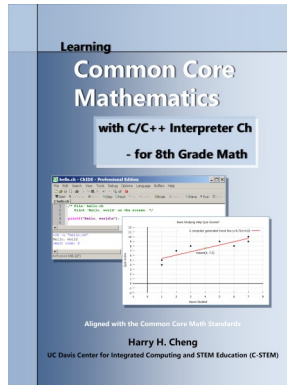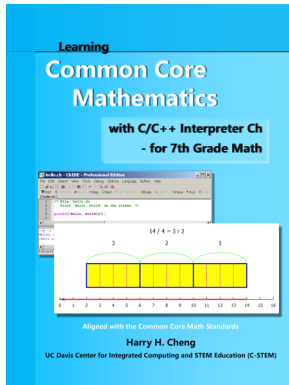 readily be added in a high school's A-G course list. C-STEM Math-ICT Curriculum provides students with up to 13-years of experience learning math with coding and robotics. Integrating coding and robotics into math education facilitates an engaging, rigorous course that promotes critical thinking and creative problem solving. Many students who take C-STEM Math with Coding and Robotics courses have fun learning often without associating the course with their struggles in a traditional math class. This unique hands-on approach provides students with the application-based learning they need to gain a thorough understanding of the materials.

Read Some of our Success Stories!

Selected Samples of C-STEM Textbooks and Curriculum

Learning
Common Core Mathematics
with C/C++ Interpreter Ch
- for 7th Grade Math

Aligned with the Common Core Math Standards
Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Common Core Mathematics
with C/C++ Interpreter Ch
- for 8th Grade Math

Aligned with the Common Core Math Standards
Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Common Core Mathematics
with C/C++ Interpreter Ch
- for Integrated Math 1

Aligned with the Common Core Math Standards
Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Common Core Mathematics
with C/C++ Interpreter Ch
- for Algebra 1

Aligned with the Common Core Math Standards
Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Computer Programming with Ch
for the Absolute Beginner

Third Edition
Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
C Programming
An Introduction to Computer Science

Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Robot Programming with Linkbot
for the Absolute Beginner

Eighth Edition
Harry H. Cheng
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Physical Computing with Arduino
for the Absolute Beginner

UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Learning
Physical Computing with Raspberry Pi
for the Absolute Beginner

UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Upcoming C-STEM Professional Development Events

https://c-stem.ucdavis.edu/pd

No coding or robotics experience is required to learn how to integrate C-STEM coding and robotics into your classroom. C-STEM PD provides K-14 teachers with the knowledge and skills necessary to introduce industry standard computer programming and robotics into their STEM classes and afterschool programs. Participants explore how to use UCOP A-G Approved C-STEM Math-ICT curriculum to thoroughly prepare their students for college and careers with engaging, hands-on, and relevant lessons, activities, and exercises. Teachers discover unique strategies for facilitating a classroom environment integrated with the latest technologies.

Upcoming Events		
Event	**Location**	**Date**
1-Hour Webinar	Online (FREE!)	1st Tues. Every Month
2-Day Workshop	Redlands, CA	Nov. 13-14
2-Day Workshop	Orange County, CA	Nov. 18-19
2-Day Workshop	Davis, CA	Dec. 7-8
2-Day Workshop	Bakersfield, CA	Feb. 3-4
2-Day Workshop	Redlands, CA	Mar. 9-10
1-Week Institute	Bakersfield, CA	Jun. 1-5
1-Week Institute	Davis, CA	Jun. 22-26
1-Week Workshop	Davis, CA	Jun. 29 - Jul. 3
1-Week Institute	La Puente, CA	Jul. 13-17
1-Week Institute	Redlands, CA	Jul. 20-24

"This was incredible. I have been to A LOT of trainings and this was by far the best!"

- Allen Thoe, CS Teacher, Citrus Valley HS, CA

2-Day Workshop
Provides an introduction to C-STEM, RoboBlockly, Linkbots, Ch Programming, and Arduino. Primarily geared for teachers and district coordinators to become familiar with C-STEM implementation materials.

1-Week Institute
The best option for beginners, especially Math, Science, and CTE teachers. This PD starts from the absolute beginning and builds the skills teachers need to utilize C-STEM Math with Coding and Robotics as well as Arduino into their classroom teaching.

"Lots of information, filled up my brain for the week, but all good stuff!"

- Alan Aceto, Comptuer Programing Teacher, Cope MS, CA

1-Week Workshop
More advanced teachers can explore higher level applications of Linkbots, Raspberry Pi, and Arduino to create sensor-based robotics systems. At least 1 year of experience working with coding, robotics, and Arduino is recommended.

Check Out Our Upcoming Events!

On-Site Training
No experience necessary, can be tailored for brand-new beginners or experienced technology veterans. This training is custom-built to align with your school or district's implementation of C-STEM whether you're doing Math, Computer Science, Robotics, Physical Computing, or any other C-STEM topic.

"I really loved this training. In over 20 years of teaching, I can't remember another one I enjoyed so much."

- Sandy Anderson, Math Teacher, La Sierra HS, CA

Girls in Robotics Leadership (GIRL/GIRL+) Summer Camps

http://c-stem.ucdavis.edu/girl/

GIRL and GIRL+ camps are designed as a Camp in a Box so that any school, district, college, or university can bring the program to their location. GIRL and GIRL+ camps are both free for the participants and offered at local sites to remove all obstacles for young girls who wish to participate. You can host your own GIRL or GIRL+ camps at your location using C-STEM GIRL/GIRL+ camp curriculum. Reach out to us to learn more.

