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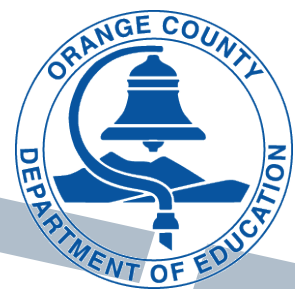
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UCDAVIS
C–STEM Center
UC Davis Center for Integrated Computing and STEM Education
http://c-stem.ucdavis.edu

RoboPlay Challenge Competition

C-STEM DAY

Saturday, May 30, 2015
Orange County

DIVISION 1

Message From the Director

Dear C-STEM Teachers and Students,

C-STEM (Computing, Science, Technology, Engineering, and Mathematics) is a UC Approved Educational Preparation Program for Undergraduate Admission to all UC campuses. Therefore, participation in the C-STEM program, C-STEM student individual and team awards, and extracurricular activities are recognized in the UC admissions process as achievements that have explicitly prepared students for colleges and careers. C-STEM joins a distinguished group of programs with UC A-G Program Status. High schools can readily and easily add the "A-G approved" rigorous C-STEM curriculum integrated with computing and robotics to their own school's A-G course lists to satisfy the UC/CSU admission requirements, without submitting a complete course content description and going through the traditional approval process with the University of California Office of President.

In 2015-2016, the C-STEM Center will pilot offering a new AP Computer Science Principles course with partner schools. This new course will introduce C-STEM students to computer science principles aligned with the learning objectives described in the College Board's CS Principles Curriculum Framework and prepare students to take the AP CS Principles exam.

The C-STEM Center aims to transform K-14 computing and STEM education in both formal and informal programs through integrated learning by integrating computing and robotics into STEM education. C-STEM Day is a culminating event of the C-STEM program. Students in the C-STEM program will showcase their accomplishments and creativity in RoboPlay and Math Programming Competitions in not only STEM topics, but also in writing, story-telling, art, music, and film production.

I would like to thank all of our participants for their hard work, including the C-STEM teachers and students, volunteers, sponsors, and C-STEM staff.

Best luck for your competition!

Dr. Harry Cheng
C-STEM Center Director

C-STEM is now a University of California approved Educational Preparation Program and has UC A-G approved Courses.

C-STEM Day Schedule: May 30, 2015

Time	Event	Location
7:30am - 8:30am	Registration and Setup for RoboPlay Challenge Competition	Building D entrance
8:30am - 8:40am	Welcome and Introduction	D1002
8:40am - 9:00am	RoboPlay Challenge Competition Introduction	D1002
9:00am - 12:00pm	RoboPlay Challenge Competition Problem Solving	As assigned
12:00pm - 12:45pm	Lunch Break	Outside Patio
12:45pm - 3:45pm	RoboPlay Challenge Competition	D1002
3:45pm - 4:00pm	Break	
4:00pm - 5:00pm	Awards Ceremony: • C-STEM Awards of Achievement • C-STEM Awards of Excellence • C-STEM Scholarship • RoboPlay Video Competition Winners • RoboPlay Challenge Competition Winners	D1002

*All room locations are located in the Orange County Department of Education, Building D

Organizer: UC Davis C-STEM Center
Co-Organizer: Irvine Valley College

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Computing, Science, Technology, Engineering and Math (C-STEM)

Why STEM?

The majority of future high-paying job opportunities will be clustered around the STEM disciplines (Science, Technology, Engineering and Math) on production and ingenuity in high-tech industries. STEM businesses and related knowledge-based high-tech clusters are projected to grow more rapidly than the overall economy and generate additional job creation in other sectors.

Why computing or IT/ICT?

Information Technology (IT) or Information and Communications Technology (ICT) refer to computers and computer networks and encompasses other information distribution technologies such as television and telephones. Several industries are associated with information technology, including computer hardware, software, electronics, semiconductors, Internet, telecom equipment, e-commerce and computer services.

