The Arch at Rensselaer

summer **HERE**. the world **AWAY**.

A transformative experience within your academic journey

Rensselaer

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The Arch Overview

Answers to Emailed Questions

ECSE-Specific Arch Planning

The Arch Overview

A webinar video (including question and answer session) of the following overview slides can be found here:

https://connect.mms.rpi.edu/p9n0yh9a8zb/?proto=true

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summer
HERE

the world
AWAY

more
OPPORTUNITIES

- Enhances student-faculty interaction and cohort development
- Broadens student perspectives enabling them to pursue career-based passions
- Provides career readiness to secure high-quality jobs or graduate placement
- Augments students' academic progress through a year-round calendar

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The Arch Goals

The Arch Goals

A pivotal point in a student's career, offering:

- A unique summer academic experience in a highly interactive classroom environment with faculty, providing the first deep dive into a student's discipline before a professional development experience
- Skill development for seeking and finding opportunities (internship, co-op, travel abroad, etc.)
- Flexibility in the academic calendar for students who want to follow their passion

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Plan of Study

Academic Matriculation

Four years to graduation and eight semesters of financial aid

	FALL	SPRING	SUMMER
FIRST YEAR	Required On-Campus	Required On-Campus	You Choose
SOPHOMORE YEAR	Required On-Campus	Required On-Campus	Required On-Campus
JUNIOR YEAR	Semester Away**	Semester Away**	You Choose
SENIOR YEAR	You Choose	You Choose	You Choose

***Fall or spring semester away for experiential learning.*
See The Arch website for exception policy.

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Financial Aid

The Arch Financial Aid

- Federal, NY State, and RPI aid is available at the same level during the summer session if enrolled full time.
- The summer term counts as one of eight semesters of RPI aid eligibility (10 semesters for students in Architecture and co-terminal programs).
- The summer term is the beginning of the academic year for RPI. For example, if enrolled in summer ’18, apply for summer aid using ’18 –’19 FAFSA.
- File FAFSA by December 31 prior to summer enrollment for earliest review of financial aid application.
- Financial aid awards for summer term begin to post to student SIS accounts in February.

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The Unique Summer Semester

The Arch | summer HERE. the world AWAY.

Sample Summer Class Schedule

PERIOD	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:00 – 10:05 a.m.	Thermal and Fluids Engineering II	Thermal and Fluids Engineering II		Thermal and Fluids Engineering II	Thermal and Fluids Engineering II
10:30 a.m. – 12:35 p.m.	Elements of Mechanical Design	Elements of Mechanical Design		Elements of Mechanical Design	Elements of Mechanical Design
12:35 – 1:30 p.m.	Common Lunch Period	Common Lunch Period	Common Lunch Period	Common Lunch Period	Common Lunch Period
1:30 – 4:30 p.m.		Lab Period	Field Trips to Companies	Lab Period	

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The Arch Summer Semester

Unique opportunities include:

- Field trips to companies and laboratories
- Community meals with faculty
- Evening programs with campus leaders
- Special seminar series (engineering leaders, visiting artists, etc.)
- Pop-up courses – i.e., CAD to 3-D Printing, Introduction to Microfluidics, and Space in the Movies

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The Student Experience

CLASS - The Student Experience

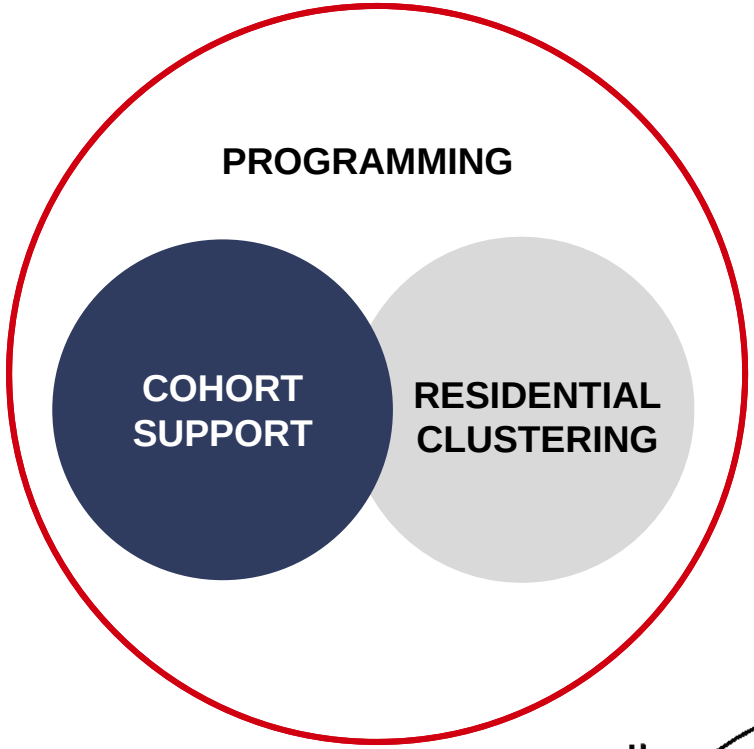
Clustered

Learning

Advocacy

Support for

Students



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Summer Semester Services

All services available to students in the fall and spring semesters are available during the summer semester.

