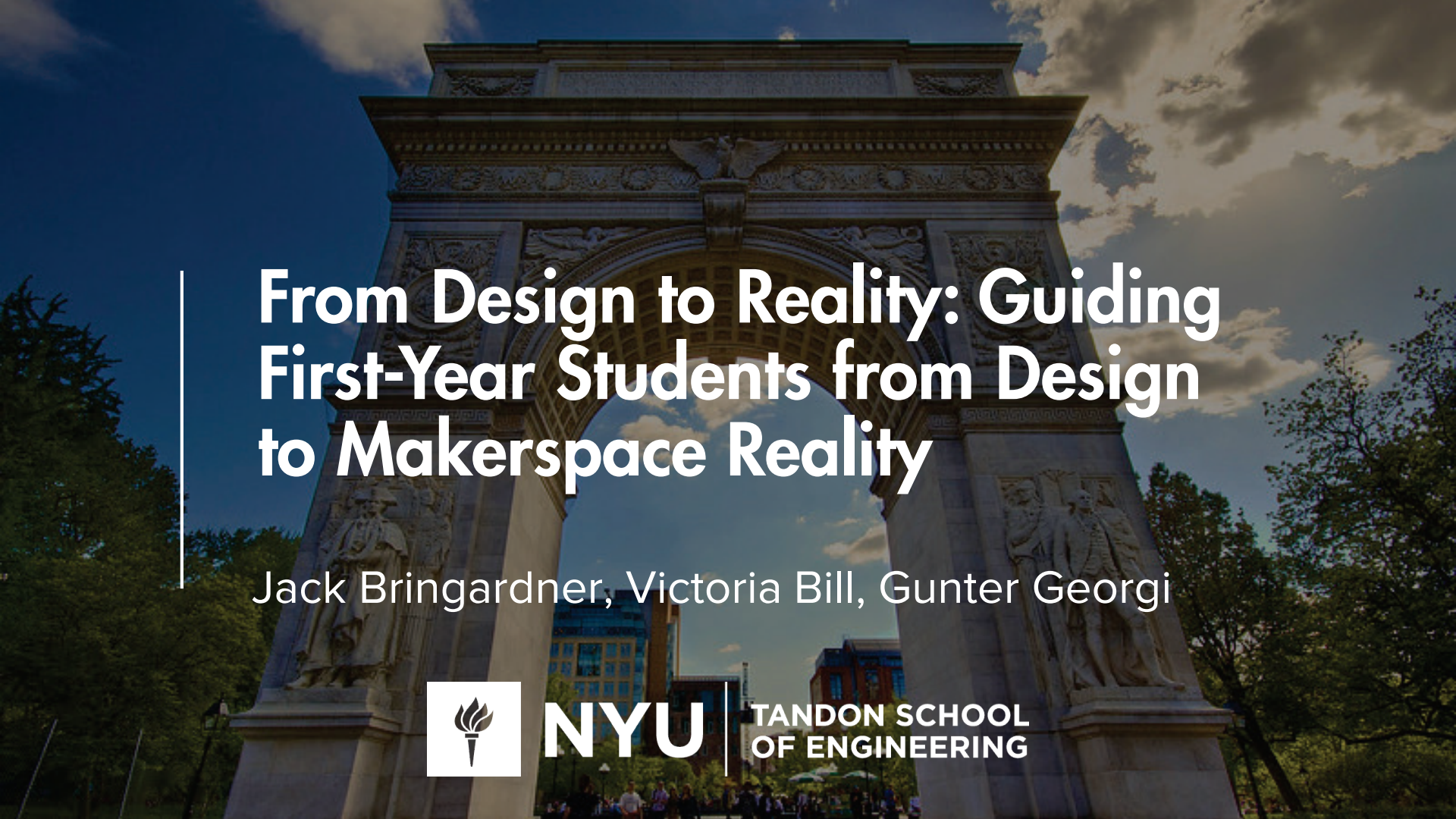
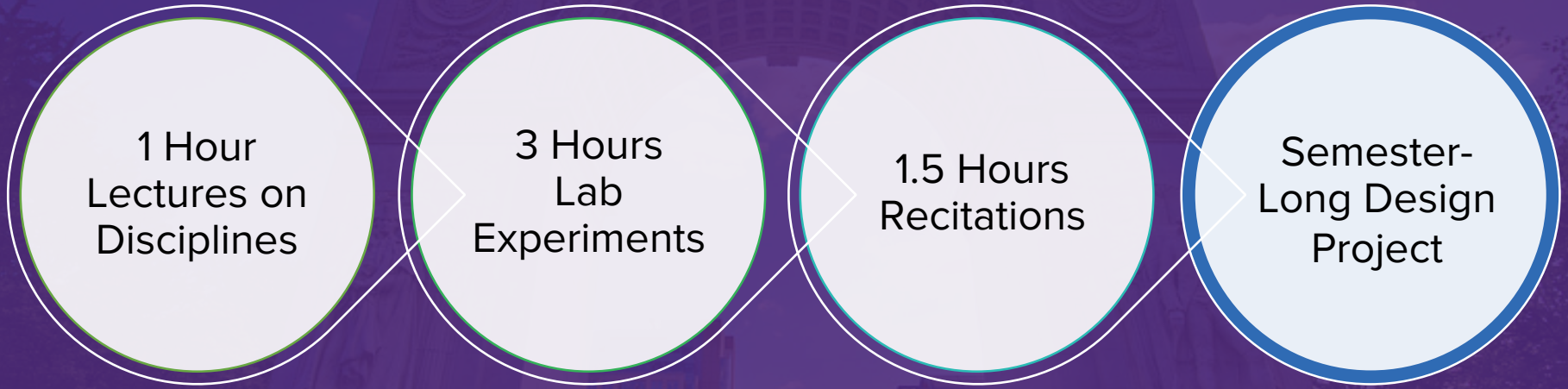