Average Salary of Open Positions: $83,687

Top OC Cities - IT Percentage Employment			
Irvine	25.8%	Orange	4.7%
Santa Ana	9.6%	Tustin	3.6%
Anaheim	8.0%	Huntington Beach	3.5%
Costa Mesa	6.0%	Lake Forest	3.2%
Brea	5.0%	Aliso Viejo	2.5%
Newport Beach	4.8%	Fountain Valley	2.2%

Current "In Demand" Occupations	Openings	Average Salary
Computer Occupations, All	1091	$76,455
Software Developers, Applications	1079	$102,962
Computer Systems Analysts	915	$91,196
Web Developers	901	$65,488
Network Administrators	654	$85,814
Computer Programmers	342	$83,203
Computer & IT System	220	$146,164
Information Security Analysts	118	$92,946

*Source: OCBC Workforce Indicators Report 2014

IT/ICT is a *fundamental driver of modern economic success and competitiveness*, allowing automation of business processes, development of information tools for decision making, connects businesses with their customers in an increasing number of ways, and provides productivity tools to increase efficiency. *Programmers by trade are sought by a wide variety of companies* for proprietary software design, network support, or process development and have surpassed the state's 10-year employment projections in just five years.

*Source: OCBC Workforce Indicators Report 2014

While the majority of IT jobs require certifications or degrees equivalent to a Bachelor's, entry-level opportunities such as Computer Support Specialists have lower education requirements. New job growth stems primarily from Software Developers, IT Security Analysts, and Market Research Analysts.

Information Technology - Top Occupation Employment and Wages

Legend:
- Est. Employment 2010
- Est. Employment 2020
- Current Employment (2013)
- Avg. Salary (2013)

Source: California Employment Development Department
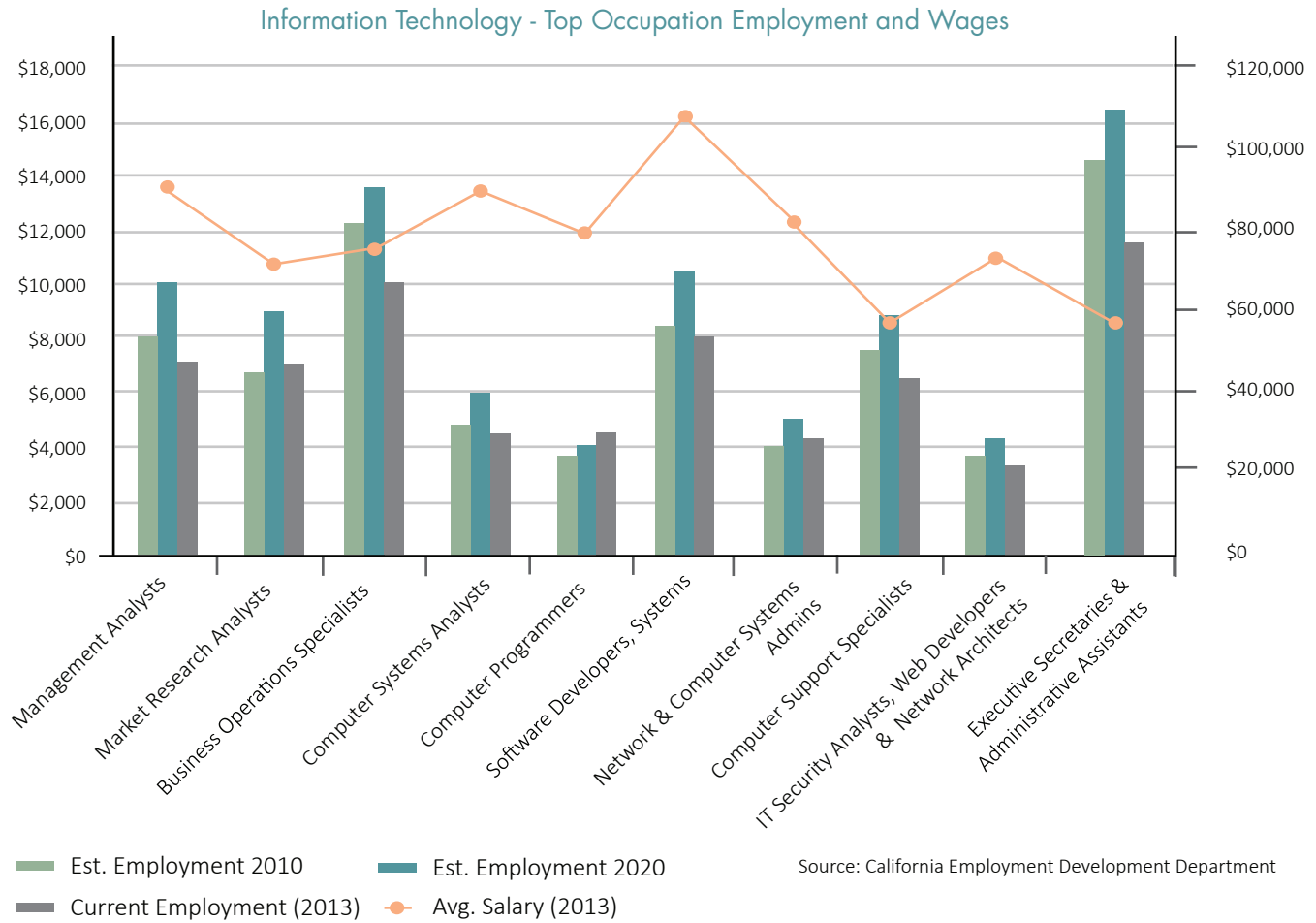
*Source: OCBC Workforce Indicators Report 2014

