

# IMPACT-CENTERED ENGINEERING EDUCATION

Sam Michalka, Ph.D.

PICK THE  
OF HISTORY



JOIN  
THE  
GREEN  
SIDE

TAKE  
ACTION



**Olin College**  
of Engineering



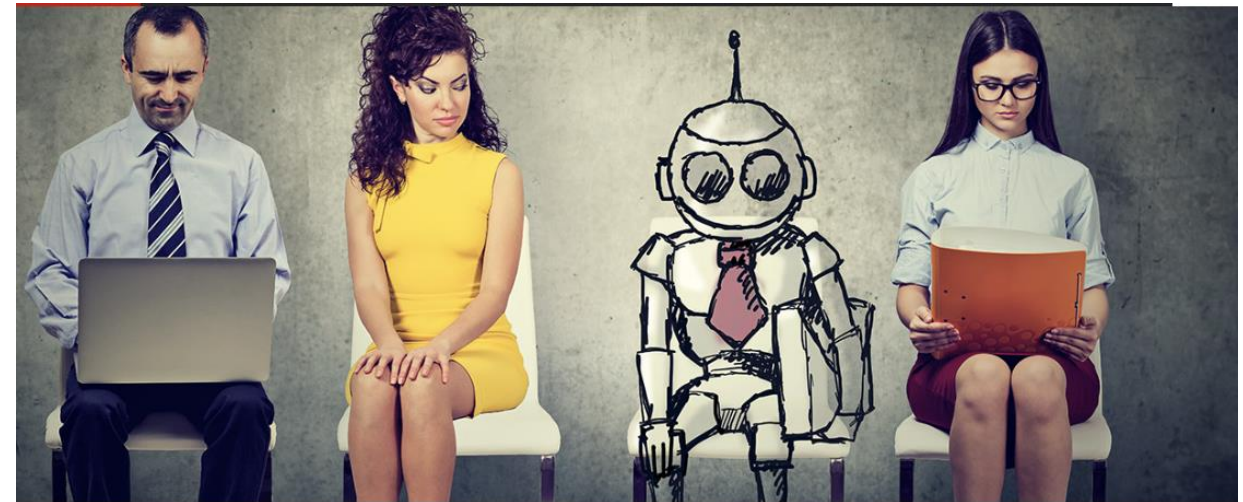
# WHAT DOES THE WORLD NEED FROM HIGHER EDUCATION ?



# CHANGING EDUCATION LANDSCAPE



**coursera**



> SOFTWARE

## SOFTWARE

### **Artificial Intelligence Is Poised to Expand in Higher Education**

Smart systems may fly under the radar, but early use cases indicate noticeable benefits.

<https://edtechmagazine.com/higher/article/2018/08/artificial-intelligence-poised-expand-higher-education>



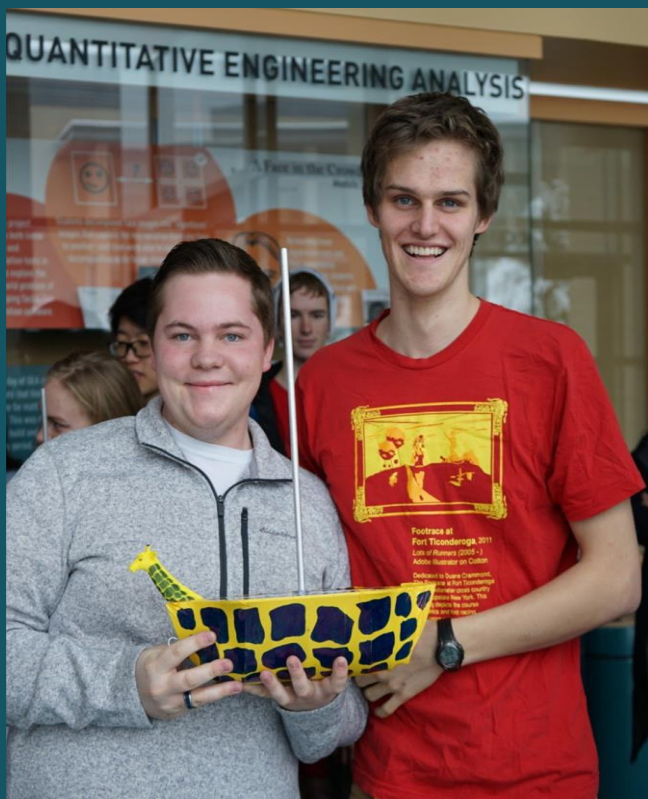


# Olin College of Engineering

Transforming engineering education toward a world in which engineering serves everyone