From Design to Reality: Guiding First-Year Students from Design to Makerspace Reality

Jack Bringardner, Victoria Bill, Gunter Georgi

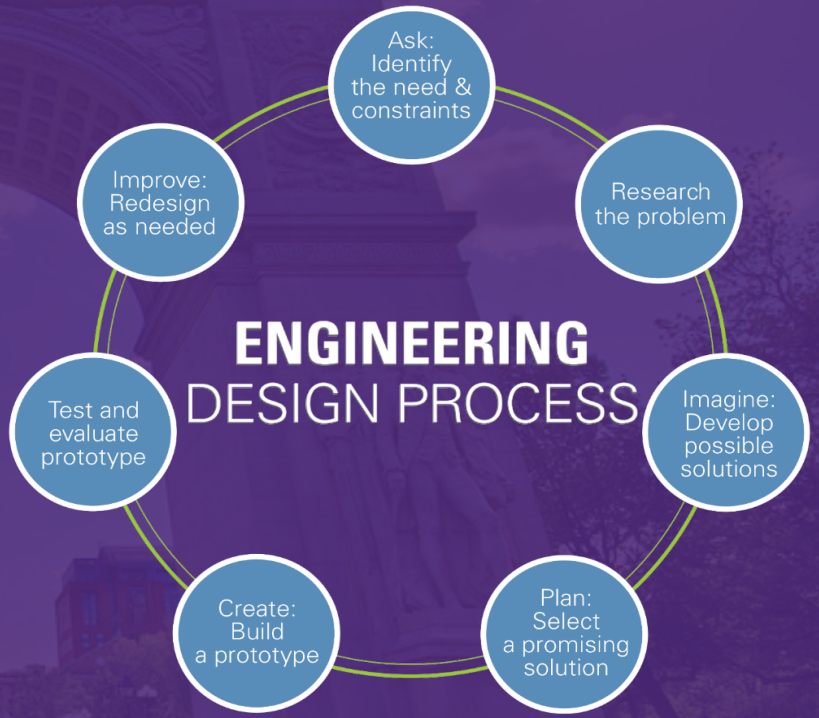
NYU TANDON SCHOOL OF ENGINEERING

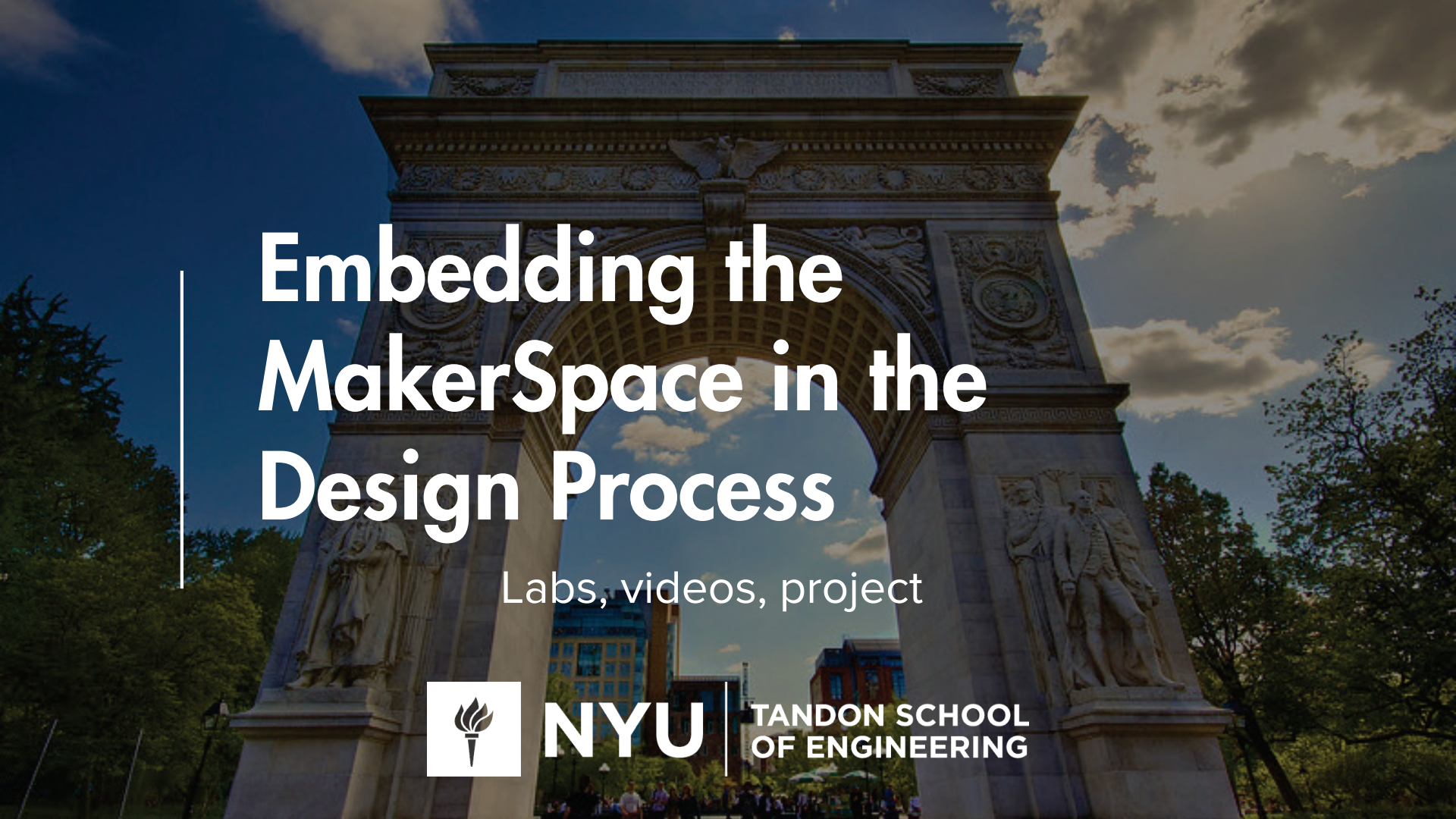
Weekly Course Structure



Course Learning Objectives

- Programming
- CAD and 3D printing
- Data analysis
- Testing
- Physical prototype
- Customer interviews





Embedding the MakerSpace in the Design Process

Labs, videos, project

NYU TANDON SCHOOL OF ENGINEERING

3D Printing & MakerSpace

Lab Activities

- 3D printing & CAD
- Sensors testing
- MakerSpace tour

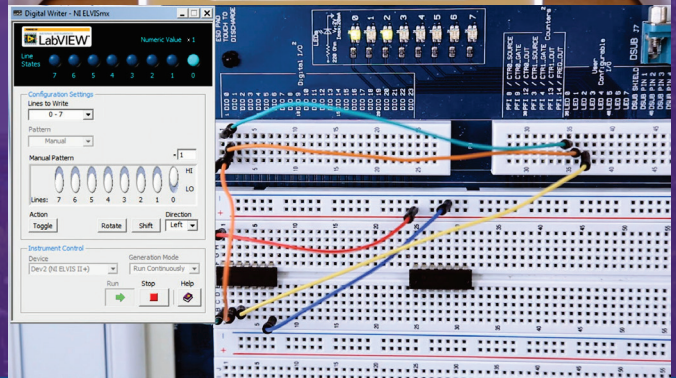
Project Applications

- Team logos
- Robot/terrain parts
