

[CROWD CHATTER]

KRISTEN RAILEY: Girls who--

ALL: Build.

KRISTEN RAILEY: OK, that wasn't loud enough. Let's try it again. Go ahead and talk. Ignore me.

[CROWD CHATTER]

Girls who--

ALL: Build.

KRISTEN RAILEY: Awesome. Good morning, you guys. My name's Kristen. You've probably gotten one or two emails from me. Thank you all for being here.

The volunteers and I-- they're wearing these awesome navy T-shirts-- we're really excited to teach you guys engineering concepts through something you use every day, cameras. How many of you guys have a camera phone? Raise them higher. OK. Mostly everyone.

How about, does anyone have Instagram? Snapchat? Nice.

So I love those things too, but I am also an engineer, which is why I started this program. Cameras are this great integration of all these different technologies, computer science, mechanical engineering, all sorts of things, and you guys interact with them every day.

So it looks like you guys have gotten your hands on them already and taken them apart. Did anything surprise you on what you found? You can talk to the people next to you.

[CROWD CHATTER]

Girls who--

ALL: Build.

KRISTEN RAILEY: OK, how about this group over here. Did anything surprise you?

AUDIENCE: The tiny, tiny screws.

KRISTEN RAILEY: Tiny, tiny screws? How about that corner in the back?

AUDIENCE: [INAUDIBLE] compared to the whole camera.

KRISTEN RAILEY: Compared to the whole camera? Great. Anything else, different from the screws, surprise you guys?

Did anyone have a film camera? Was there anything unique about that? Had you ever used one before?

AUDIENCE: Yeah, the reusable film cameras, I was surprised at how simple they were.

KRISTEN RAILEY: Oh, great. So you guys are going to learn a lot about cameras today and you're even going to build one yourself.

But before we get started, I would like to know, who comes to mind when you think of an engineer or a computer scientist? So close your eyes and think about what this person looks like and what they do during their day job. Think about it for a minute.

All right. Open your eyes. What do you guys think?

AUDIENCE: [INAUDIBLE]. No, they sit at a computer [INAUDIBLE].

KRISTEN RAILEY: Nice. How about you in the green jacket. What do you think?

AUDIENCE: Coding and--

KRISTEN RAILEY: What do they do with the code?

AUDIENCE: Make programs.

KRISTEN RAILEY: Anyone think of hacking? Or Mark Zuckerberg? You guys have probably seen him before, right? So those are all really good examples of what computer programming is.

Have you guys seen *Iron Man* before?

AUDIENCE: Yeah.

KRISTEN RAILEY: So he does a combination of computer science and mechanical engineering, but engineering

is a lot more broad than that. And in just camera technology alone, here's some interesting examples that you might not normally think about.

Have you guys heard of unmanned aerial vehicles? Drones? So a big thing is putting cameras on them. And they can do things like go inside a burning building and map it out for a fireman. Another example is high-speed photography for understanding how animals work or satellite imaging for figuring out how healthy the earth is. And finally, Instagram, which you guys have probably heard of.

And like I said before, camera technology is not just about computer science. It involves materials and mechanics and optics. And you guys are going to learn about all those different components during this workshop.

So that leads me to what the goal of today is. You are going to discover what camera technology is, how to apply it, and gain engineering skills. And you're going to do this by building a camera, programming your own Instagram filters, and also learn about applications of camera technology.

We have an awesome lineup of speakers, including space cameras and medical imaging. And we have a bunch of cool demos at the end, including high-speed photography, infrared, and 3D scanning.

So this is just an overview of today. We'll begin with a keynote speaker, Chris Clark, who I'll introduce in a minute.

And you're going to spend the first half of the day building a camera. You're going to start off with an introduction to all the different components of a camera. And then you're going to get your hands on all the different components, and assemble them, and program it to take a picture when you press the button.

And then during lunch, we have a panel from the Society of Women Engineers, and the Women's Technology Program at MIT, and an all-girls robotics team. So if you're interested in a certain part of today, like, you want to do more coding or you want to do more building, you should pay attention to these programs. So they'll talk about what you can do for longer. They have summer programs and programs throughout the year.

And then in the second half of the day, we're going to do image processing. So you're going to get an introduction to how a computer understands what an image is, and how you can

manipulate it with math, and make those really cool Instagram filters.

And after you program your own, we'll have a conclusion and talk about what you learned. And finally, we have those really cool demos that I mentioned before, where you'll rotate around and check them out.

So you all received a picture of a famous female engineer. If you didn't get one, I have a bunch of extras for you guys. So if you didn't get one, I'm going to start in the front and just pass them down, and take one, OK?

So you guys are going to be in teams of four today, and those famous female engineers and computer scientists are your teams. So you're going to work together on all these challenges, and the volunteers will work with you during those activities.

Now we have some really boring details, but they are very important. So in case of an emergency, there is stairs in the back. So when you exit, turn left, and go all the way to the back, and then you cluster outside in the quad area.

And there are bathrooms. When you go outside, turn left, and the bathroom is on your right. And the volunteers know where they are too, if you have any questions.

And you guys are probably interested in this, where you can find the photos afterwards. So I highly encourage you to take as many photos as possible with your cameras that you build and they will be posted on our Facebook page afterwards. It's called Girls Who Build.

And finally, all the links to the activities that you do today, and the code that you worked on, and the resources, like, if you want to build your own camera at home, we'll send that to you too.