GIRL Camp

C-STEM's GIRL camp is a week-long summer program geared for middle school girls entering 7th and 8th grade. This camp targets girls at a critical stage in their development when most girls lose interest in STEM. GIRL Camp aims to foster their interest in STEM subjects through peer mentoring and engaging hands-on coding and robotics activities. GIRL camps facilitate a positive environment for young girls to explore science and technology beyond the classroom while boosting their confidence and self-esteem through group projects and presentations. Campers are inspired to serve as leaders and role models to other young girls and encouraged to create and join robotics clubs in their schools as well as to participate in the RoboPlay competition.

Scan For More!

GIRL+ Camp

High school girls entering 10th, 11th, and 12th grade can benefit from the C-STEM GIRL+ camps, which are specifically designed to motivate high school girls to pursue higher education in STEM fields. GIRL+ provides girls with an in-depth look into more advanced coding and physical computing with Arduino and robotics. Girls learn teamwork and leadership skills through integrated, hands on coding, Arduino, and robotics activities. Campers are inspired to serve as leaders and role models to other young girls, as well as mentors to middle school girls.

FREE For Students!

Get in Touch: girlcamp@c-stem.ucdavis.edu

2020 RoboPlay Theme: Adventure and Exploration

https://c-stem.ucdavis.edu/roboplay

RoboPlay Competition is an annual culminating event for the C-STEM program. The event brings the C-STEM community together to engage students in project-based team activities and to showcase their accomplishments and creativity.

RoboPlay Challenge Competition

RoboPlay Challenge Competition is a theme-based level playing field robotics competition for students in grades 5-12. The competition challenges students to creatively use modular robots and accessories to complete various tasks. The competition arena and specific challenges will be unknown to participants until the day of the competition. Using their math, programming, and problem solving skills, student teams try to most efficiently obtain the highest score for each task on their own.

RoboPlay™

RoboPlay Video Competition

101 (RoboPlay Video Competition Sample Video)
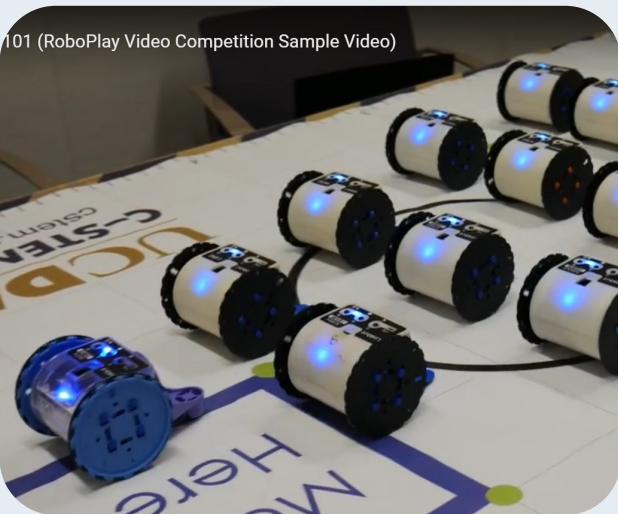
RoboPlay Video Competition is a robotics-centric video competition for students in grades 5-12. It is designed for students to learn robotics while having fun and exploring their creativity in writing, storytelling, art, music, choreography, design, video editing and film production, and at the same time seamlessly learning C-STEM subjects.

Dr. Barbara Nemko
Napa County Superintendent of Schools

The Impact of Creative Problem Solving with Robotics on K-12 STEM Education

Selected by the Center for Digital Education as one of the "Top 40 Innovators in Education", Dr. Nemko describes herself as passionate about ed tech, even though she bravely admits to sometimes struggling with her own technology devices. She is a strong advocate of curriculum materials with embedded media that engages and motivates learners and content that can be instantly updated. Two "ed tech" programs of which Dr. Nemko is particularly proud are the "Footsteps2Brilliance" early learning for preschoolers (especially helpful for ESL learners and their parents) and tech tutoring where Court and Community School students teach residents of the Senior Center how to use their mobile devices.

Working in education her entire life, Dr. Nemko started as a teacher in New York City, then took a position at U.C. Davis evaluating California Department of Education programs. Later, when Dr. Nemko was Curriculum Director at Napa County Office of Education, she was appointed Interim Superintendent when the Superintendent retired. Now in her sixth elected term, Dr. Nemko continues to use her ed tech enthusiasm to promote positive programs for over 21,000 students at five districts within Napa County. Her favorite role, however, may be the one she has with her two granddaughters, ages 8 and 10.

Professor Bahram Ravani
Department of Mechanical and Aerospace Engineering, UC Davis

Robotics Research and Its Applications

Bahram Ravani is a distinguished professor in the Department of Mechanical and Aerospace Engineering, the director of the Center for Information Technology Research in the Interest of Society at UC Davis and co-director of the Advanced Highway Maintenance and Construction Technology Research Center, a collaborative effort with the California Department of Transportation. This center applies robotics, automation and information science in engineering to the civil infrastructure including the highway system. Ravani also initiated an international research training group in Germany to train Ph.D. students in manufacturing. During his 31-year career at UC Davis, Ravani has led research in the areas of design and manufacturing, automation, robotics, highway safety, mechatronics and informatics, intelligent transportation systems, dynamics and biomechanics resulting in over 140 technical publications and a graduate -level textbook. He is also a member of the American Society of Mechanical Engineers (ASME) and a past recipient of several achievement awards including the Machine Design Award, Design Automation Award, Mechatronic and Embedded Systems and Applications (MESA) Achievement Award and the ASME Gustus Larson Memorial Award.

Hands-on STEM with Robotics from the Perspectives of Teachers, Schools, and Districts

Moderator: Merry Kim, Associate Dean, CTE, Coastline College
**Panelists:**

Dr. Judy Fancher
Assistant Superintendent of Curriculum, Instruction, & Assessment,
Hacienda La Puente Unified School District

Judy A. Fancher, Ed.D. currently serves as the Assistant Superintendent of Curriculum, PreK-12 in Hacienda La Puente Unified School District in Los Angeles County. Dr. Fancher has 32 years of educational experience including 19 years as an administrator and 13 years as a high school English Teacher. Her commitment to the implementation of STEAM based classes began during her principalship at Sunny Hills HS (Fullerton Joint Union HS District) with the development of the engineering program and continues with the expansion of STEAM, Coding, and CSTEM in HLPUSD.