- Prototype component

Flipped Teaching Videos

Training the Engineering Design Process

- CAD for projects
- Intro to 3D printing
- Circuitry & wiring



MakerSpace Training Timeline

Week 1
- CAD lab
- Project proposal

Week 2
- CAD video
- Team assigned

Week 3
- 3D printing video
- Sensors lab

Week 4
- Makerspace tour
- Prototyping lab orientation

Week 5
- Breadboarding video
- Project milestone 1

Week 7
- Initial 3D print due
- Project milestone 2

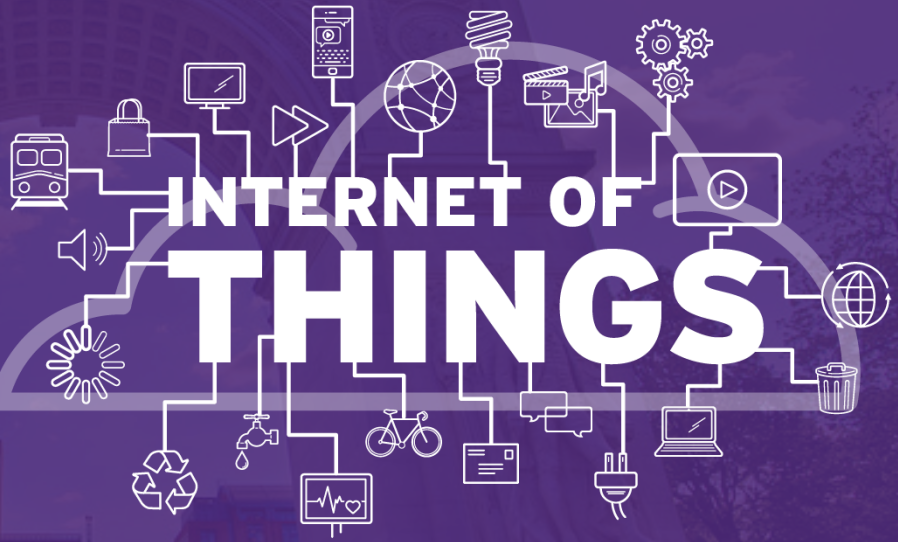
Week 11
- Final 3D print due
- Project milestone 3

Week 14
- Project submission
- Final presentation


Inspiring Making in the First Year
Global issues, tech trends, and large projects
NYU
TANDON SCHOOL OF ENGINEERING