- RPI Counseling Center
- Center for Career and Professional Development (CCPD)
- Public Safety
- ALAC Tutoring
- Rensselaer Union
- Mueller Center
- Dinning Halls and Meal Plans
- Undergraduate Class Dean

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Semester Away Opportunities

- Co-op/Internship
- Civic Engagement
- International Experience
- Research
- Self-Designed
- Restorative Semester

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Preparing For Your Semester Away

- **Seminars and Workshops**
  (Resume and cover letter preparation, interview skills, etc.)

- **JobLink**
  Rensselaer's exclusive online recruiting and job posting system

- **On-Campus Recruiting**
  More than 500 employers come to campus each year for career days, information sessions, and career fairs

- **84% of Students**
  who responded to our *First Destination Survey* had future plans within six months of graduation
  – Class of 2016

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Sample Internship/Co-op Employer List

Industrial Opportunities

- Apple
- Google
- Boeing
- Bloomberg
- IBM
- American Airlines
- General Electric
- Microsoft

Government Labs/Internships

- Los Alamos National Laboratory
- Sandia National Laboratories
- Bennett Lab
- Smithsonian Institution

Tailored Research Experiences

- Icahn School of Medicine
- Faculty collaborations

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"This experience was above and beyond anything I could gain from a textbook and was an invaluable part of my engineering education."

Matthew Beaudoin '19
Chemical Engineering
Semester away – SABIC

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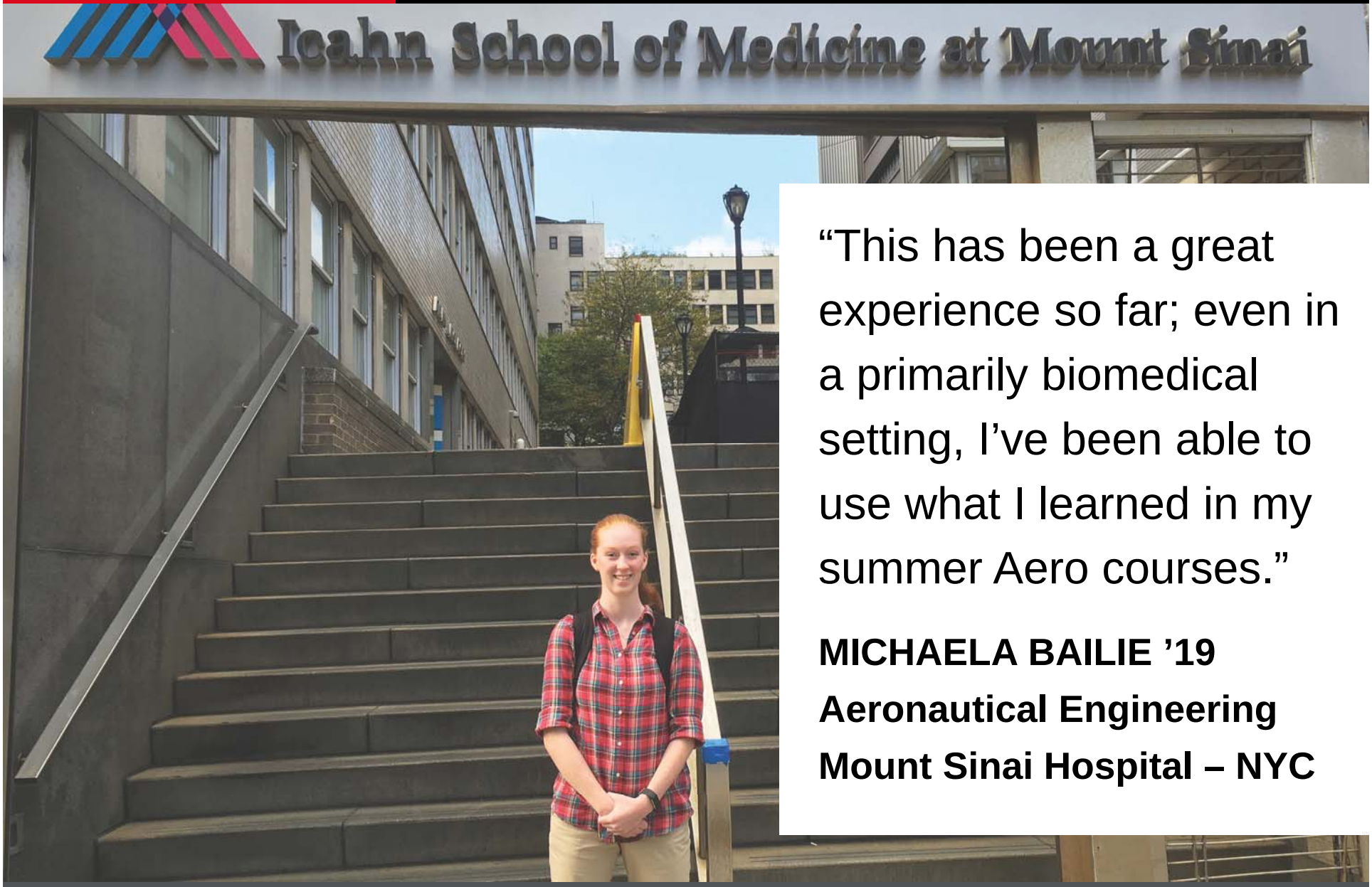

"This has been a great experience so far; even in a primarily biomedical setting, I've been able to use what I learned in my summer Aero courses."