Did you know?

1.   2001-2011, over 565,000 IT-related jobs (in all industries) were created in the United States. IT jobs grew more than 95 times faster than employment as a whole.

2.   In 2011, IT workers earned $78,584 a year, 74 percent more than the average worker ($45,230).

3.   In the 2011 Inc. 5000 rankings of the 5,000 fastest growing companies in the US, almost 1/4 (1,140) were in the IT industry, with a 3-year average growth rate of 302% and revenues totaling nearly $54 billion.

4.   In 2012 there were 466,000 US jobs related to mobile apps, up from 0 in '07. The mobile app economy generated almost $20 billion in revenue in 2011.

*Source: www.itif.org

Schedule for RoboPlay Challenge Competition - Division 1

School	Teacher	Team #	Board	Practice Times	Competition Times	Pit #
Corona Del Mar MS	Vorona	1	E	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 2:02	1
Corona Del Mar MS	Vorona	2	A	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	2
Corona Del Mar MS	Selby	3	A	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	3
Corona Del Mar MS	Selby	4	A	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	4
Costa Mesa MS	Smith	5	B	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	5
Costa Mesa MS	Cross	6	B	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	6
Costa Mesa MS	Cross	7	B	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	7
Ensign Intermediate	Metcalf	8	C	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	8
Ensign Intermediate	Metcalf	9	C	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	9
La Paz MS	Tellier	10	C	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	10
La Paz MS	Tellier	11	D	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	11
McPherson Magnet	Warren	12	D	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	12
McPherson Magnet	Warren	13	D	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	13
McPherson Magnet	Duncan	14	E	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	14
TeWinkle MS	Kling	15	E	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	15
TeWinkle MS	Motamed	16	F	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	16
TeWinkle MS	Motamed	17	F	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	17

Schedule for RoboPlay Challenge Competition - Division 2

School	Teacher	Team #	Board	Practice Times	Competition Times	Pit #
Marina HS	Cunneen	18	G	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	18
Valley HS	Vu	19	G	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	19
Woodbridge HS	Hermans	20	G	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	20
Woodbridge HS	Hermans	21	H	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	21
Woodbridge HS	Sabado	22	H	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	22
Woodbridge HS	Sabado	23	H	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	23

Schedule for RoboPlay Challenge Competition - Division 3

School	Teacher	Team #	Board	Practice Times	Competition Times	Pit #
Corona Del MarHS	Leedy	24	I	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	24
Costa Mesa HS	Smith	25	I	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	25
Foothill High School	Brawley	26	I	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	26
Foothill High School	Brawley	27	J	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	27
Irvine Valley College	Loke	28	J	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	28
Irvine Valley College	Loke	29	J	10:40 - 10:57 11:20 - 11:37	1:25 - 1:42 1:45 - 2:02 3:05 - 3:22	29
Northwood HS	Aguilar	30	K	10:00 - 10:17 11:00 - 11:17	12:45 - 1:02 2:05 - 2:22 3:25 - 3:42	30
Northwood HS	Aguilar	31	K	10:20 - 10:37 11:40 - 11:57	1:05 - 1:22 2:25 - 2:42 2:45 - 3:02	31

Overview

General Rules

1. Use of other electronics during the competition, including other computers, calculators, cell phones, and other computing devices is not allowed.
2. There will be no internet access during the competition. If a team is caught using the internet during the competition, the team will be disqualified.
3. Teams cannot use custom-made parts. Parts allowed are listed below under "Challenge Materials."
4. All challenge tasks must be completed using a computer program (no tilt drive or copy cat). Programs for controlling the robots must be written in Ch from SoftIntegration, Inc.
5. Once the competition has begun, the teams may speak to the Judges and volunteers for clarification on problems and technical problems, but should not talk to anyone else outside of their team.
6. Keep your name tag on at all times. You will need it to gain access to the competition zones.
7. Only the teacher and the competing students are allowed in the competitions zones. No other students or parents are allowed in the pit or competition zones.