Allen Thoe
Computer Science Teacher, Citrus Valley High School

Allen Thoe graduated from UC Davis in 2001 with a B.S. in Physics. He taught math for 11 years at Foothill High School in Pleasanton, CA before moving to Redlands where he has taught for 6 years (computer science and math). Aside from teaching, he is also the girls soccer coach and avid aviation pilot (Paragliding, hang gliding and Single Engine land airplanes). He has two daughters (ages 19 and 14) with his oldest being a Computer Science Major at UC Santa Cruz. One of the reasons he switched to teaching computer science was because his daughter wanted to take the class but it was not offered at his school.
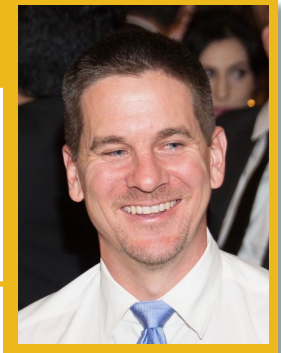
Melissa Hale
STEM Teacher, Cosumnes Oaks High School

Melissa Hale is a graduate of Cornell University where she earned her bachelor's degree in Applied Economics and Management. After earning a master's in Education, she began teaching High School Mathematics at Cosumnes Oaks High School. Since getting involved in the C-STEM Center with UC Davis, she has created a Coding and Robotics CTE Pathway at Cosumnes Oaks High school, earned a credential in ICT, and has been awarded C-STEM Teacher of the year. Melissa continues to grow the program with after school clubs such as Autonomous Circuits Racing Team, Girls Who Code, and Cyber Security.

Julie Lovie
Math Teacher, Valley Oaks High School

Julie Lovie has been teaching Math and Science at Valley Oak Continuation High School in Napa for over 26 years.

In 2015 she was recognized as Napa County Teacher of the Year, in 2019 she was honored as the C-STEM Teacher of the Year. In July She completed her Masters in Education from Touro University. The focus of her Thesis being How does coding and robotics support struggling Math learners. This is her 3rd year teaching the C-STEM Curriculum and the growth seen in her students is inspiring.

Dr. Roy Rogers
Principal, Southridge Middle School

Rogers has earned a Master of Arts degree in Education, with an emphasis in Instruction and Curriculum, a Master of Science degree in Education with an emphasis in Administrative Leadership, and a Doctorate degree in Education, with emphasis in K-12 Education. He began his teaching career in San Bernardino City Unified School District and has served as a WASC Coordinator, English Department Chair, Academic Coach, and Behavior Support Provider. For the past three years, Dr. Rogers has served as the Principal of Southridge Tech. Dr. Rogers has been at Southridge Tech Middle School since 2017, where they are developing a STEM program that includes Microsoft Education, C-STEM, and Discovery Education.

A

RoboBlockly for Engaging the Absolute Beginner in Computing, Robotics, and Math

(E)
(M)
(H)
(B)

Facilitator:

Sandra Soto, Teacher, Cambridge Elementary, Travis Unified

Description:

RoboBlockly is a web-based drag-and-drop development environment for programming virtual and hardware Linkbot and Lego Mindstorms NXT/EV3 robots. Based on Google's Blockly, RoboBlockly is designed to guide absolute beginners through an introduction to solving real-world problems with math, coding, robotics, and logic. Explore hundreds of pre-built activities including CCSS-aligned math activities, NGSS-aligned science activities, coding and robotics activities, and detailed projects to bring classroom learning to life. RoboBlockly also prepares students to program in C/C++, the most widely used conventional text-based programming language in industry and college, and can run in any modern web-browser without installing additional software. Attendees will experience a hands-on introduction to free block-based programming and robotics.
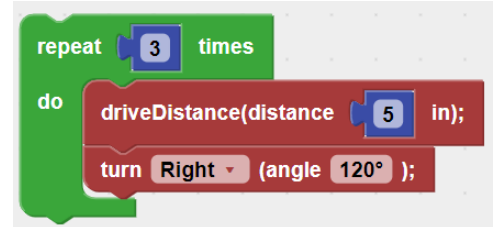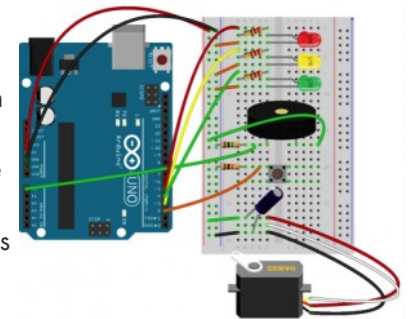
Attendees must bring their own personal computer. Windows XP and Mac OS X users must pre-install software from https://c-stem.ucdavis.edu/downloads. Chromebook users must pre-install Linkbot software from https://barobo.com/downloads/.

B

Arduino: Introduction to Basic Electronics and Creative Problem Solving for Physical Computing

(E)
(M)
(H)
(B)

Facilitator:

Melissa Hale, C-STEM Teacher and CTE Department Chair, Cosumnes Oaks High School, Elk Grove Unified

Description:

Join this hands-on session to get started using Arduino microcontrollers through C-STEM Studio, Ch Arduino, RoboBlockly, and ChIDE. This session will explore an introduction to Physical Computing with Arduino by combining the hands-on projects of physical computing with the simplicity of block-based programming. Discover the endless possibilities of physical computing and how to incorporate modern do-it-yourself electronics into your classroom teaching. Arduino can be integrated into Math, Computer Science, Engineering, and Robotics Courses, as well as afterschool programs and summer camps to facilitate a technologically advanced learning environment.

