



# STEM Robotics Leading to Career Opportunities



# Presenters

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STEM Summer Institutes  
Gindy Anfinson



# History of the STEM Summer Institutes

- Palomar has/had 3 grants to support development of the program: a Title V/STEM Grant (federal), an Innovations Grant (State of California), and a grant from the San Diego Foundation
- Spring 2017: faculty from Math, Biology, Physics and Engineering, Chemistry, Library, and Counseling worked with the division dean to create a program called the STEM Academies. This program was designed to cohort students in Biology and CS/Engineering throughout a two-year time span.

# History . . (continued)

- Due to the widely varying math and chemistry levels of the students, it was too difficult to cohort the students into math and chemistry. So the idea of cohorting students into STEM Academies was dropped.
- Program maps were developed for the STEM majors on our campus, both as part of the Title V grant and as part of the Guided Pathways initiative.
- The Summer Institutes were designed to keep students active in the program over the summer and provide them with hands-on experiential learning opportunities.

# Goals of the STEM Summer Institutes

- Give students hands-on experiential learning opportunities in either Biology or Robotics
- (Biology) Give students both lab experience (DNA bar-coding) and field experience
- (Robotics) Give students experience in a maker space
- Give students experience in working in teams
- Give students experience in presenting their work

# Two Summer Institutes

- We have offered the Robotics Institute and the Biology Institute the past 3 summer sessions.
- Both Summer Institutes have an embedded counseling component as part of the program. The purpose of the counseling component is to build community and cover essential skills to be successful in STEM majors and careers such as career exploration and development, metacognitive skills, and provide student support in the area of soft skills.
- Due to the research project involved, the students in the Biology Institute have an embedded Library component to help them with research, citations, and preparing their posters for presentation.

# Biology Institute

Students participate in:

- Field work learning about local ecosystems and pollinators
- Work in teams to come up with a hypothesis regarding a local pollinator
- Collect, identify, and label pollinators
- Perform DNA barcoding on their pollinator being researched,
- Do statistical analysis on their data,
- Create and present a research poster

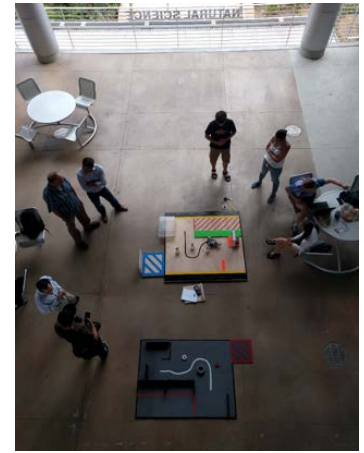




# Robotics Institute

Students learn to:

- Program LEGO Mindstorms Robots in C. They work with motors, rotation, and sensors.
- Use system analysis and experimental processes.
- Integrate engineering management, time management, project management, problem-solving and teamwork.
- Present their projects for evaluation.





# Funding the STEM Summer Institutes

- The program was offered through a non-credit class for the first two summers, so faculty were paid out of the class.
- Faculty prep time was paid out of grant funding.
- Students were paid stipends out of grant funding (first two years, the San Diego Foundation, this year the Innovations Grant).
- Use of OSML was paid for out of grant funding. We are looking to institutionalize this via a STEM endowment (set up by a previous Title V grant).
- Staffing, tutors, marketing were paid for out of grant funding.

# Growth of the Program

<b>Year</b>	<b>Biology Enrollment</b>	<b>Robotics Enrollment</b>
Year 1 (2017)	5	6
Year 2 (2018)	12	21
Year 3 (2019)	10	21



# Robotics

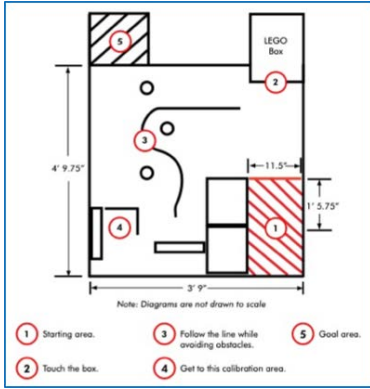
## Quan Nguyen

# Classroom Projects with Industry Involvement

- Cohorts of Engineering and Computer Science Students
  - Middle school to college students
- Cohorts work in a team environment
- Several projects assigned during each STEM session
  - Managing
  - Designing
  - Testing
  - Building obstacle courses
  - Presenting
- Students gain valuable experiences
- Industry contacts for our cohorts



# Robotics Obstacle Courses



# Developed Soft Skills via the Program

- Personal Development
  - Build relationships
  - Achievement, self-worth, sense of belonging, confidence, pride
  - Academic - it's a full time job!
- Network
  - Schools
  - Industries
- Continue Support
  - Tutoring - writing, mathematics, sciences
  - Guidance for transferring

# Mentorship

- Invest the time with each student
- Careers
  - Advise in various career fields
  - Write resume for specifics
  - Apply for positions
  - Interview techniques
- Share personal experiences
  - Students can avoid the pitfalls
  - Realistic view
  - Expectations



# Workplace Tours

# Viasat™



# Robotics Students - after program successes!

- LeeAnne Higuera
  - Women in STEM
- Natalie Scales
  - Joined Palomar's STEM Core program
- Alex Dunn
  - Interned at NASA - Kennedy Space Center in Spring 2019
  - Returning for second internship in Spring 2020
- Thomas Offenbecher
  - First cohort
  - Transferred to SDSU - Electrical Engineering program
- Joe Ayala
  - Transferred to UCR - Mechanical Engineering program

# STEM Robotics Cohorts



Summer 2017



Summer 2018



Winter 2018



Summer 2019

# Cooperative Work Experience Education

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# Final Thoughts and Lessons Learned



# Lessons Learned

- Students did not like the math and chemistry bootcamps. Due to their varying backgrounds, the bootcamps were difficult to run.
- At a community college, it is difficult to cohort students in large programs for several years.