

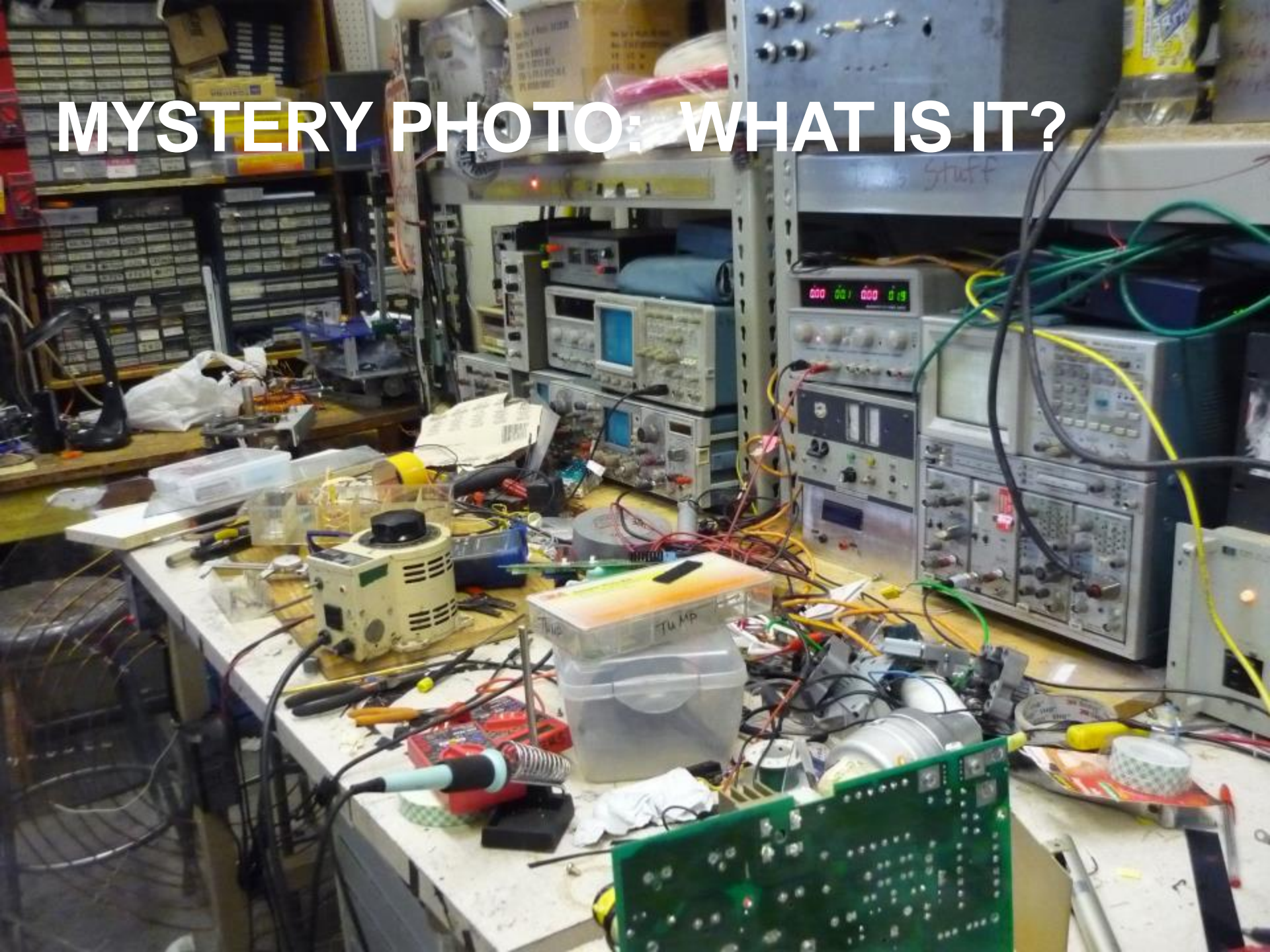
INVESTING IN STUDENTS OUTSIDE-OF-THE CLASSROOM

Norwegian University of Science and Technology
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Director, Office of Experiential Learning
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MYSTERY PHOTO: WHAT IS IT?



BEYOND SMART, WHAT ARE YOU LOOKING FOR IN A STUDENT?

- Leadership
- Intelligent risk-taking
- Creativity, perseverance
- Desire to make the world a better place
- The ability to teach others

My advice: Provide students with multiple pathways to success. Grades are not the only metric.