Attendees must bring their own laptop and pre-install software from https://c-stem.ucdavis.edu/downloads/. Arduino Uno Starter Kits will be provided by the C-STEM Center.

Legend

(E)　　Appropriate for Elementary School

(M)　　Appropriate for Middle School Teachers

(H)　　Appropriate for High School Teachers

(A)　　Appropriate for Administrators

(B)　　BYOD—Bring Your Own Device
　　　　Windows XP or MAC OS 10.7.5 or higher unless specified

8

C

E M H A

Secondary School Math with Computing and Robotics: Open the Gate for STEM Careers

Chairs:
Dr. Judy Fancher, Assistant Superintendent of Curriculum, Instruction,
    & Assessment, Hacienda La Puente Unified
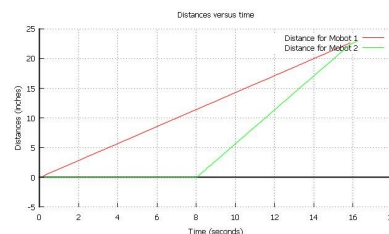Deepika Srivastava, STEAM & Innovation Coordinator, Redlands Unified

Presenters:
Allen Thoe, C-STEM Math Teacher and District Lead, Citrus Valley High School, Redlands Unified
Pamela Matea, C-STEM Teacher, Southridge Tech Middle School, Fontana Unified
Alma Gonzalez, Teacher, American Canyon High School, Napa Valley Unified

Description:
Student success in Algebra is recognized as a gatekeeper to future STEM Careers. Unfortunately, far too many students are not passing Algebra. In this session, C-STEM teachers discuss their implementation of C-STEM's Math 7, Math 8, Algebra 1, Geometry, Algebra 2, and Integrated Math 1, 2, and 3 curricula focused on closing the math achievement gap. Teachers show how the C-STEM A-G Approved courses, with C Math credit, helped guide their students through challenging mathematics topics while simultaneously teaching students programming and computational thinking. Learn how teachers use the curriculum and other Common Core-aligned resources to support struggling or failing students.

A1

M H A

Diversity and Inclusion: Girls In Robotics Leadership (GIRL) and GIRL+ Summer Camps

Chairs:
Lisette Estrella-Henderson, Solano County Superintendent of Schools
Gary Page, Education Programs Consultant, Career Technical Education Leadership Office, CDE

Panelists:
Kristina O'Brien, Teacher and C-STEM Coordinator, CORE Charter School/AeroSTEM Academy
Shauna Hawes, Teacher and GIRL Camp Mentor/Organizer, Valley View Middle School, Mt. Diablo Unified
Terri Soth, GIRL+ Camp Head Coach, UC Davis C-STEM Center
Ashlynn Flewen, C-STEM Student and GIRL Camp Participant, CORE Charter School
Bella Zemko, C-STEM Student and GIRL Camp Participant, CORE Charter School

Description:
Learn how to promote diversity and inclusion through C-STEM GIRL (Girls in Robotics Leadership) and GIRL+ Camps, Afterschool program and Summer Camps. The C-STEM GIRL camps are focused on motivating middle school girls through peer mentoring to teach computing and STEM concepts through a fun and exciting robotics-based curriculum that culminates with the creation of a C-STEM Day RoboPlay Video. GIRL+ camps are for high school students. Additionally, schools and districts can take advantage of the C-STEM computing resources and robotics infrastructure to use in their expanded learning programs. Learn how C-STEM curriculum is successfully integrated into the GIRL/GIRL+ camps, afterschool program, and summer camps . GIRL/GIRL+ camps are funded by various sponsors and free for camp participants.

A

E M H A B

Getting Started with Hands-on C-STEM Coding, Robotics and Curriculum for the Absolute Beginner

Facilitators:

Julie Lovie, Math, Science, and C-STEM Computing and Robotics Teacher, Valley Oak High School, Napa Valley Unified

Kristina O'Brien, Teacher and C-STEM Coordinator, CORE Charter School/AeroSTEM Academy

```
1  #include <robot.h>
2  CLinkbotI robot;
3  double radius = 1.75;
4  robot.driveDistance(5, radius);
```

Description:

New to C-STEM? Learn how C-STEM is bringing programming and robotics into classrooms and afterschool programs in ways that are engaging all students through hands-on activities and opportunities for competitive learning. Experience first-hand how computing and robotics can be easily integrated into your teaching of STEM subjects. Additionally, learn how to work with C-STEM Studio, Linkbot Labs, and ChIDE while programming and controlling robots.

Attendees must bring their own laptop and pre-install software from https://c-stem.ucdavis.edu/downloads/. Linkbots will be provided by the C-STEM Center.

B

M H B

Sensor-Based Robotics

Facilitators:

Dr. Larry Lagerstrom, Chief Academic Officer, Barobo, Inc.

Melissa Hale, C-STEM Teacher and CTE Department Chair, Cosumnes Oaks High School, Elk Grove Unified

Description:

Expand your robotics and computing experience by interfacing Linkbots with Arduino boards. Use the new Linkbot Arduino Pack and Robot Sensor Pack to build interesting configurations and attach sensors, breadboards, and microcontrollers to Linkbots. This combination opens a world of possibilities for robot control, sensory based computing, and creativity such as line following, obstacle avoidance, responding to light and sound, displaying LCD graphics, and tracking motion using a camera Linkbots and Arduino boards can be integrated into Math, Computer Science, Engineering, and Robotics courses, including afterschool programs and summer camps.

Attendees must bring their own laptop and pre-install software from https://c-stem.ucdavis.edu/downloads/. Linkbot Arduino Pack will be provided by the C-STEM Center.