Maker Movement and IoT

Maker Faire



Great Problems in Engineering

National Academy of Engineering

14 Grand Challenges

Cyber Security

Virtual Reality

Urban Infrastructure

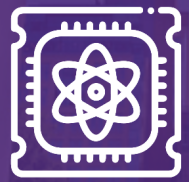
Solar Energy

National Science Foundation

10 Big Ideas

Harness Data

Human Computer Interaction



Quantum Computing

United Nations

17 Sustainability Goals

Clean Energy

Sustainable Communities

Inclusive Education

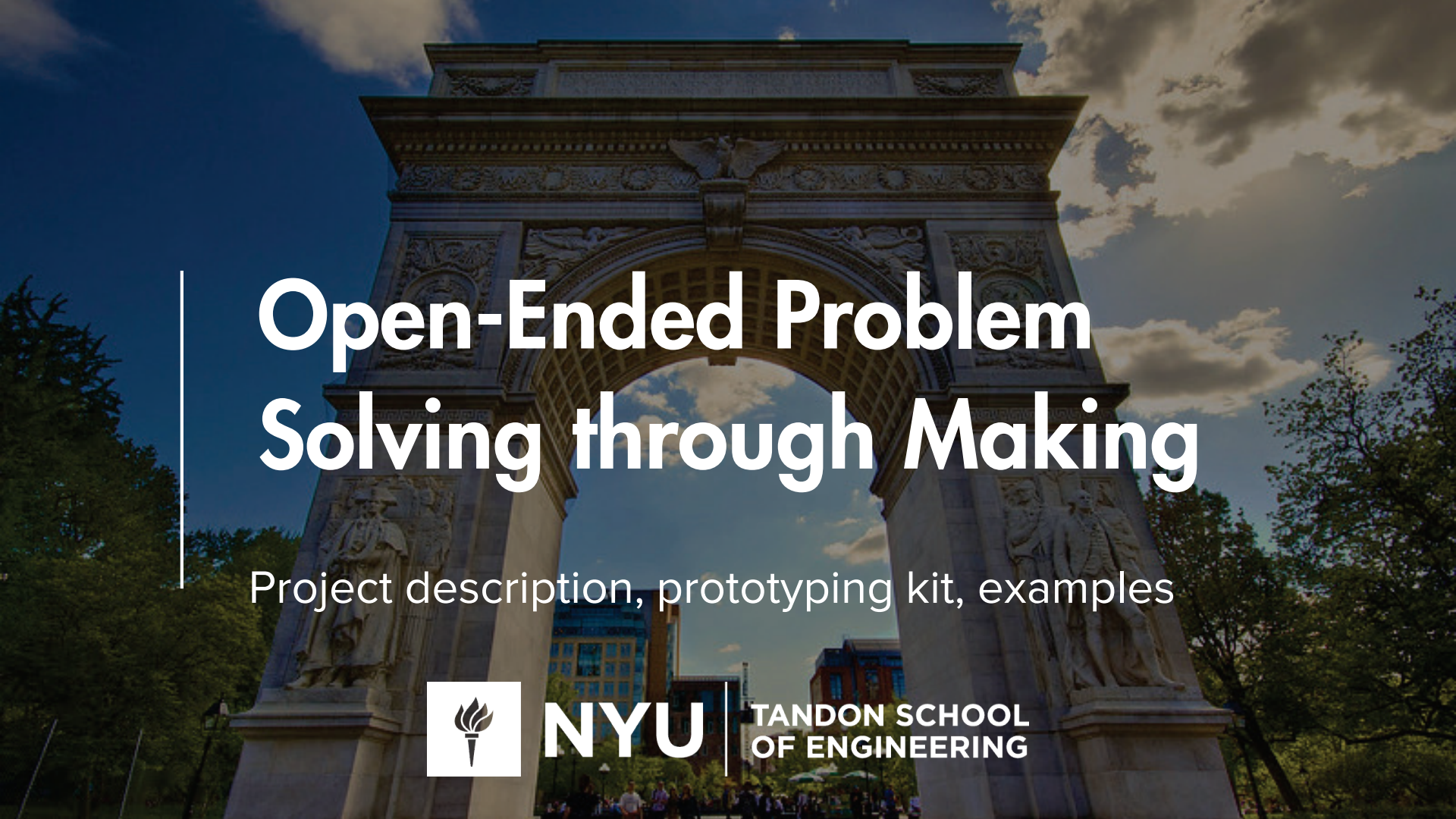
Water & Food

Integrating Project-Based Curriculum

First Year — EGR General Engineering

Second & Third Year — VIP Vertically Integrated Projects

Fourth Year — Capstone Design



Open-Ended Problem Solving through Making

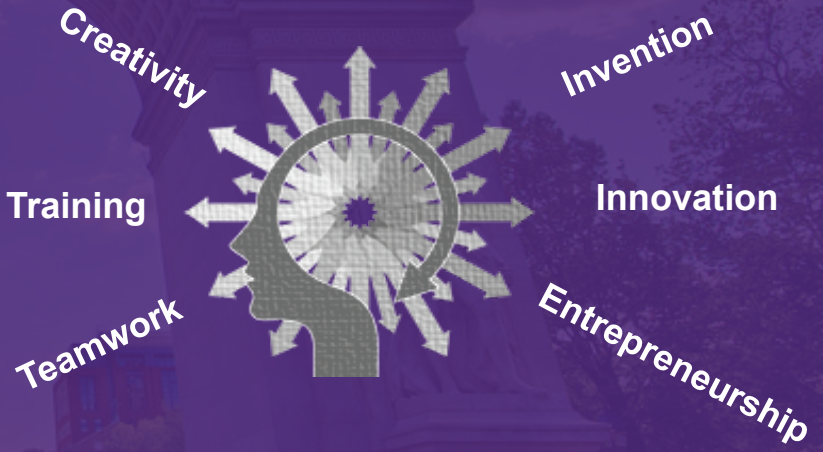
Project description, prototyping kit, examples