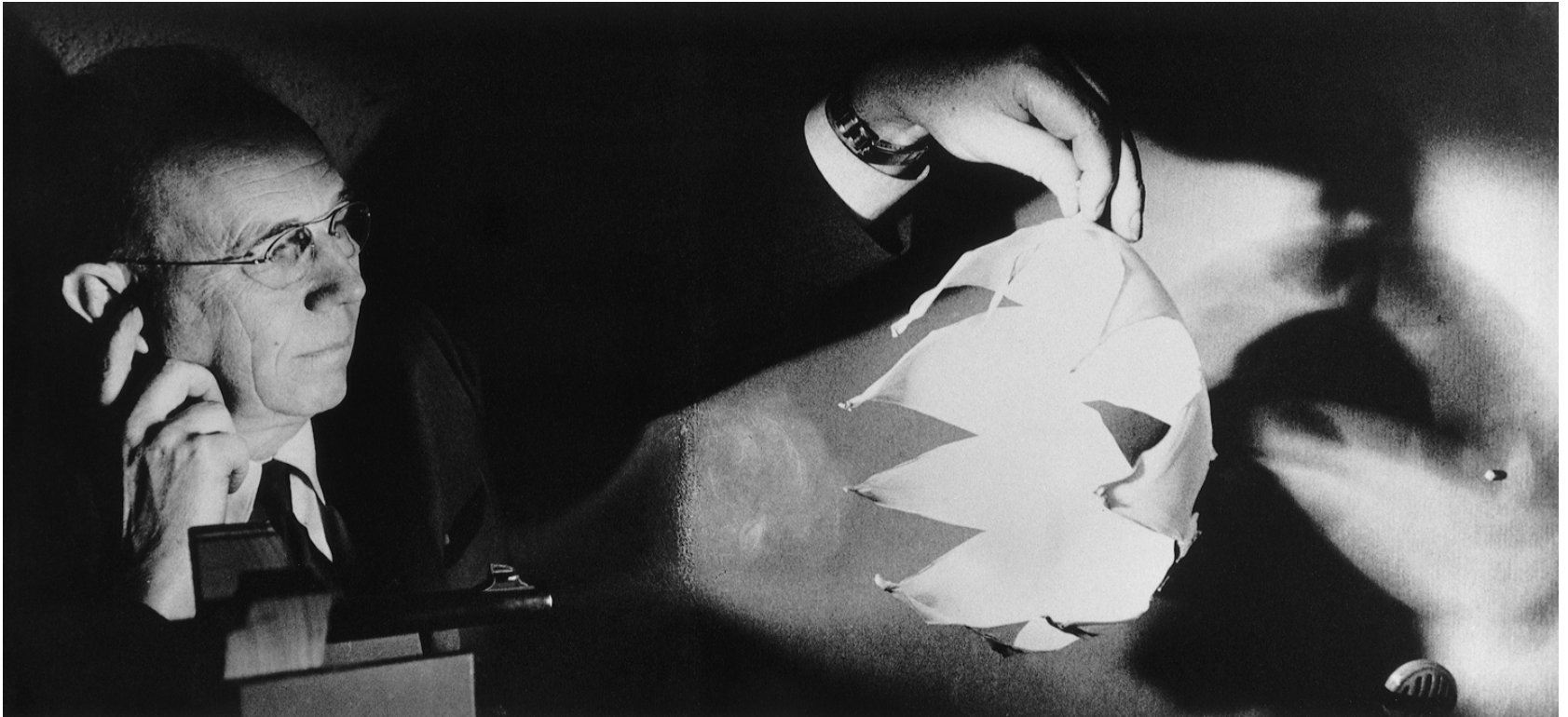
THERE ARE MANY WAYS:

Some MIT examples

- Mentors are important
- Undergraduate Research Opportunities Program (UROP)
- Edgerton Center--Student teams
- D-Lab
- Imagine what will work best here

MENTORS MATTER

Harold “Doc” Edgerton 1903-1990



“The trick to education is to not let them know they are learning something until it is too late.”