C

E M H B
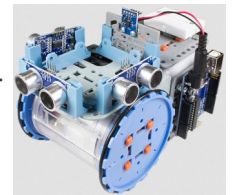
RoboBlockly Activity Portal and Classroom Management: RoboBlockly for Classroom Teaching

Facilitator:

Allen Thoe, C-STEM Math Teacher and District Lead, Citrus Valley High School, Redlands Unified

Description:

Join this session to gain experience with RoboBlockly's new classroom management tools and Activity Portal! The classroom management feature can be used to create classes, assign and grade homework, and track students' performance. The Activity Portal features nearly 700 engaging coding, robotics, art, and math exercises, and the ability to create your own custom activities. Attendees will have the opportunity to access and explore both the classroom management tools and the Activity Portal, as well as edit and generate lessons. This resource is built by teachers for teachers! Join the C-STEM community development effort!

Attendees must bring their own laptop and pre-install Google Chrome browser and software from https://c-stem.ucdavis.edu/downloads/.

RoboBlockly™

A1 — RoboPlay Competition for Competitive Learning

E M H A

Chairs:

Merry Kim, C-STEM Coordinator, OC and Associate Dean, CTE, Coastline College
Rex Schrader, RoboPlay Head Judge, HP Enterprise

Presenters:

Christopher Smith, C-STEM RoboPlay Challenge Development Lead and Sr. Infrastructural Engineer, UC Davis
Emma Kristovich, RoboPlay Coordinator, UC Davis C-STEM Center
Shane Ludwig, C-STEM RoboPlay Video and Volunteer Coordinator and Validation Engineer
Huy Pham, Teacher, Westminster High School, Huntington Beach Union High
Dubarrie Fagout, Technology Teacher, River City High School, Washington Unified

Description:

The RoboPlay Challenge Competition is a theme-based level playing field robotics competition for K-12 students.
The RoboPlay Video Competition is a robotics-centric video competition for K-12 students. The competitions are designed for students to learn C-STEM subjects while having fun and exploring their creativity. In this session, the RoboPlay Team will share their experience on how to successfully prepare for the competitions and bring the competitive learning to the classroom. The RoboPlay leadership team will also provide many updates and receive your suggestions for the upcoming 2020 RoboPlay Competition.

B1 — C-STEM for NGSS-aligned Science, CTE, and Computer Science Education

E M H A

Chairs:

Roxann Lynch-Burns, District Science Coordinator, Vacaville Unified
Lilibeth Pinpin, Director, Innovative Programs and Student Success, Solano County Office of Education

**Presenters:**

Greg Murray, Middle School Teacher, Hogan Middle School, Vallejo City Unified
Cliff Hilken, Pre-Engineering Teacher, Edward Harris Jr. Middle School, Elk Grove Unified

Description:

The Next Generation Science Standards (NGSS) changed the way science, technology and engineering intersect by providing a wealth of opportunities to engage students in science through computing and engineering. Science, CTE, and Computer Science teachers will discuss the C-STEM can be used to teach and reinforce standards. Additionally, watch them demonstrate an NGSS-aligned physical science lesson that includes incorporating physical computing for data collection and analysis using Linkbot and Arduino.

A
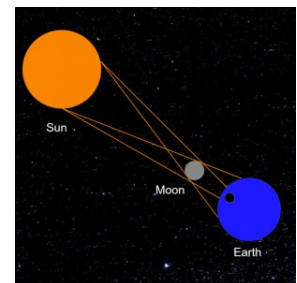
(E) (M) (H) (A)

Create your own STEAM Makerspace at your School

Facilitators:
Emma Kristovich, RoboPlay Coordinator, UC Davis C-STEM Center
Ziqian Zhu, Graduate Student, UC Davis Mechanical and
 Aerospace Engineering
Travis Jens, C-STEM Student, CORE Charter School
Cassandra Salyers, C-STEM Student, CORE Charter School

Description:
Join this session to learn how your school can facilitate a hands-on STEAM Makerspace for your students to develop robotics systems to creatively solve problems. Explore how quickly and easily dynamic Linkbot systems can be assembled to accomplish various tasks and solve challenges. With a robotics-based STEAM makerspace, students will discover new ways to solve problems by designing, building, and testing their own robotics systems. See how a Makerspace can be created for Elementary, Middle, or High school students using Linkbot, Arduino, and Raspberry Pi.

B

(M) (H) (B)

Raspberry Pi for Physical Computing

Facilitator:
Daniel Ryan, Education Service Manager, UC Davis C-STEM Center

Description:
Join this session to learn more about the Raspberry Pi, an ultra-low-cost tiny computer designed specifically for educational purposes, and experience how the C-STEM Center's free CSTEMbian operating system makes it more accessible for teachers and students to create exciting projects from controlling virtual and hardware robots to making interactive electronic devices. C-STEMbian economically and conveniently runs C-STEM Studio in Pi from Windows, Mac, and Chromebooks. Learn more about the new C-STEM A-G approved course of Physical Computing with Pi and Arduino while learning how to use general-purpose input-output (GPIO) pins and the wiringPi library. Raspberry Pi can also be readily used to control Linkbots.

Attendees must bring their own laptop and pre-install software from https://c-stem.ucdavis.edu/downloads/ and Bonjour and VNC as described at https://c-stem.ucdavis.edu/c-stembian/get-started/
Raspberry Pi Starter Kit will be provided by the C-STEM Center.

C

(E) (M) (H) (B)

Art and Animation: Full STEAM Ahead

Facilitator:
Margaret Elliott, Technology Teacher, Foothill Middle School, Mt. Diablo Unified

Description:
This session shows how the C-STEM program integrates Art into STEAM education by giving students the opportunity to explore their artistic and creative talents using music and visual media. See how C-STEM's curriculum and activity resources support the development of artistic talents through various channels including movie making, drawing and animating with coding, programming hardware robots to play melodies, learning math with a piano, and generating a gallery of graphics.