NYU TANDON SCHOOL OF ENGINEERING

Rapid Assembly & Design (RAD) Challenge

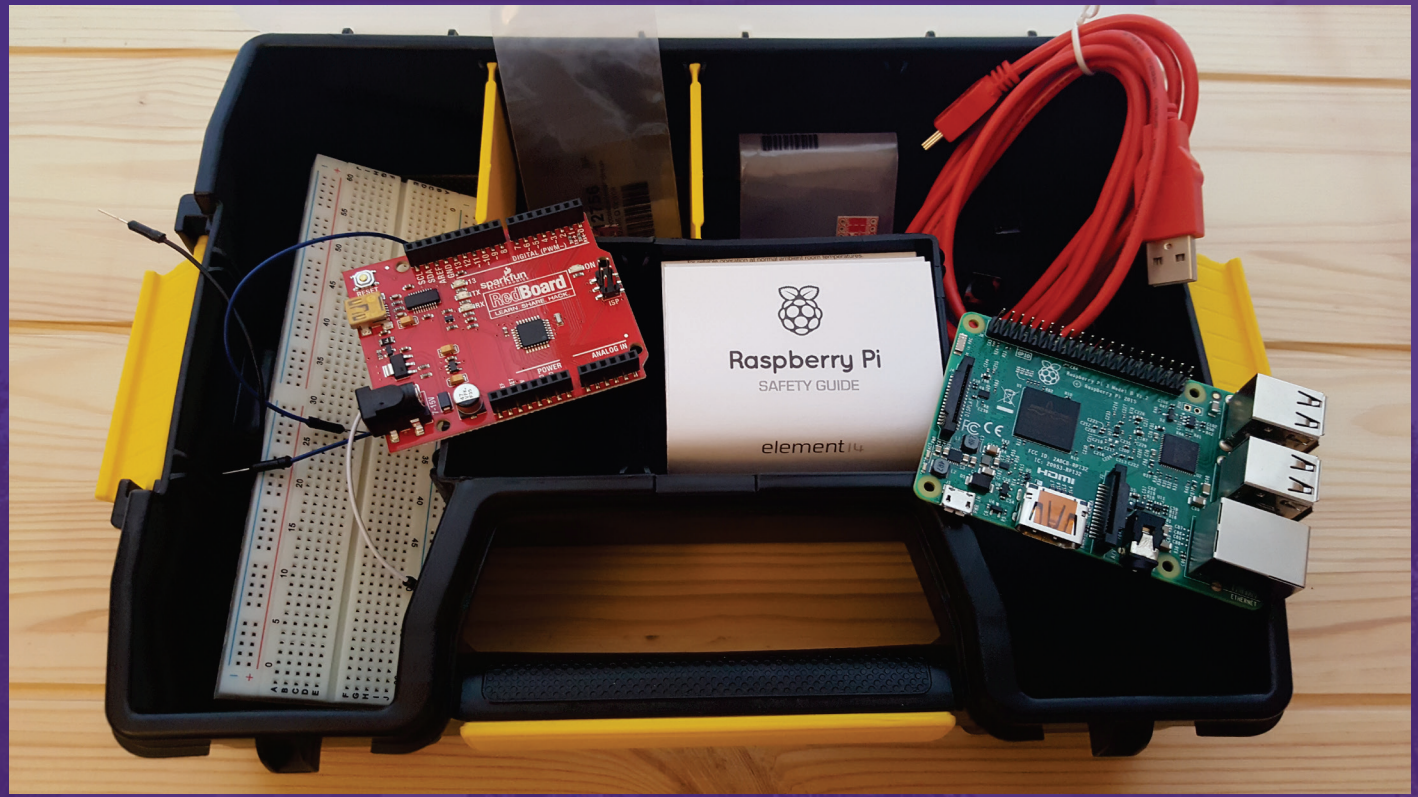
Task: Prototype technology for real-world problem.

- Application due 1st week
- Feasibility report 3rd week
- 3 milestones on pivots
- Physical prototype

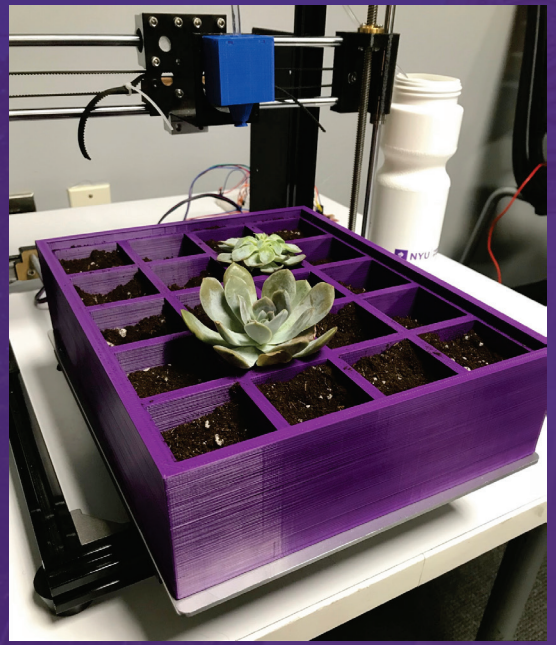


manual.eg.poly.edu/index.php/Rapid_Assembly_and_Design_Challenge_(RAD)