MICHAELA BAILIE '19
Aeronautical Engineering
Mount Sinai Hospital – NYC

The Arch Primary Contacts

DR. MICHELL TOLLINCHI-MICHEL
Assistant Vice President for Student Transitions

JADE FELDER
Director, The Arch and Student Transitions

ROCCO M. FRAGOMENI II
Director, Summer Academic Programs

thearch@rpi.edu

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Answers to Questions

A few of your questions were addressed directly by JADE FELDER Director, The Arch and Student Transitions and ROCCO M. FRAGOMENI II Director, Summer Academic Programs.

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Can students choose to attend both junior year semesters so that they could potentially finish earlier?

Not on RPI's campus. They'll need a valid exception to remain on campus. As stated in the FAQs section of the Arch website....

"To accelerate academic progress, and graduate in fewer than eight semesters, students may take classes elsewhere prior to enrollment at Rensselaer, obtain AP/IB credit from high school, take summer courses in subsequent summers, study abroad during the away semester, or some combination of these options."

How has RPI collaborated with the athletics department regarding sports programs like football, basketball, and hockey? What is the necessary coordination with the ROTC detachments on campus relative to this program?

For students who have applied for and been granted an exception, The Arch Summer courses would be taken during the fall semester. For listing of the exception process go to: http://info.rpi.edu/arch/students/#ExceptionProcess

ECSE-Specific Arch Planning

All major options including dual majors were considered to come up with summer course listing. The remaining junior year courses are offered both Fall and Spring semesters of the Junior year.

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Electrical Engineering (EE)

SUMMER ARCH SEMESTER			Third Year		Fall or Spring		
ECSE-2050	Intro. to Electronics	4	ECSE-2900	ECSE Enrichment Seminar	1	
ECSE-2410	Signals & Systems	3	ECSE-2100	Fields & Waves I	4	
ECSE-2500	Engineering Probability	3	ECSE-2210	Microelectronics Tech.	3	
	Professional Development II [3]	2	ECSE-2110	Electrical Energy Systems	3	
	Free Elective [2]	3-4		Math/Science Elective	4	

Computer Systems Engineering(CSE)

	Summer Arch Semester		Third Year	Fall or Spring		
ECSE-2010	Electric Circuits	4	ECSE-2050	Intro. to Electronics	4	
ENGR-2050	Intro. to Eng. Design	4	ECSE-2410	Signals & Systems	3	
MATH-2010	Multivar Calc & Matrix Alg.	4	ECSE-2500	Engineering Probability	3	
	Hum., Arts or Soc. Sci. Elective	4		Free Elective[2]	3-4	
				Hum., Arts or Soc. Sci. Elective	4	
			ECSE-2900	Enrichment Seminar	1	

EE/CSE Dual

Summer					Third Year	Spring or Fall		
ENGR-2050	Intro. to Eng. Design	4			ECSE-2900	ECSE Enrichment Seminar	1	
ECSE-2010	Electric Circuits	4			ECSE-2050	Intro. to Electronics	4	
	Multidisc. Elective[1]	4			ECSE-2100	Fields & Waves I	4	
MATH-2010	Multivar Calc & Matrix Alg	4			ECSE-2410	Signals & Systems	3	
	Hum., Arts or Soc. Sci. El.	4			ECSE-2500	Engineering Probability	3	
					ECSE-2110	Electrical Energy Systems	3	

EE/Mechanical Engineering Dual

Summer					Third Year	Fall or Spring		
ECSE-2050	Intro. to Electronics	4			ECSE-2100	Fields & Waves I	4	
ECSE-2410	Signals & Systems	3			ECSE-2210	Microelectronics Tech.	3	
ECSE-2500	Engineering Probability	3			MANE	Mechanical Eng. Core Mod.	6	
MANE	Mechanical Eng. Core Mod	6			ECSE-2110	Electrical Energy Systems	4	
						Professional Devel. II[1]	2	

ECSE Summer Courses

1st Session: May 21 – June 29, 2018

ECSE 2010-Electric Circuits

ECSE 2410-Signals and Systems

ECSE 2500-Engineering Probability

ECSE 2610 – Computer Component & Operations

2nd Session: July 9 – August 17, 2018

ECSE 2050 – Intro to Electronics

ECSE 2100 – Fields and Waves I

ECSE 2110 – Electrical Energy Systems

*ENGR-2050 Intro to Engineering Design offered both summer session
*MATH-2010-Multivariable Calculus and Matrix Algebra offered first summer session
*Professional development II – offered the second summer session


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Applications of Digitized, Color Tunable Lighting Systems

Robert F. Karlicek, Jr.
Professor, Electrical, Computer and Systems Engineering
Director, Center for Lighting Enabled Systems & Applications **(LESA)**
Rensselaer Polytechnic Institute, Troy, NY