Directions

1. You have 10 challenges to do in any order you like. Successful completion of each challenge earns your team points. The goal is to get as many points as possible.
2. Read how assignments are scored to figure out the best strategy to get points.
3. Ask questions if you are unclear about something or are having technical difficulties.

Pit Zone Rules

1. All teams will be provided a designated practice area (pit) to place their practice board. Your pit number is indicated on your name tag. Refer to the diagram in your packet to find your pit.
2. Teams may bring as many laptops as they have students to the competition and keep them in their practice area (pit).

Competition Zone Rules

General

1. You will be competing on the same competition board throughout the practice and competition sessions. Your board letter is indicated on your name tag. Refer to the diagram in your packet to find your board.
2. Arrive 5 minutes early for your allotted practice/competition time and stand in the designated waiting area.
3. Refer to packet if you don't know when your practice/competition times are.
4. Practice/competition times will be marked by a whistle being blown.

Practice Information

1. You are given two 17-minute practice periods to practice on the official board between 10am and noon. (17 minute periods can be found on the RoboPlay Competition schedule page.)

2. Each 17 minute period starts and ends when specified in the schedule. Your 17 minutes will end on schedule, so don't be late.

Competition Information

1. Only one laptop may be used at the competition table.

2. You are given three 17-minute competition periods to compete on the official board between 12:45pm and 3:45pm. (17 minute periods can be found on the RoboPlay Competition schedule page.)

3. In between each team's run, there will be a 3 minute passing period. No robots may be placed on the competition board during the 3 minute passing period.

4. Teams are responsible for setting up the board for each run of each challenge.

5. At the start of every run you must tell the judge which challenge you are running.

6. Teams may not use more than five robots simultaneously, nor more than four I-bots and one L-bot simultaneously.

Challenge Scoring

1. You are allowed to attempt each challenge as many times as you like within the allotted competition time. Only the points from the highest scoring run will be kept.

2. Only one challenge may be run and scored at any given time. Multiple challenges may not be chained together nor run simultaneously.

3. Each challenge attempt, regardless of outcome, counts as a run. In the case of two teams with identical scores, the number of runs will be used a tie breaker, with the lowest number of attempts winning the tie.

4. To receive points for all scoring elements completed, your program must run to completion and all bots must stop their motion, unless specifically allowed by the challenge text.

5. Any challenge that is on-going when your 17 minute period ends will be immediately stopped and points will be calculated.

6. You may abort a run at any time by touching a robot or calling "abort". Aborted runs still count as an attempt, and score zero points.

7. If your program is still executing but no penalty points are possible you may ask the judge for a "partial call" in order to abort the run and still receive partial points. The judge must agree to the "partial call" before touching any robots or the run will be scored as an "abort".

8. At the end of each run your judge will show you your run number and run score prior to submission. If you wish to contest the score for that run, you must call for a Head Judge at that time.
9. You are encouraged to keep a record of your challenge scores in the space provided at the bottom of each challenge.
10. Once you start your program you may not interact with your computer except as specified in the "Random Numbers" section below. Interacting with your computer will count as an "abort".

Random Numbers

1. Some challenges have random numbers you will need to input into your program at the start of each run.
2. You must use the `scanf()` function to read random numbers into your program.

> Sample code:

```
int distance:
scanf ("%d", &distance);
```

3. Random numbers will change at the start of every run. Your Table Judge will hold up and say the relevant numbers for each run.
4. You may enter your random numbers into your program after starting it. Step away from the computer after entering your numbers.
5. You may not strategically abort your challenge to get "better" random numbers. If your judge feels that you are aborting to get better numbers you may be banned from attempting that challenge for the remainder of the current competition period.

Definitions and Common Terms

Whole Inch:

>   A distance/measurement rounded down to the nearest inch.
>   Examples:
>   - 3.75 inches = 3 whole inches
>   - 1.95 inches = 1 whole inch
>   - ½ inch = 0 whole inches.

Nearest Point

>   The nearest point is a measurement taken from the nearest edge of the robot to the reference point by the shortest straight line distance. The measurement will be taken with the measurement triangle resting against the nearest point.

Same Time

>   For the purposes of scoring, events which happen within two seconds of each other shall be considered the same time.