Project Kits



RAD Examples




New Initiatives to
Support Making Projects
First-Year lab, workshops , mentors
NYU
TANDON SCHOOL
OF ENGINEERING

Prototyping Lab

AUTODESK

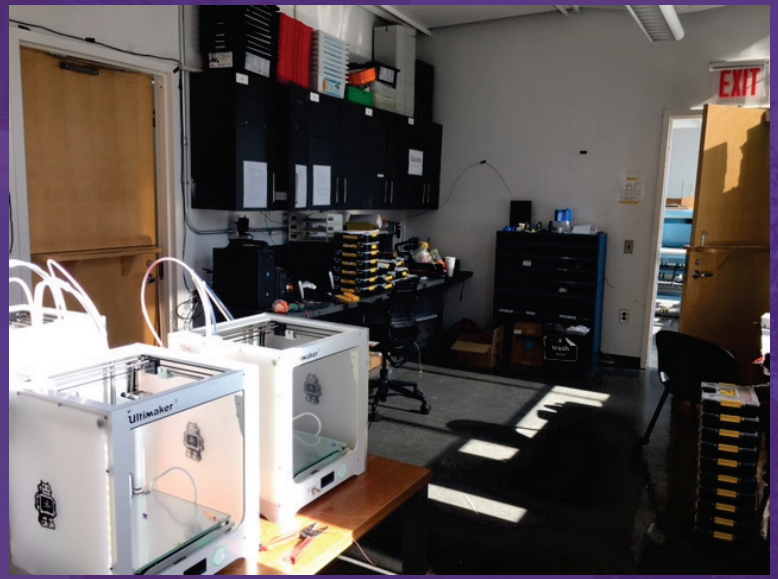
AUTOCAD

INVENTOR

REVIT

Computer-Aided Design

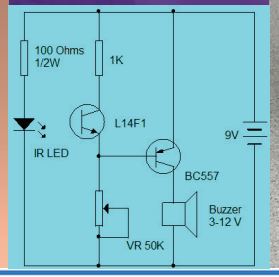
Ultimaker 3
3D Printers

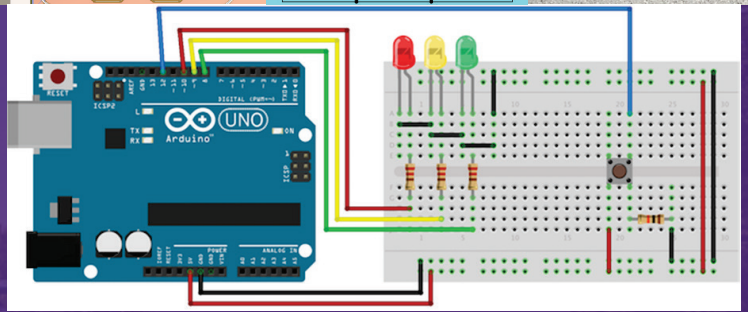


Workshops

MakerSpace, First-year program, and clubs

