IMAGINE THE FUTURE

2016 Science & Engineering Expo
Welcome, explorers and discoverers, to the 2016 Science and Engineering Expo at The School at Columbia University! Our Parents Association and the Science and Engineering Expo Committee have worked very hard to put together this special day—our fourth biennial celebration of all things science—for you.

The theme this year is Innovation, and we invite you to take this passbook, meet the talented scientists, engineers, and health professionals, and tour the exhibits throughout our school. We hope you end your visit brimming with new facts and information, and with a deeper appreciation for and attention to the incredible ways science affects our lives. Thanks for exploring with us, and thanks to our PA for making this extraordinary day happen.

—Amani Reed, Head of School

Panel 12:00 pm-1:00 pm
This diverse panel of professionals, who represent a widely varied set of careers in science and engineering, will answer our students’ questions regarding their career trajectories. From the challenging, inspiring, and ‘a-ha’ moments of their high-school and college experiences to how they are using those experiences to innovate, create, and educate in their daily work. This panel has been organized and will be moderated by our middle-school students.

Exhibits
We’re so glad you’re here to see our school transformed into a hands-on interactive science museum! Don’t forget to collect your passport stamps as you explore the 30 exhibits, where you can watch brains thinking, see the far reaches of the Universe, and even crack the code of DNA! - Michele Damiano, David Lebson, Damien Rapoldi, Benedik Rahne, Laura Randie, Monique Rothman, Dylan Ryder, Lisbeth Uribe and Pablo Zatz (TSC Science and Technology Teachers)
Glow Worms, Grow Worms!
Elizabeth Hillman
Dept. of Biomedical Engineering, Dept. of Radiology, Columbia University
Use microscopes to see glow in the dark maggots that hatch into flies.

Type C-O-O-L Without Using Your Hands
Nima Mesgarani, Prachi Patel, Sarat Vysyaraju, Dept. of Electrical Engineering, Columbia University
Laura Long, Dept. of Neurobiology and Behavior, Columbia University
See how a brain-computer interface program uses scalp recordings to spell words.

Sensory Illusions
Qi Wang
Dept. of Biomedical Engineering, Columbia University
Are there ways to trick your brain?

Mind Games
Daphna Shohamy, Nim Tootenham, Dept. of Psychology, Columbia University
Lila Dayachi, Dept. of Psychology, New York University
See how different activities use different parts of your brain.

Growing Babies
Ceridwen Morris
Learn how babies develop in utero from blastocyst to embryo to fetus to the birth of a newborn.

Save a Life
Stephanie Goodman, Riva Ko
Dept. of Anesthesiology, Columbia University
Learn CPR and how it keeps blood flowing to the heart, brain, and prevents death.
Guess What’s Inside
Eliza Konofagou
Dept. of Biomedical Engineering, Columbia University
Use ultrasound to see what’s inside a box.

Cracking the Secret Code of DNA
Harmen Bussemaker
Dept. of Biological Sciences, Columbia University
Translate “DNA-ese” to “protein-ese” and write your name using DNA language.

Your Genome
Itsik Pe'er
Dept. of Computer Science, Columbia University
Play games to learn about genomic sequences and get a tour of one 7th grader’s genomic information.

Electric Fish
Nate Sawtell
Dept. of Neuroscience, Columbia University
Learn about a fish that uses electricity to sense the world.

Playing with Soquids
Laura Kaufman, Sarah Hansen, Alyssa Manz
Dept. of Chemistry, Columbia University
Explore properties of soquids: solids, liquids, both, or neither?

Lights, Lasers, and Your Smartphone
Keren Bergman, Michal Lipson, Gil Zussman
Dept. of Electrical Engineering, Columbia University
Experiment with lightwaves and lasers and see how they enable mobile networking.
2016 Science & Engineering Expo

**Room 415**
4th Floor

**Sticker**

**Seeing Sounds**
Dan Ellis, Dept. of Electrical Engineering, Columbia University
Douglas Repetto, Sound Arts, Columbia University
See the sound waves that we usually only hear.

**Room 416**
4th Floor

**Sticker**

**Talk Like a Computer**
Rocco Servedio
Dept. of Computer Science, Columbia University
Play a game to learn about how computers talk to each other.

**Room 421**
4th Floor

**Sticker**

**Teaching Computers to See**
John R. Smith
IBM T.J. Watson Research Center
How is computer vision different from human vision?