LESA Lighting Enabled Systems & Applications

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BOSTON UNIVERSITY

UNM

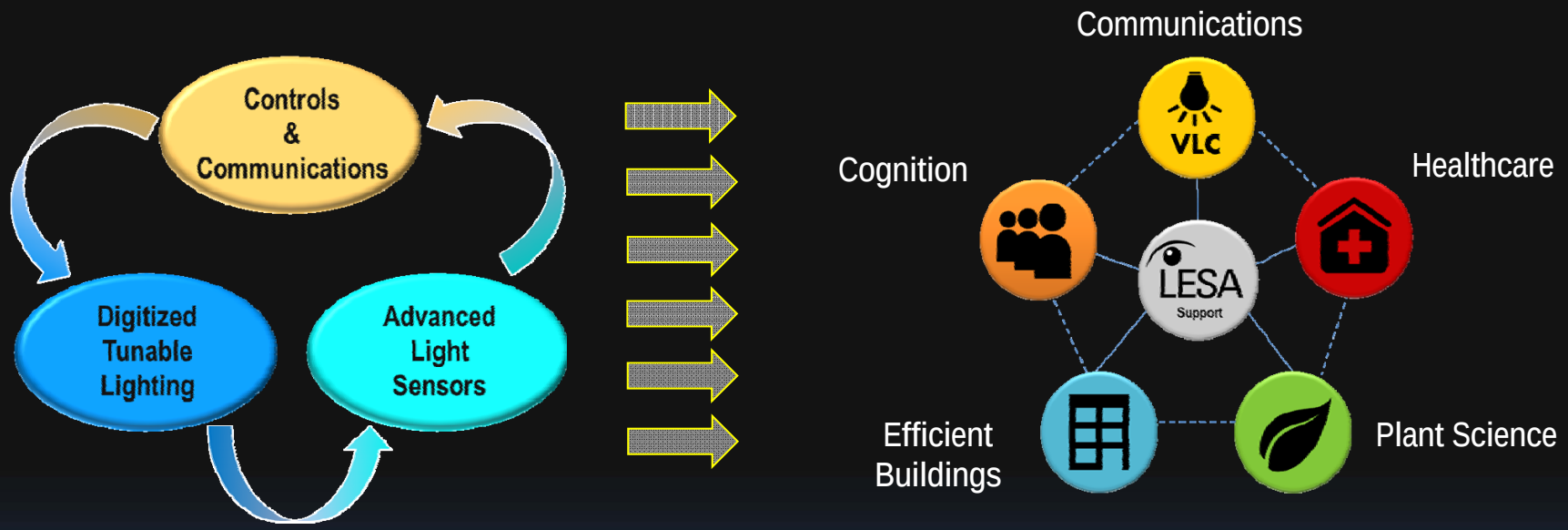
Jefferson HEALTH IS ALL WE DO

NSF

NEW YORK STATE OF OPPORTUNITY. Division of Science, Technology & Innovation

28 Industry Members

Advanced services from data in reflected light



- Digitized Illumination for advanced sensing
- Scalable services in new markets
- Superior functionality compared to other technologies

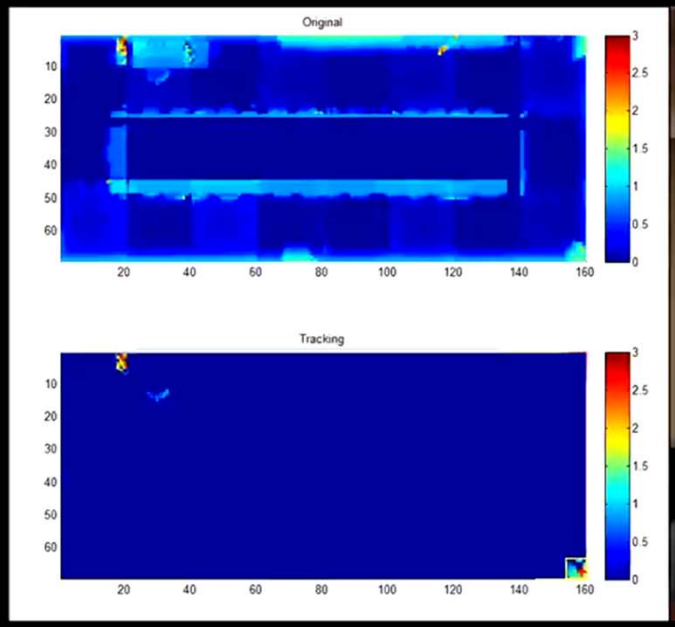
Conference Room Testbed Facility

- Color Tunable Lighting
- ToF sensors
- Ceiling mounted Color Sensors

Three sensing modes:

1. Reflected color mapping
2. Reflected encoded light
3. Time-of-flight mapping

Time of Flight 3D Mapping/Tracking



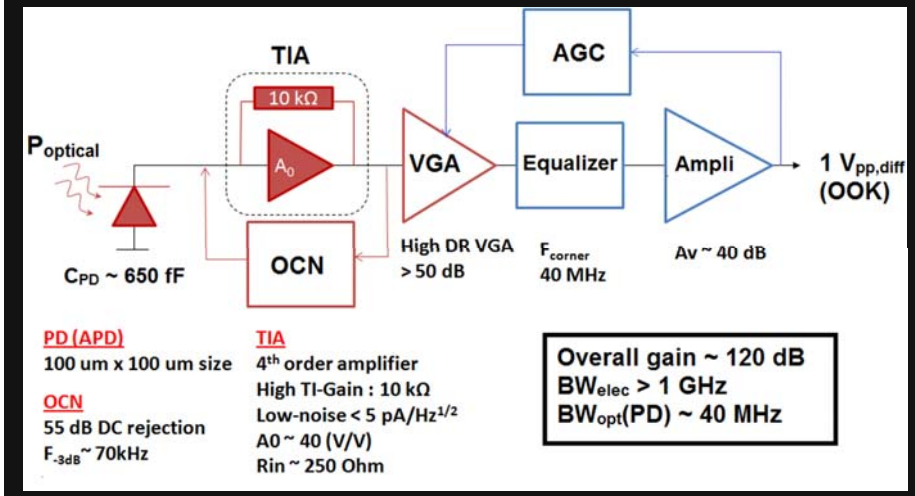
Number of people: 1

	ID	Position	Height
1	1	[158, 67]	1.52

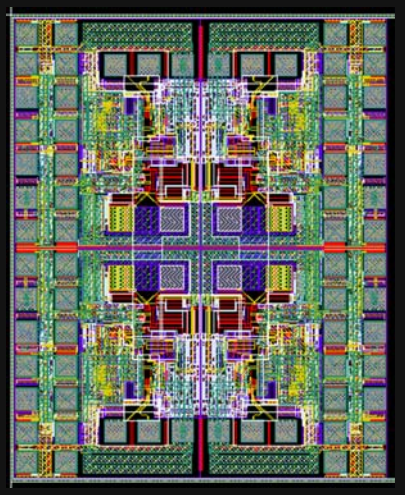
Collaborators:
Richard Radke
Art Sanderson
TKae Woodstock
Indrani Bhattacharya

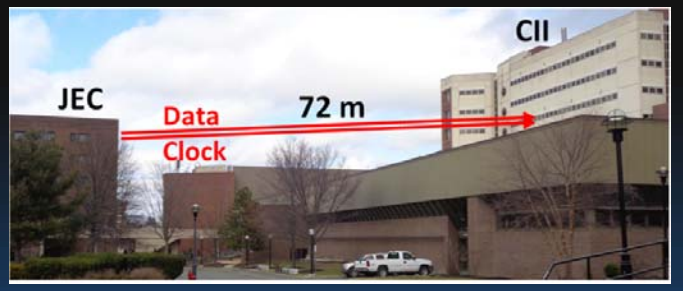
Distance measurement, not heat maps (accurate to +/- 5 cm)