1. Soldering
2. Circuitry
3. Arduino
4. PCB milling
5. Woodworking
6. Carbon fiber



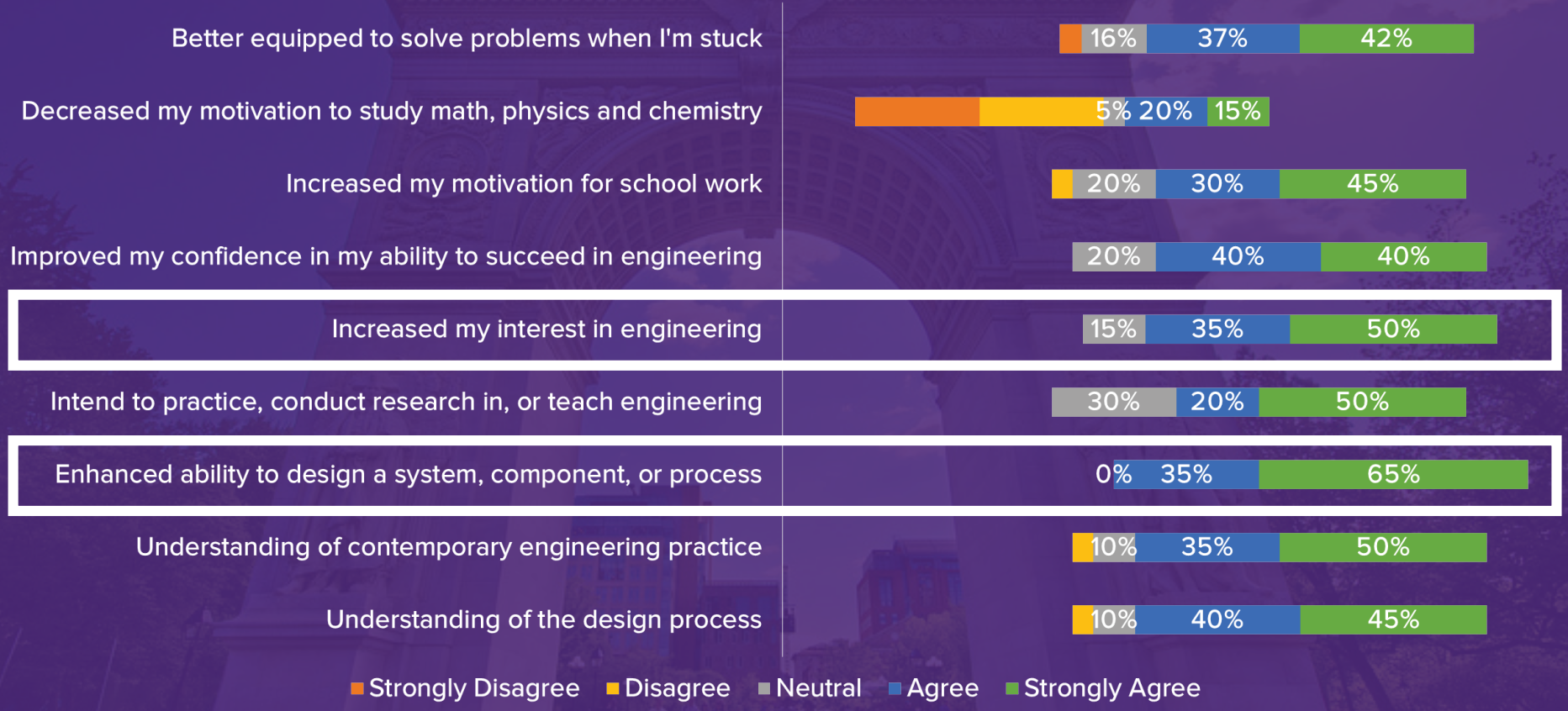


Mentors

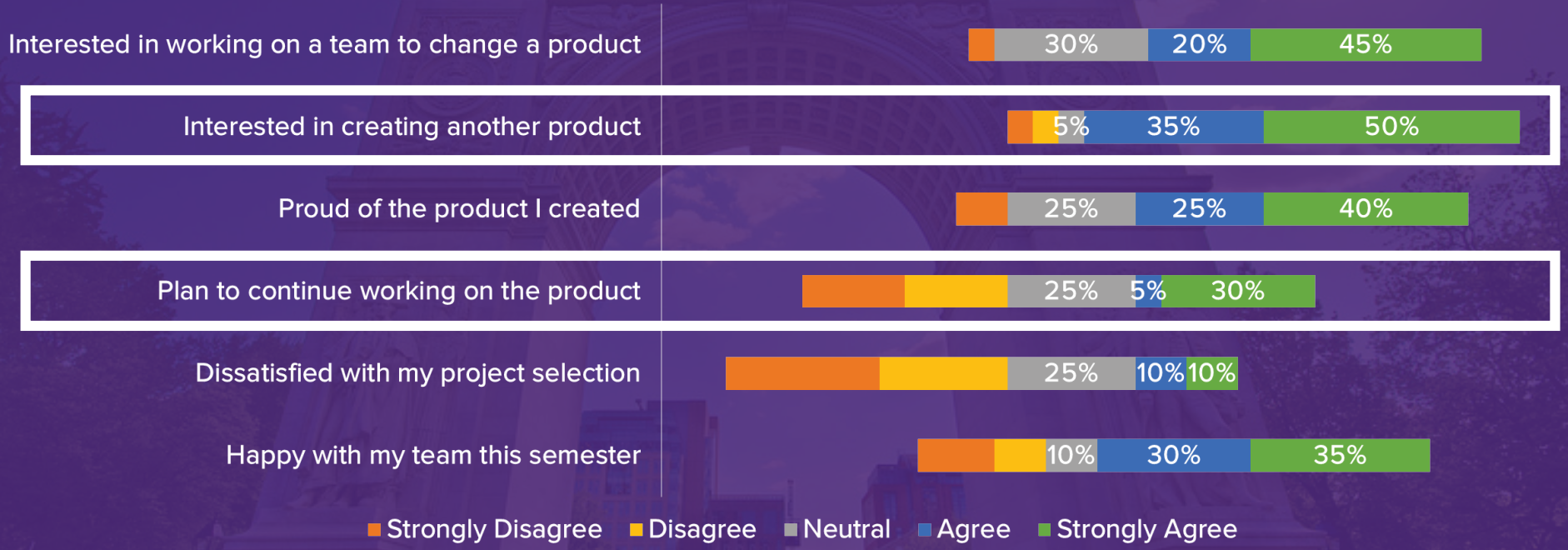
- 1 mentor per team
- TA in field or interest
- Paired in the 2nd week
- Assist and train
- Track progress


Survey of Student Making Experience
Self-efficacy, product development, comments
NYU
TANDON SCHOOL OF ENGINEERING