Attendees must bring their own laptop and pre-install software from https://c-stem.ucdavis.edu/downloads/.

A1 — Engaging Elementary School Students Learning Math and Science with Coding and Robotics

(E) (A)

Chairs:
Ken Wagner, Assistant Superintendent, Educational Services, Redlands Unified
Ryan Galles, Director of Elementary Education, Vacaville Unified

Presenters:
Timothy Keys, STEM-PBL Teacher, Pine Grove STEM Magnet Elementary School, Amador County Unified
Sandra Soto, Teacher, Cambridge Elementary, Travis Unified
Summer Shadley, Principal, Arbuckle Elementary and Grand Island Elementary School, Pierce Joint Unified
Greg Miller, Teacher, McPherson Magnet School, Orange Unified

Description:
Hear how a panel of Elementary School educators have incorporated the C-STEM program in their Elementary Math and Science classes as well as after school programs. C-STEM supports early learners in building confidence and understanding of abstract math and science concepts through applied hands-on robotics and coding activities. By incorporating coding and robotics into early education, students gain valuable exposure to modern technologies, develop logic-based problem solving skills, and apply creativity throughout their learning.
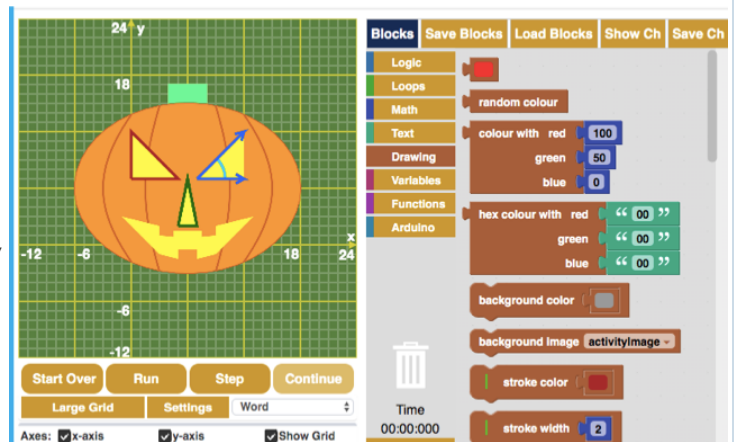
B1 — Forging Partnerships Between Higher Education Institutions and K-12 Schools through the C-STEM Program

(E) (M) (H) (A)

Chair:
Brittney Beck, Director, Teacher Education, CSU Bakersfield

Presenters:
Jesus Esquibel, Assistant Director, Teacher Education, CSU Bakersfield
Merry Kim, C-STEM Coordinator, OC and Associate Dean, CTE, Coastline College

Description:
Learn how the C-STEM program can be used to forge strong partnerships between K-12 schools and higher education institutions to build a foundation for student success. Colleges and Universities can support their community of K-12 schools through C-STEM expanded learning programs such as Girls in Robotics Leadership (GIRL) and GIRL+ summer camps, Educational Research on Math and Diversity, C-STEM Professional Development, and C-STEM RoboPlay Competition. Hear from partnered institutions about how their efforts have impacted their community and inspired K-12 students to pursue higher education in STEM fields.
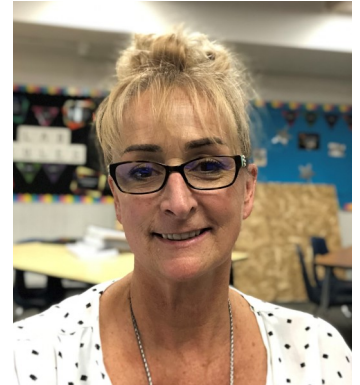
For exceptional contributions in teaching computing, integrating computing into STEM subjects, and inspiring students to pursue careers and post-secondary study in C-STEM fields.

Zelda Allison
Roosevelt MS

Alma Gonzalez
American Canyon HS

Pamela Matea
Southridge Tech MS

Todd Metcalf
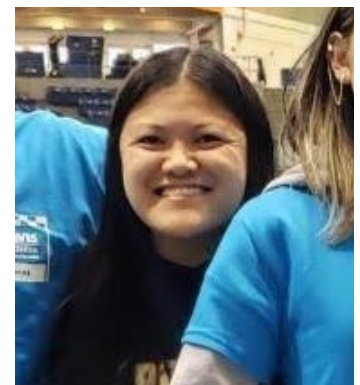Horace Ensign Intermediate

Greg Miller
McPherson Magnet

Kristina O'Brien
CORE Charter/AeroSTEM

Huy Pham
Westminster HS

Allen Thoe
Citrus Valley HS

Nhu-Y Vu
American Canyon HS

For strong leadership in supporting integrated computing and STEM education through systematic implementation of C-STEM program school, district, and county wide.

Lisette Estrella-Henderson
Superintendent, Solano County

Roxann Lynch-Burns
Science Coordinator, Vacaville USD

Dr. Kenneth Wagner
Asst. Superintendent, Redlands USD

Service Award

For unusually dedicated voluntary service to the C-STEM program by demonstrated outstanding performance, effective leadership, prolonged and committed service, devotion, enthusiasm, and faithfulness.
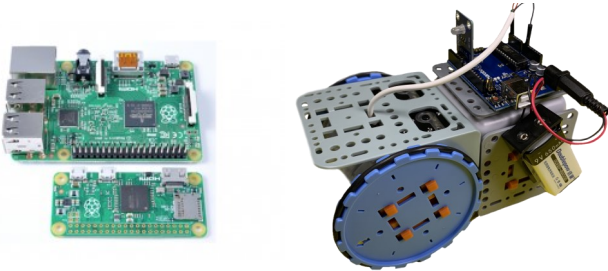
Emma Kristovich
RoboPlay Coordinator, C-STEM