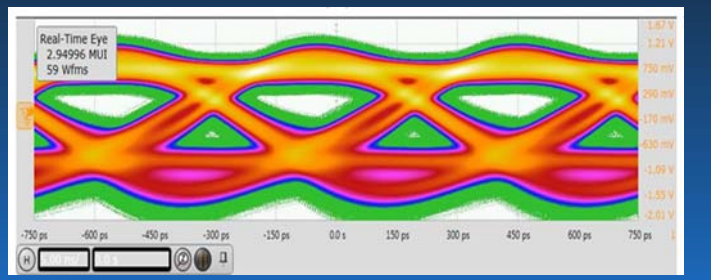
VLC Receiver R&D



CMOS APD ASIC

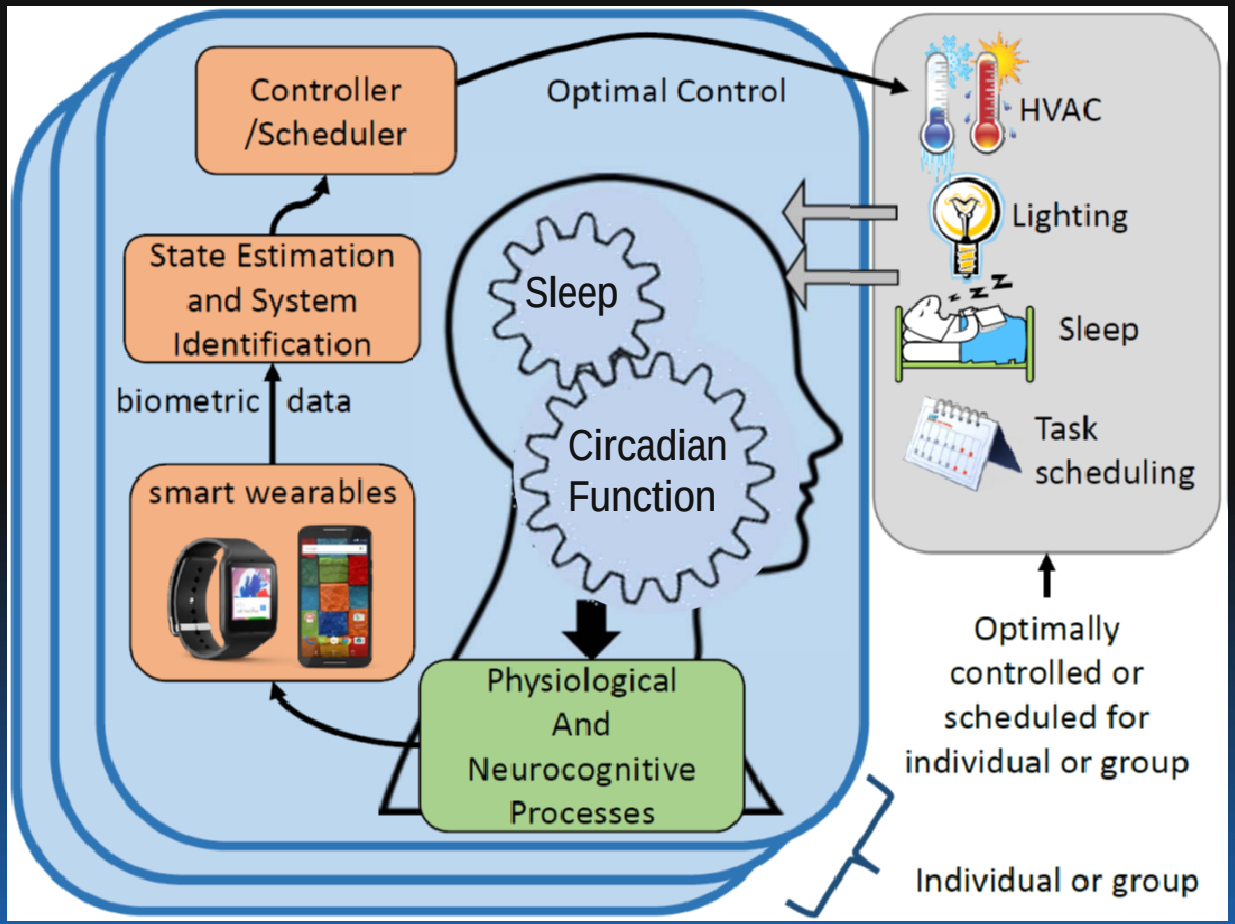






- State-of-the-art LESA receiver designs (CMOS APD)
- Integrated ToF capability (in progress)

Sources, Sensors and Controls - WELLNESS



The LESA Platforms:

- Lighting and Health
- Data for Building Management
- Improved Human Performance
- Cognitive Lighting

Spectral impact on anthocyanin in red lettuce

Internships

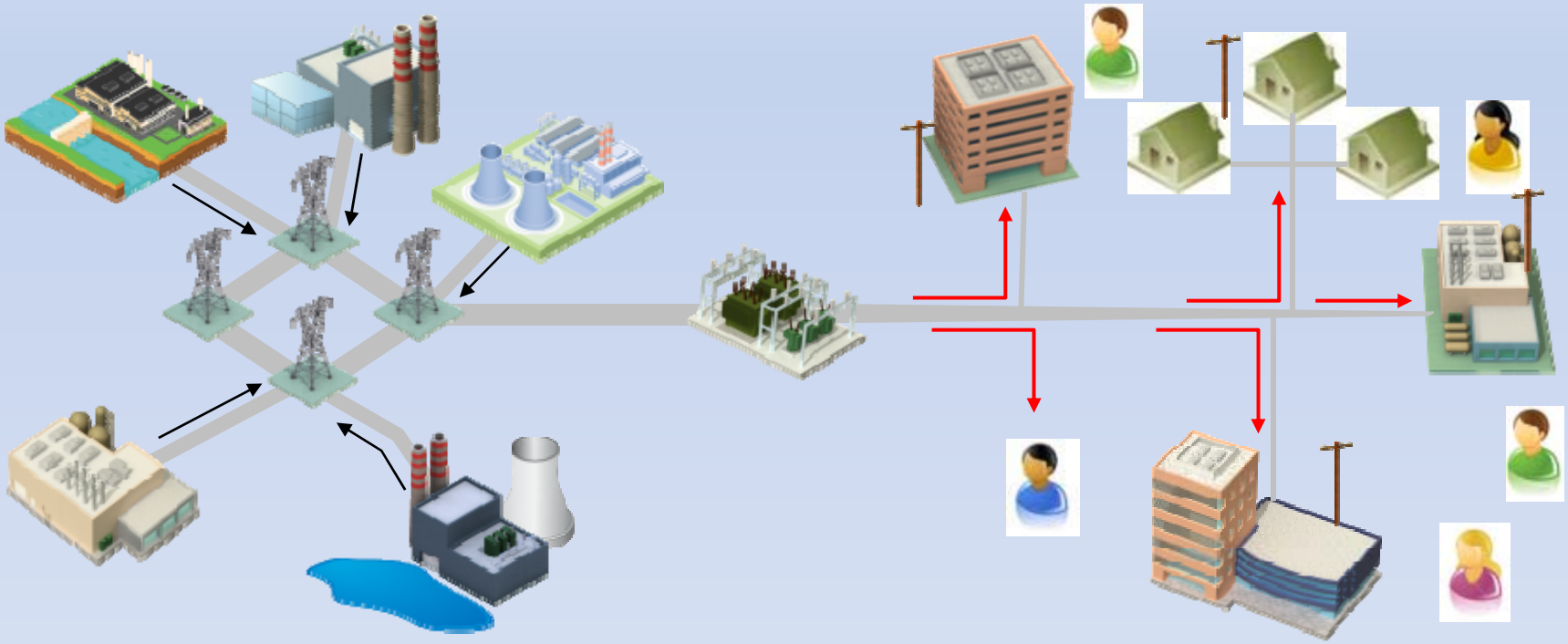
- Lots of challenging undergrad research projects
- LESA Industry members seek qualified interns
- Happy to seek industry experience for talented undergraduates

Arch Discovery Day 2018-08-29

Power Systems

RPI

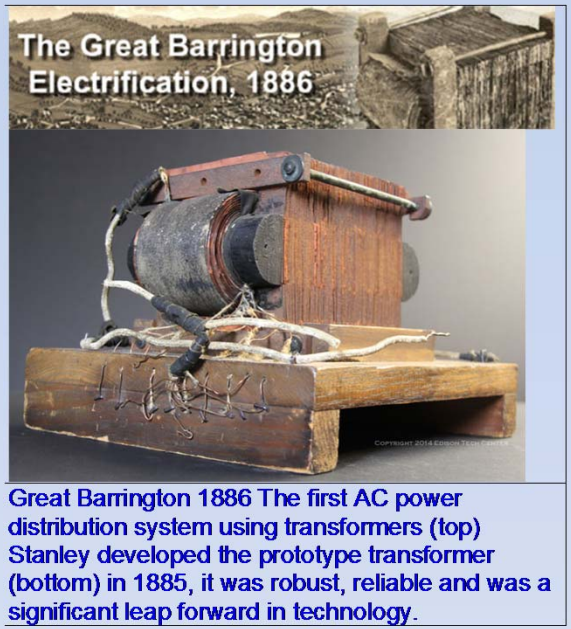
Traditional Power System



Objective: Balance generation with load

Traditional roles of power engineers

- Design generation
- Design transformers
- Design lines
- Design equipment
- Design loads
- Control the system
- Maintain the system
- Exciting?