Engineering Self-Efficacy



Team and Product Development



Survey Comments

Struggle

choosing an idea

feasible timeline

learning the coding

learning CAD

unreliable teammate

Enjoyed

freedom to create

understand which field

creating a physical prototype

safety net of a mentor

solidified my interest

Improve

more mentors

labs that are more related

programming tutorial

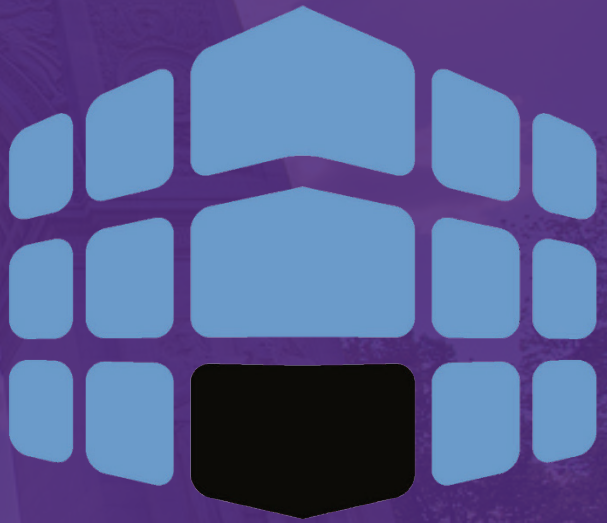
more support on CAD

an application process

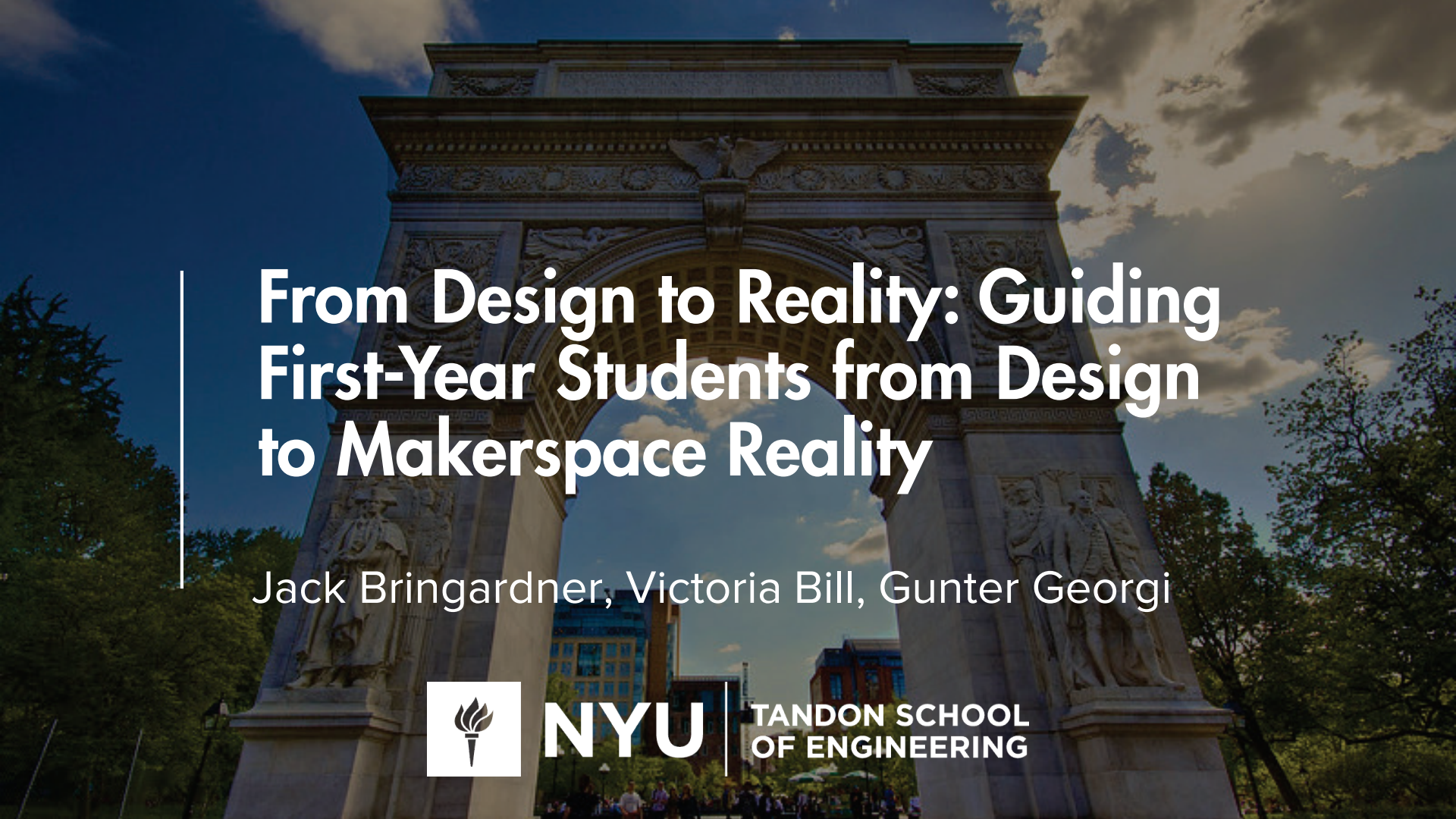

If you are interested in creating an open-ended Making project…
Conclusions, recommendations, warnings
NYU
TANDON SCHOOL OF ENGINEERING

Recommendations

- Start small (5% of your class size)
- Application review
- No digital prototype
- Strict requirements and deadlines
- Contest requested budget
- Multifaceted training
- Grow slowly



Cornerstone



From Design to Reality: Guiding First-Year Students from Design to Makerspace Reality

Jack Bringardner, Victoria Bill, Gunter Georgi

NYU TANDON SCHOOL OF ENGINEERING