Inside Engineering Lab Visit

Visitor Information

Visit #1
Group: Lower East Side Preparatory High School
Number of students: 30
Grade(s): 9-12 **ELL (English Language Learners) needs*
Date**:** December 1, 2016
Time: 4pm-5pm
Length: 25-30 min
Lab: Nayar/CAVE
Department: Computer Science

Visit #2
Group: Scholars' Academy, Rockaway Park
Number of students: 30
Grade(s): 7
Date**:** December 8, 2016
Time: 11am-12pm *students may arrive slightly late, around 11:10.
Length: 25 min
Lab: Nayar/CAVE
Department: Computer Science

Lesson Objectives

LO 1: Students will be able to describe computer science, in general terms.
LO 2: Students will receive an introduction to computer vision — its current status, what its goals are, what challenges are involved, etc.
LO 3: Students will see examples of computer vision technology and cameras being developed.
LO 4: Students will discuss and identify the applications and impact of computer vision.
LO 5: Students will understand the accessibility of science Ph.D. programs – students receive a stipend, do not pay tuition, etc.

Materials Needed

- Screen if you wish to play the introductory video
- Self-powered/internal camera
- Sheet camera
- Cambits

Lesson Outline

1. Introduction (5 min)
   - Make introductions:
     - PI Name, title, department
     - Graduate students and researchers
   - Contextualize:
     - Ask students questions to gauge their STEM knowledge.
     - Ask or describe: Specifically, what is Computer Science?
     - Ask or describe: What does a computer scientist do?
   - Research — Briefly cover any/all of the following * in lay terms, easily understood with only basic knowledge:
     - What is your research area?
     - What is the problem your research addresses?
     - What's been done so far?
     - What uses or solutions will (or could) your research bring about?

2. Lab Demos (10-15 min)
   - Highlight fundamental concepts and key equipment
   - Show the self-powered/internal camera. Briefly discuss how it works, how it doesn't require any external power supply, how it uses light in the scene itself, etc. Discuss the challenges of developing this technology. Discuss the applications of this camera (or ask the visitors to suggest how they think this could be used). Example: If you are doing wildlife conservation and are out in the field, it is difficult to have wired and tethered cameras. Thus, a wire-free camera with no need for an external power supply would be invaluable.

- Show the flexible sheet camera. Give a brief overview of how it works (elastic lens that captures complete field of view). Discuss challenges and applications. Try to invite visitors to answer as many questions as possible to keep them engaged.
- Show Cambits reconfigurable camera system. How does it work? What are its goals? What are some challenges? How can it be used?

3. Conclusion (5 min)
   - Discuss any statistics that you think might be interesting, or some information to paint a picture of the future impacts of this technology — something to get the students thinking about how this might affect them.
   - Discuss intersectionality of engineering types and how teamwork and collaboration is key. E.g. talk about different types of engineering that went into making a piece for your equipment
   - Emphasize *accessibility* of science Ph.D. programs — students will get paid a stipend, will not pay tuition, etc.

4. General Tips
   - Ask the audience a question early on to gauge their STEM knowledge
   - Ask questions throughout to encourage engagement
   - Ask for questions at the end
   - Avoid jargon as much as possible; students will be more likely to participate and ask questions
   - Emphasize big-picture ideas
   - When praising, praise the thought process, not intelligence (promote a growth mindset). More info on growth mindset: https://www.youtube.com/watch?v=NWv1VdDeoRY