Shane Ludwig
Validation Engineer, Intel

Christopher Smith
Sr. Infrastructural Engineer, UCD
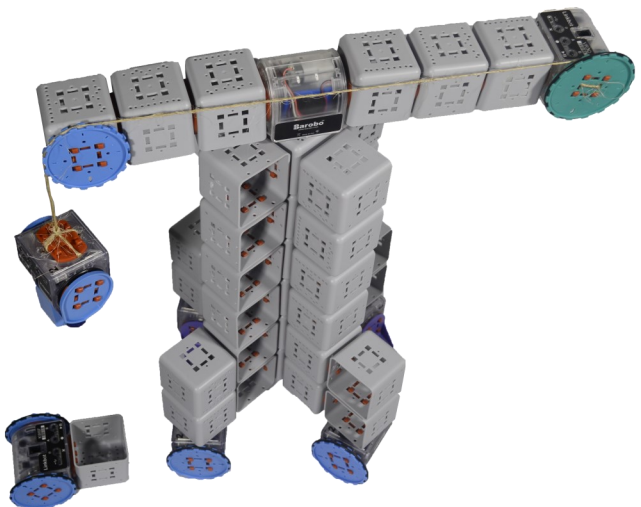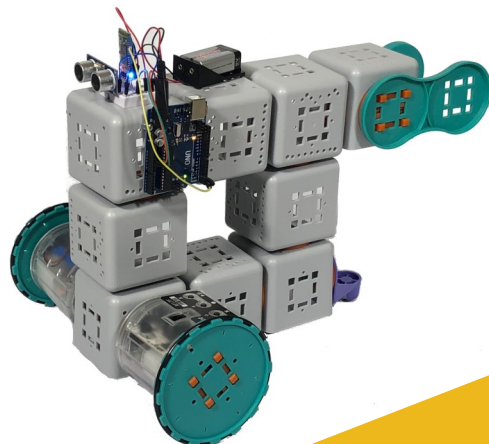
Create Your Own

Linkbot Masterpiece

See Linkbots in action!

Ask the C-STEM Team questions

Build and run your own robot creation

Explore Linkbot, Arduino, and Raspberry Pi possibilities

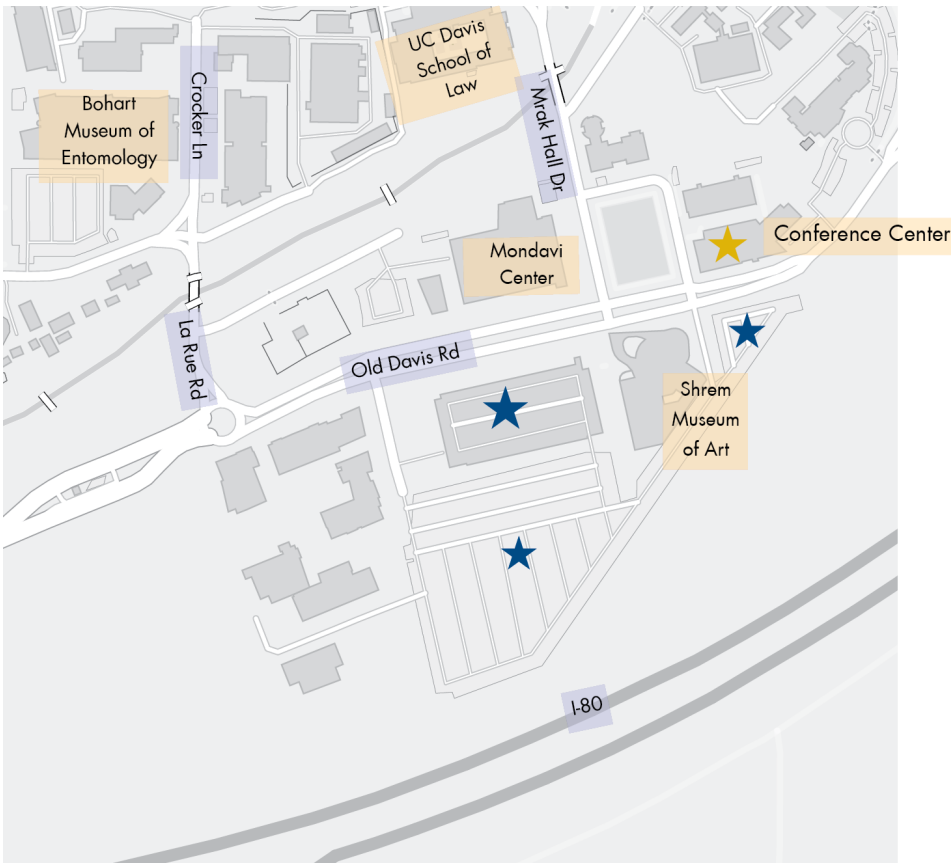Try your hand at block-based coding

Join the C-STEM Team at the Expo and Makerspace to learn the basics or explore the creative possibilities of robotics, coding, and integrated math education.

Choose from a large number of parts to build your own Linkbot / Arduino / Raspberry Pi creation, see first-hand how simple it is to get started with coding and robotics, and how to create a Makerspace in your school.

Whether you missed a breakout session and need further explanation on a subject or want to explore exciting new projects, the Expo is the perfect place to learn from the C-STEM Team and gain further hands-on experience. Visit throughout the day to try building your own Linkbot creation.