AS DOC'S T.A. IN 1972, HE CHALLENGED ME TO DO SOMETHING EXTRA: SCHLIEREN PHOTOGRAPHY



ED LAND TALK-1957—a story UROP (FOUNDED IN 1969)

- Enables undergraduates to conduct faculty-mentored research for credit or pay
- MIT has 4400 undergraduate students
- 89% of graduating students have participated in the UROP program by graduation, many multiple times. Each year about 60% participate.
- \$6.5M/year in student salaries
- Students publish and present papers, are named on patents, and gain confidence in their ability to solve hard problems.

MY FIRST EXPERIENCE WITH UROP STUDENTS—VIV 1975



- 4 to 6 week long field research projects at Castine, Maine
- UROP students and grad students, working together
- Late nights, up before dawn, bug bitten, cold and wet—all in a days work.
- Experiential learning at its best.-
-They delivered!! Not necessarily the strongest in the classroom—but best in the field.

SUAN TANG '14 –Any field is possible



| u | R | o | p |

A LONG ROAD TO MIT

- Left rural village in Myanmar in 2008, two years later applied to MIT on advice of ESL teacher in Florida
- Freshman year IAP did UROP with Prof. Stephen Lippard, worked on mechanism of anti-cancer drug cisplatin, further research with Lippard published in the *European Journal of Inorganic Chemistry*
- More UROPs with Institute Professor Robert Langer
- Active member of ClubChem bringing science to the community
- Now pursuing MD-PhD in cancer research

UROP--Summary

- Undergraduate, faculty-mentored research for credit or pay
- MIT has 4400 undergraduate students
- 89% of graduating students do at least one UROP by graduation, many multiple times.
- Each year about 60% participate.
- \$6.5M/year in student salaries

Where does the money come from for UROP salaries?

- \$6.5 Million USD is spent supporting UROP salaries. 50% comes from income from gifts and endowment
- 50% comes from sponsored research grants. Long ago the US government and US corporations recognized undergraduate salaries as an appropriate budget category in proposals.


Edgerton Center Student Teams

- Over a dozen design/build/compete teams; 200 students involved
- We provide workspace, machine shops, training, support.
- Students create the challenge, provide the skills, intensity, passion, and desire to achieve.



JACQUELINE SLY '14



- Inspired in HS by Prof. Triantafyllou's robotuna-He was her freshman advisor
- On two Edgerton Center teams, Formula SAE and Marine Robotics Team
- Completed six UROPs, four with student teams
- Led K-12 programming for Edgerton Center
- Now working at NASA's Jet Propulsion Lab in Extreme Environments Robotics Group 

MARINE ROBOTICS TEAM KETCHIKAN, ALASKA



FROM BUILDING ROCKETS...



TO BUILDING A FLYING CAR?



KURT STIEHL '07

APPLE COMPUTER PRODUCT DESIGNER



“I use skills almost every day that I learned working on the MIT ROV team. [It] was one of the key things that helped me land a job

at Apple as they really wanted practical hands-on experience. The ROV team definitely gave me an edge and completed my education in few ways that other classes could.”

D-LAB PROBLEM SOLVING



Amy Smith

D-Lab Leader
2004 MacArthur
Fellow

First female to win
Lemelson-MIT
Inventor prize in
2000

- Began as a subject “Design for the Developing World” in 2000 by MIT graduate student Amy Smith
- Developing technologies to improve the lives of those living in poverty in developing countries
- Now 10-15 subjects plus field work focusing on Health, Energy, Wheelchair Design, etc., enrolling 100-200 students, 12 countries
- **Females make up 71% of 189 students enrolled**
- 40 UROPs through D-Lab

JESSICA VECHAKUL '05, SM '08



DOC EDGERTON USED TO SAY TO ME: “NOTHING MAKES ME MADDER THAN TO BE TOLD ‘IT CAN’T BE DONE!’”

- By trusting and empowering our students they **CAN DO** impossible things.
- Provide multiple ways to success
- Find resources to get started, but leave some room for student and staff innovation and expect it to be messy at times

A photograph of a cluttered electronics workshop. In the foreground, a workbench is covered with various electronic components, tools, and a green printed circuit board (PCB) with numerous holes. A soldering iron is visible on the left. In the background, there are several electronic devices, including a power supply unit with a digital display showing '0.00', and other test equipment. The room is filled with shelves and racks of electronic components and tools, creating a dense and busy environment.

MITERS

THE MIT ELECTRONICS RESEARCH SOCIETY

—1970's, oldest maker club at MIT

WHAT GOES ON OUTSIDE OF YOUR CLASSROOM?