Tips and Tricks

- Illustrations don't nessisarly show the best configuration or path for a robot to complete a challenge.
- Use accessories or create multi-bot configurations unless specifically limited by the challenge text.
- Don't be afraid to try something "crazy". If it's crazy and it works … it's not crazy.
- If the whole challenge is too hard, go for partial points.

Challenge Materials

Each team will have the following parts to complete the challenges:

Part	Quantity
Linkbot-I	5
Linkbot-L	1
Snap Connector	14
Caster	2
3.5" Wheel	8
4" Wheel	8
Bridge Connector	2
Gripper	1
Cube Connector	1
Soccer Scoop	2
Hacky Sack	1
2" Wooden Block	1
3/4" Colored Stickers	3

Recommended Accessories:

1. Protractor
2. Writing Utensils
3. Compass
4. Timer/Stopwatch
5. String
6. USB flash drives
7. Ruler & Measuring Tape (min. 8 feet)
8. Extension Cord
9. Skiva PowerFlow Four Port
10. USB Charger (Qty: 2)

Orange County C-STEM Project

(C-STEM = Computing, Science, Technology, Engineering & Math)

Participating Middle School, High School/ROP and College Educators

Susan Damon (Programming/Video Game) - Canyon High School

Peter Selby (Physics) - Corona del Mar High School

Jackie Verona (Physics) - Corona del Mar High School

Daniel Leedy (Math) - Corona del Mar Middle School

Racine Cross (Math) - Costa Mesa High School

Mark Smith (Computer Programming/Math) - Costa Mesa Middle School

Todd Metcalf (Math) - Ensign Intermediate School

Klarke Brawley (Math) - Foothill High School

Jeff Farr (Engineering) - Foothill High School

Sean Glumace (Digital Media Art) - Golden West College

Chan Loke (Computer Science) - Irvine Valley College

James Tellier (Math/Technology) - La Paz Middle School

Marilyn Cunneen (Digital Media Arts/Video Game Design/Virtual Enterprise) - Marina High School

Glen Warren (Technology/Information Literacy) - McPherson Magnet School

Shannon Duncan - McPherson Magnet School

Ibeth Jaime Aguilar (Computer Science) - Northwood High School

Randy Kolset (Math Common Core) - Orange County Department of Education

Denise Thienes (Computer Technology) - Orange High School

Terry Kling (Technology/Library) - TeWinkle Intermediate School

Yassi Motamed (Math) - TeWinkle Intermediate School

Minh Vu (Engineering/CAD) - Valley High School

Kimberly Hermans (Computer Science) - Woodbridge High School

Dan Ma - Woodbridge High School

Ryan Sabado (Math) - Woodbridge High School

Todd Roth (Communication Technology) – Yorba Middle School

Acknowledgements

A very special thank you to Irvine Valley College and Corine Doughty, Dean of Instruction & EWD
Coastline ROP Board of Trustees, Superintendent, and Assistant Superintendent
for their support of the Orange County C-STEM Project and its success.

Our appreciation and recognition of the following individuals who believe in the importance of Computing, Science, Technology, Engineering and Math and in the power of innovation and collaboration to create opportunities for students in Orange County:

Kathy Boyd, Orange Unified School District

Gustavo Chamorro, ICT/DM Deputy Sector Navigator

Jeff Farr, Foothill High School

Debra Friedman, Saddleback Valley Unified School District

Christine Friend, California Career Cafe

Chris Harrington, California State University, Fullerton

Don Isbell, Santa Ana Unified School District

Patsy Janda, Irvine Unified School District

Kathy Johnson, Vital Link

Jillian Johnson-Sharp, CTEp

Merry Kim, Irvine Valley College

Sara Landa, Digital Media Center

Patricia Lim, Calit2, University of California, Irvine

Chan Loke, Irvine Valley College

Connie Mayhugh, Huntington Beach Union High School District

Alisa McCord, Orange County Department of Education

Laura Ott, Saddleback Valley Unified School District

Gary Page, California Department of Education

Tracy Parker, North Orange County Community College District

Kumar Ramajayam, Mathobotix

Debra Richardson, University of California, Irvine

Dejah Swingle, Coast Community College District

Keith Tuominen, Irvine Unified School District

Michael Vossen, Newport-Mesa Unified School District

Peggy Webster, Newport-Mesa Unified School District

Thank you to Irvine Valley College-ATEP, Newport-Mesa Unified School District Office of College and Career Education, Orange County Department of Education, Coastline ROP, and UC Davis C-STEM Center staff, volunteers and participants in the second annual C-STEM Day in Orange County.