8:00am—2:20pm: Lobby
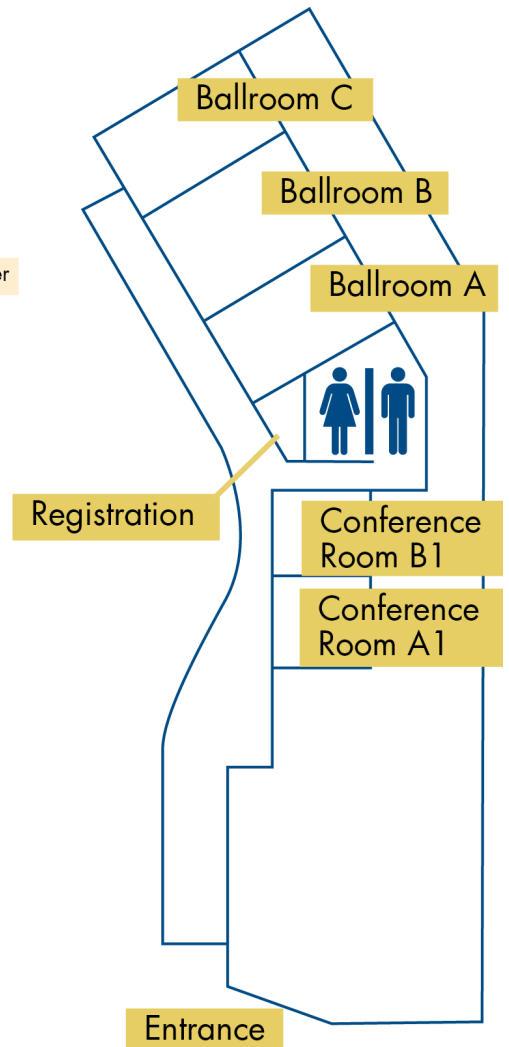## 2:40pm—4:00pm: Ballroom A

Bohart Museum of Entomology

Crocker Ln

UC Davis School of Law

Mrak Hall Dr

Mondavi Center

Conference Center

Shrem Museum of Art

La Rue Rd

Old Davis Rd

I-80

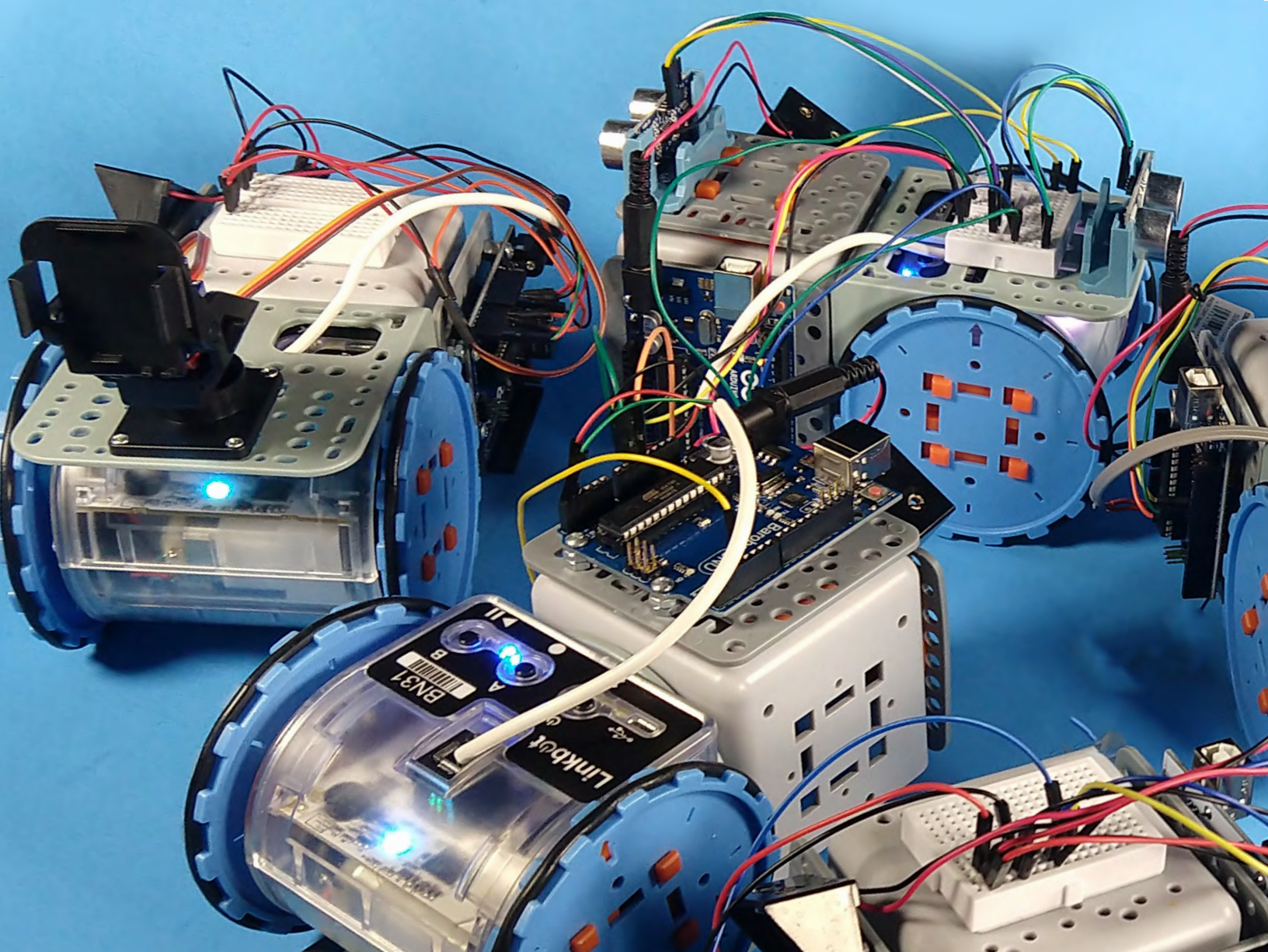## Legend

★ Guest Parking   ★ Conference Center

Ballroom C

Ballroom B

Ballroom A

Registration

Conference Room B1

Conference Room A1

Entrance

17

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