# COLLABORATIVE ENGINEERING PROJECTS

# ENTREPRENEURIAL THINKING

39%

of alumni have been involved in a startup venture



# HUMAN-CENTERED DESIGN

INSPIRING THE  
TRANSFORMATION  
OF EDUCATION  
THROUGH  
WORKSHOPS,  
COACHING, AND  
INSTITUTIONAL  
PARTNERSHIPS

3000+

educators and business  
leaders have visited Olin



# OLIN'S NEW VISION



President Gilda A.  
Barabino, Ph.D.

# Engineering for everyone.



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**engineering**  
**EDUCATION**  
**for everyone**



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**engineering**  
**SERVING**  
**everyone**

# A NEW KIND OF ENGINEER

- ❖ **PERSONAL IDENTITY & INCLINATION TO SERVE** society and the planet, not just themselves and their employer.
- ❖ **PROFESSIONAL & TECHNICAL SKILLS & ATTITUDES** to solve problems by understanding people's needs, generating creative solutions, and thinking and acting entrepreneurially.
- ❖ **SYSTEMS THINKERS** who appreciate and understand perspectives other than their own, approach situations with humility, and are willing to question whether engineering is the right approach to a given situation.
- ❖ **REPRESENTATIVE OF THE DIVERSITY OF TALENT** in society, including the talent that has been historically excluded from engineering.



# CORE STRATEGY

Advancing  
**ENGINEERING FOR EVERYONE**  
through



**Impact  
Centered  
Education**

# BUILDING ON EXISTING STRENGTHS



## Affordable Design and Entrepreneurship

An international, experiential social entrepreneurship and design course that aims to create solutions with people and democratize opportunity.

Ben Linder, Craig Bida, Elizabeth Johansen, Kofi Taha, Scott Hersey, Amon Millner, Erhardt Graeff



## Senior Capstone Program in Engineering

An industry-university collaboration in which seniors work in multi-disciplinary teams to provide innovative solutions to a company's real-world problems.

Scott Hersey, Ruth Levine, Jessica McCarthy, faculty



## Stuff of History

An integration of history of technology and materials science that has been shared and exported around the world.

Jon Stolk  
Rob Martello



## Context and Consequences

A course in which students explore critical theory and practice applying the framework to their experiences through a range of approaches and voices

Alison Wood  
Callan Bignoli  
Lynn Stein  
Caitrin Lynch



## Engineering for Humanity

A course in which students study topics around aging in society, while also working in design teams with one older adult in their community

Caitrin Lynch  
Ela Ben-Ur



## PInT, PIT-UN

A student-led effort empowering the Olin community to serve and engage the public interest in a hands-on way. PIT-UN is a university network focused on public-interest tech.

Erhardt Graeff



# SCALING UP REAL-WORLD EXPERIENCES





## Senior Capstone Program in Engineering

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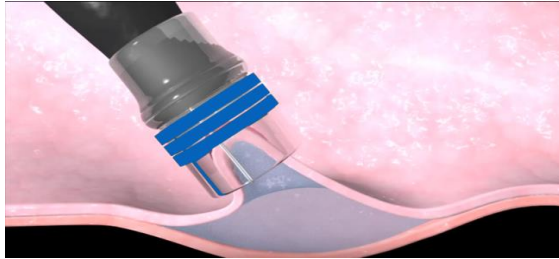
# SCOPE HIGHLIGHTS

- ❖ Full academic year course
- ❖ Significant, real-world project with an external sponsor
- ❖ Team of 4–5 Olin students; skills matched to project
- ❖ Supported by faculty advisor and other experts

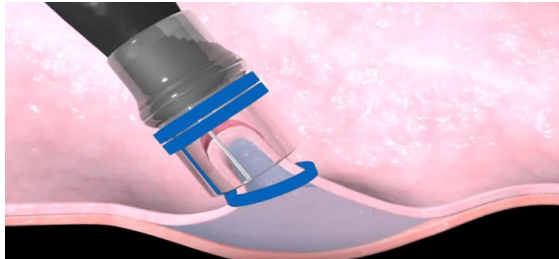


## ENDOSCOPIC MUCOSAL RESECTION DEVICE REDESIGN

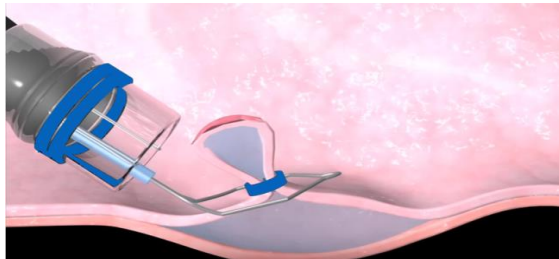
1. The lesion is sucked into the EMR cap