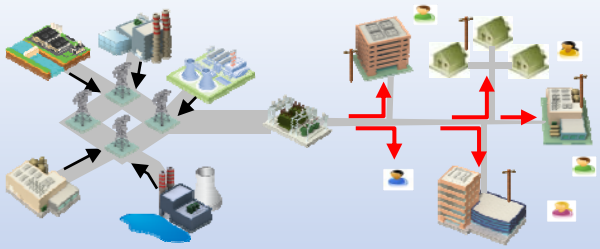
Great Barrington 1886 The first AC power distribution system using transformers (top) Stanley developed the prototype transformer (bottom) in 1885, it was robust, reliable and was a significant leap forward in technology.

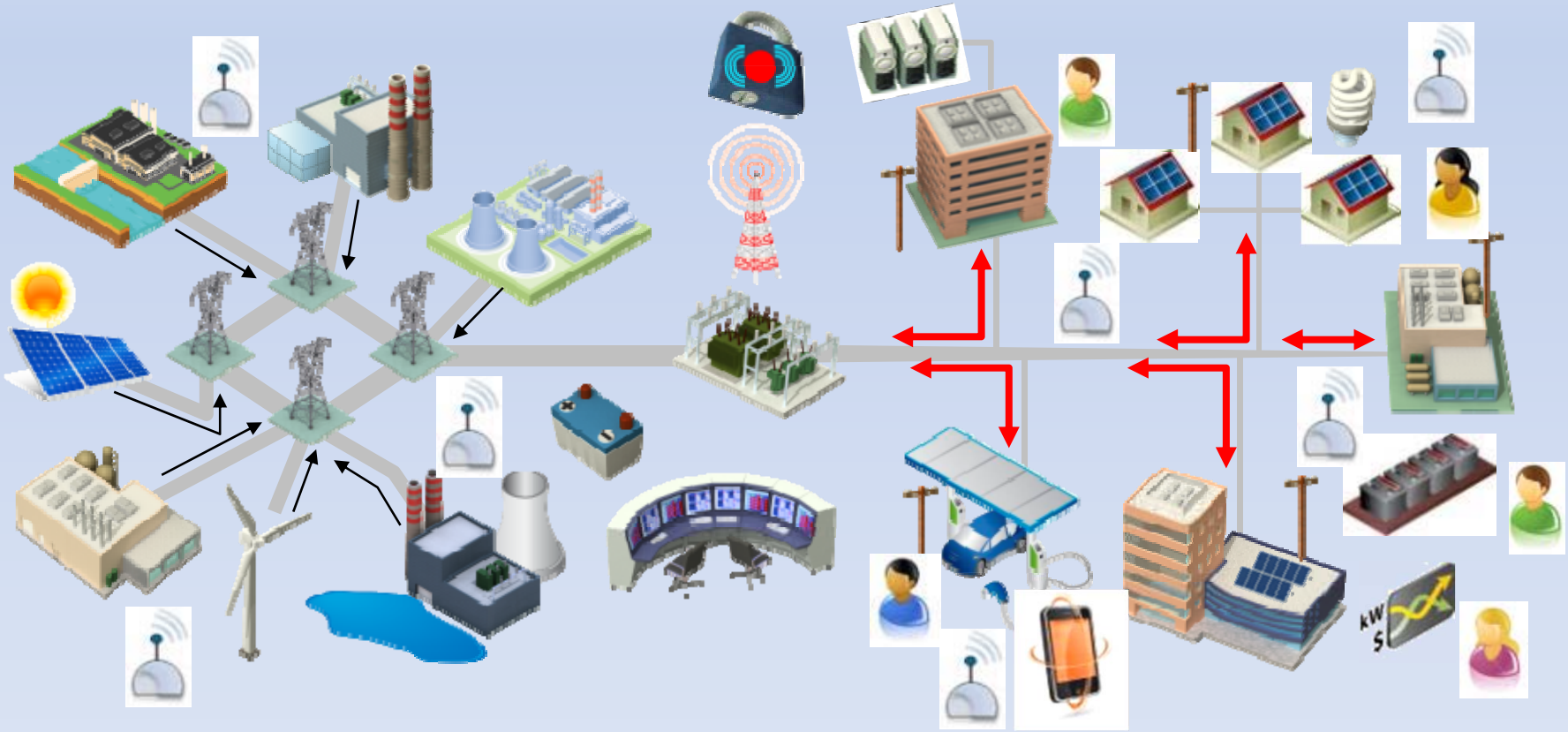
New challenges

"Ecological awareness is the one characteristic that will make the new generation of engineers – and particularly energy engineers – different from their predecessors. Too often in the past engineering projects were justified solely on economic criteria without regard for their impact upon the environment.
As the professed custodians for this nation's resources the engineer must take major responsibility for their optimum and balanced use."