**Room 422**
4th Floor

**Sticker**

**You Are My Cousin!**
A.J. Jacobs
Explore how humans are all one big family — and how you’re related to everyone from Barack Obama to Beyoncé.

**Room 423**
4th Floor

**Sticker**

**Plug & Play Bioreactor**
Gordana Vunjak-Novakovic, Dept. of Biomedical Engineering, Dept. of Medicine, Columbia University | Luke Hess, Alessandro Marturano, Sue Halligan, Dept. of Biomedical Engineering, Columbia University
Learn how a bioreactor can simulate a living environment for growing human tissue.

**Room 424**
4th Floor

**Sticker**

**How to Make Computer Chips**
Jamie Tacherani
Dept. of Electrical Engineering, Columbia University
Learn how computer chips are made out of silicon wafers.

**Room 447**
4th Floor

**Sticker**
Room 448
4th Floor

Tear Apart a Computer
Stephen A. Edwards
Dept. of Computer Science, Columbia University
Investigate computer internals by dissecting one.

Room 458
4th Floor

Technologies for the Sole and Spine
Damiano Zanotto, Jesse Xing, Joon Park, Paul Stegall, Sunil Argawal
Dept. of Mechanical Engineering, Columbia University
Learn how these wearable technologies make music from your gait and augment/correct your spine.

Room 459
4th Floor

Colored LEDs and Microcontrollers
Ioannis (John) Kymissis
Dept. of Electrical Engineering, Columbia University
Make all of the colors of the rainbow using only Red, Green and Blue LEDs.

Room 507 (Discovery Room)
5th Floor

Hot Air Stirling Engine
Haim Waisman
Dept. of Civil Engineering, Columbia University
Discover how thermal energy can be converted to mechanical energy and to electrical energy.

Room 508 (Art Studio)
5th Floor

Do Try This at Home
Georgia Alexandra, Helen Causton, Talia Jimenez, Amber Saleem, Terry Scotland-Caraballo, Tamika Summers
See cool science experiments you can do using stuff you have around your home. No science qualifications needed, just a healthy curiosity and an adventurous spirit.

Room 511
5th Floor

Physics Frontiers
Bradley Johnson, Robert Mawhinney
Dept. of Physics, Columbia University
Learn how physicists use innovative tools and technologies to study the smallest scale particles.
Massive Black Holes
Zoltan Haiman, Dept. of Astronomy, Columbia University
Janna Levin, Dept. of Physics and Astronomy, Barnard College
Zsuzsa Marka, Astrophysics Lab, Columbia University

Why is there a giant black hole at the center of the galaxy?

As Far As We Can See
Lam Hui, Dept. of Physics, Columbia University
David Schiminovich, Dept. of Astronomy, Columbia University

Learn about telescopes and specialized instruments that peer into the distant reaches of space and time.

It's Getting Hot in Here
Douglas Almond, School of International and Public Affairs, Dept. of Economics, Columbia University
John Mutter, Dept. of Earth and Environmental Science, School of International and Public Affairs, Columbia University

The science and economics behind global warming.

LED Flower
Christine Kovich, Erika Gillette, Devin Wilson
HYPOTHEkids
Explore the science behind your lightswitch.

Bridge Building
Andrea Lamberti
RAFAEL VINOLY Architects
Build different kinds of bridges and then test them to see which is the strongest.

Rising Seas and You
Claudia Giulivi, Martin Fleisher, Joerg Schaefer, Gisela Winckler
Lamont Doherty Earth Observatory, Columbia University

Play with a 3D Earth model, navigate around icebergs, and dive into computer simulations to learn why sea level changes and why that matters.
2016 Keynote Speaker

Shree K. Nayar is the T. C. Chang Professor of Computer Science at Columbia University. He heads the CAVE lab, which develops advanced computer vision systems. His work is motivated by applications in the fields of digital imaging, computer graphics, robotics and human-computer interfaces.

Nayar received his PhD degree in Electrical and Computer Engineering from the Robotics Institute at Carnegie Mellon University. For his pioneering contributions to computer vision and computational imaging, he was elected to the National Academy of Engineering in 2008, the American Academy of Arts and Sciences in 2011, and the National Academy of Inventors in 2014. In 2006, he received the Columbia Great Teacher Award.

Please join us in the MPR (Floor 2) at 3:45 pm today to meet and hear Shree Nayar, who will give closing remarks and answer audience questions. Come and get a peek at the future of photography! The School at Columbia University, the PA, and the 2016 Science and Engineering Expo Committee thank Shree Nayar for joining us today.