2. A band is deployed around the lesion



3. The lesion is caught in the snare and it is tightened to resect





# The joy of food in the golden years

Older adults  
are often  
**forgotten**  
when  
designing new  
technology.



Technology  
is designed  
with a  
specific  
**“normal”**  
in mind.



# WHAT MAKES A GOOD SCOPE PROJECT?

All companies have three classes of problems:

1. Mission-critical, absolutely essential problems.
2. Problems, that if solved, could dramatically benefit the company, but the company lacks staff or facilities to work on the project.
3. Problems that have no effect on operations.



# WHY OUR SPONSORS INVEST IN SCOPE

- ❖ Project deliverables from student team
- ❖ Ownership of intellectual property (IP)
- ❖ Opportunity to build relationships and hire our students
- ❖ Ability to support Olin's educational mission



# SCALING UP REAL-WORLD EXPERIENCES





A grayscale photograph of a person's lower legs and feet as they walk on a paved sidewalk. The person is wearing dark trousers and dark leather shoes. A white cane is held in their right hand, touching the ground. The sidewalk is made of large, light-colored rectangular tiles. The background is slightly blurred, showing more of the sidewalk and some distant figures.

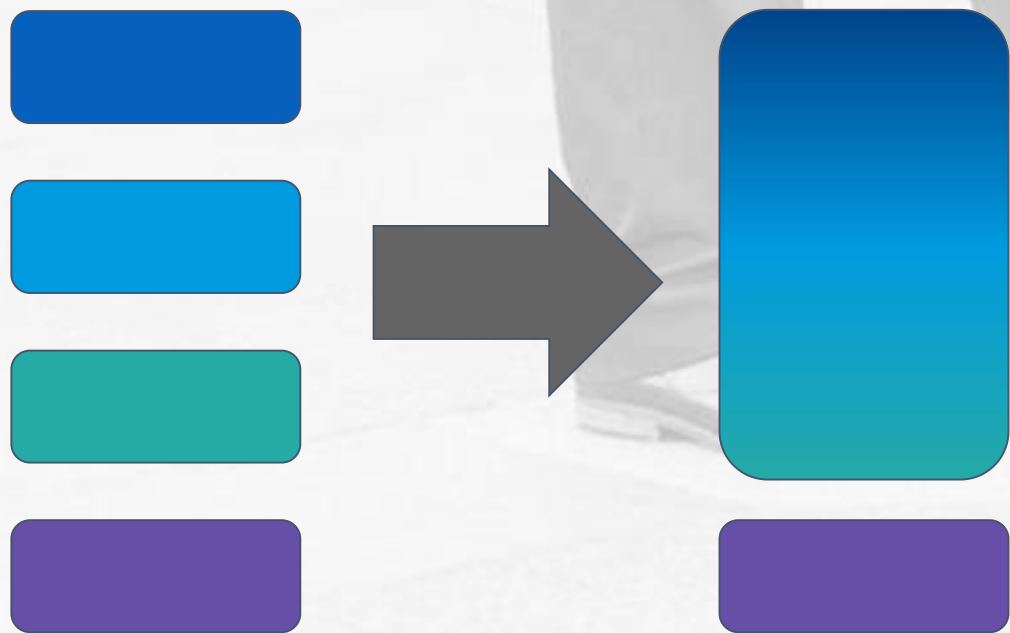
# STEP

SOCIAL TECHNOLOGY ENTERPRISE  
WITH PURPOSE

# UNDERGRADUATES AND FACULTY CAN COLLABORATE TO HAVE REAL IMPACT (IF WE CHOOSE THE RIGHT AREAS).







STUDENTS  
AND FACULTY  
DEVOTE  
SIGNIFICANT  
TIME TO ONE  
PROJECT

# PURSUING MULTIPLE APPROACHES TO INNOVATION IN PARALLEL



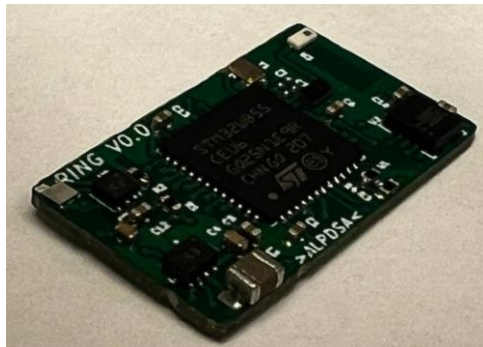
Human-Centered Design

Technology Development

Entrepreneurship



ITERATION 1:  
RESEARCHED  
THE WEARABLE  
TECH SPACE,  
BUILT  
PROTOTYPES,  
AND  
TESTED THEM  
WITH REAL  
POTENTIAL  
USERS

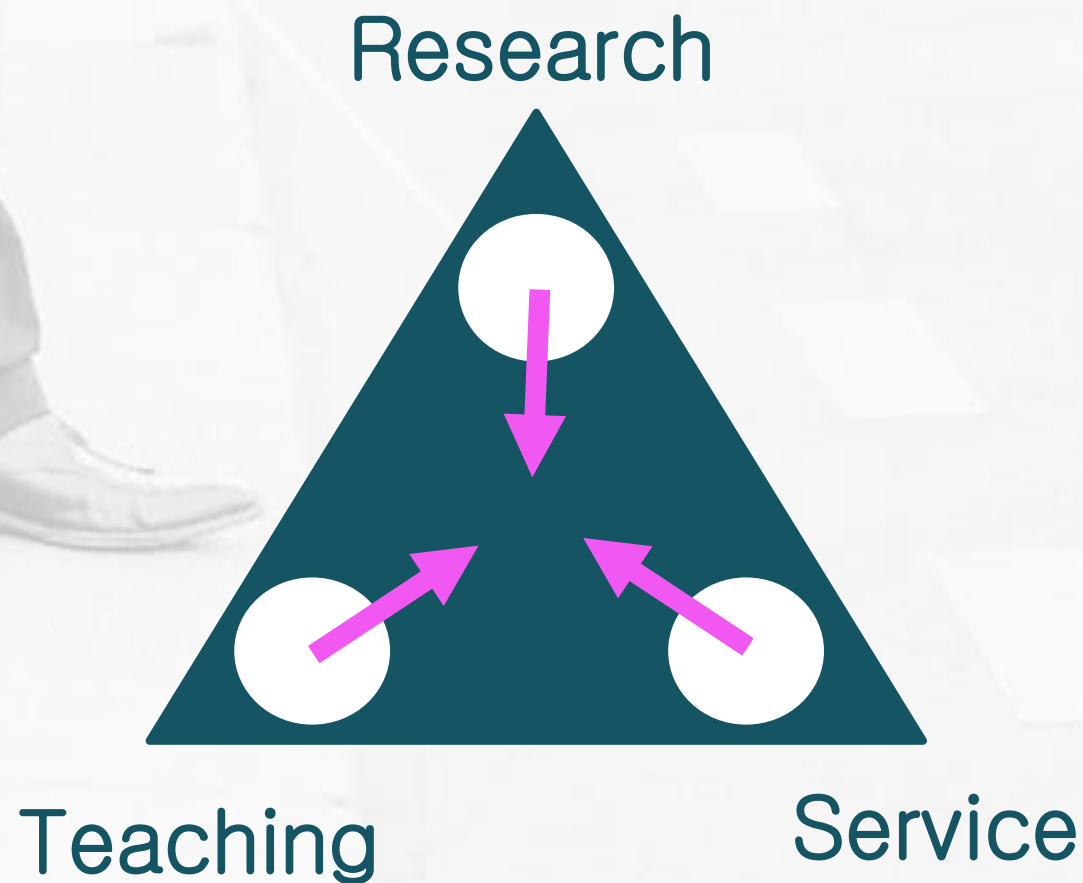








# THE STEP MODEL MEANS A DIFFERENT ROLE FOR FACULTY



Advancing  
**ENGINEERING FOR EVERYONE**  
through

Impact  
Centered  
Education





# 감사합니다

# THANK YOU!

This work is only possible with the collaborations of Olin's students, staff, faculty, leadership, and partners, with special acknowledgement of the strategic planning committee, the senior capstone teams, and all those who helped launch STEP.

Contact info:

Sam Michalka

[smichalka@olin.edu](mailto:smichalka@olin.edu)