- Olle I. Elgerd, "Electric Energy Systems Theory: An Introduction", McGraw-Hill, 1971

More challenges





Objectives: Flexibility, Resiliency, Connectivity, Security, Microgrids, Smart Grid, Renewables, E-cars, Other?

Motivation

- "Your task is nothing less than the creation of a whole new civilized industrial technology to replace the brute machine that raised so much ecological hell."
  - Walter J. Hickel, Secretary of Interior,

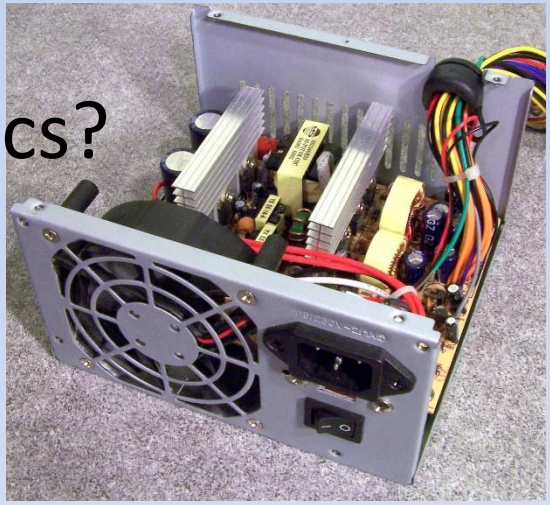
  in a speech to the graduating class of Stevens Institute of Technology, May 1970.

- To accept these challenges, we must first acquire thorough understanding of today's and tomorrow's evolving electric power system.

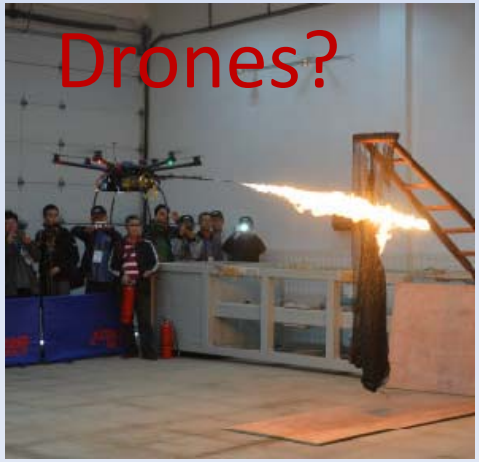
What will future power engineers do?

What do YOU want to do?

Power electronics?



Robotics?



Thank you!
See you in class.

- Fields and Waves
- Electrical Energy Systems
- Power Engineering Analysis
- Electromechanics
- Mechatronics
- Industrial Power System
- Semiconductor Power Electronics
- Semiconductor Devices and Models
- Mechanical Aspects of Electric Power Apparatus
- Engineering Probability

Arch Discovery Day 2018

ECSE Student Internships

Meaghan Podlaski

Rensselaer

why not change the world?®

About me

- Co-terminal BS/MS Electrical Engineering student graduating in May 2019
  - Very enthusiastic about power systems and energy!
- Summer 2017 and 2018 IT-Energy Management Systems Day-Ahead Support Intern at ISO New England
- Member of RPI women's cross country and track teams

Choosing an industry and company to work for

Why power?

- The power industry is undergoing many fun, exciting changes!
  - Smart grid technology
  - Renewable energy
  - Microgrids

Why ISO New England?

- For my first summer: they gave me an offer and it was one of the companies I decided I really wanted to work for
- For my second summer: I was given the option to come back, but I was able to take time to see what else I could do. ISONE was the best option I had

Working at ISO New England

- ISO New England is the independent system operator of New England
  - Oversee New England's transmission grid operations
  - Design, operate, and oversee the wholesale electricity markets
  - Plan the New England power system for 10 years ahead
- Smaller company (about 600 employees) across one main control center and a backup control center
  - Small company size makes it easy to reach out to other departments to learn more about power industry

ISO New England Experience – Work stuff

- Had my own individual research projects both summers with some additional work to help others in the department
  - Consider possible projects you would be working on and the type of work you would like to do
  - Other interns I worked with provided technical support for their group, updated documentation, had their own research projects, and assisted with FERC studies

ISO New England Experience – Fun stuff

- The program offered a lot of intern networking events and field trips
  - Visited power plants to learn about how ISONE fits into the industry and learn about other careers
  - Lunch meetings with senior staff at ISONE to learn about their experiences and background

How did the internship program help with school?

- It was nice to see how concepts learned in class were applied in the real world
- Projects and coworkers at ISONE allowed me to learn about concepts not covered in class
  - I have taken mostly power systems classes, but my projects have applied some concepts covered in CSE/CS courses
  - Coworkers took me on tours of secure areas at ISONE to learn about how IT fits into operating the grid

Things to consider when looking for an internship

- If you're moving away:
  - Some companies offer a generous housing stipend, others have you live in a local college dorm with other interns
  - There's advantages and disadvantages to finding your own housing vs. having housing provided for you
- Will there be other interns?
  - ISONE's program had about 30 interns each year
- Possibility of continuing position during school year

CONTROL, ROBOTICS, AND AUTOMATION

ARCH DISCOVERY DAY 2018

Dr. Agung Julius

Exciting Advances in EE

Source: IEEE Spectrum

Source: Amazon.com

Source: bostondynamics.com

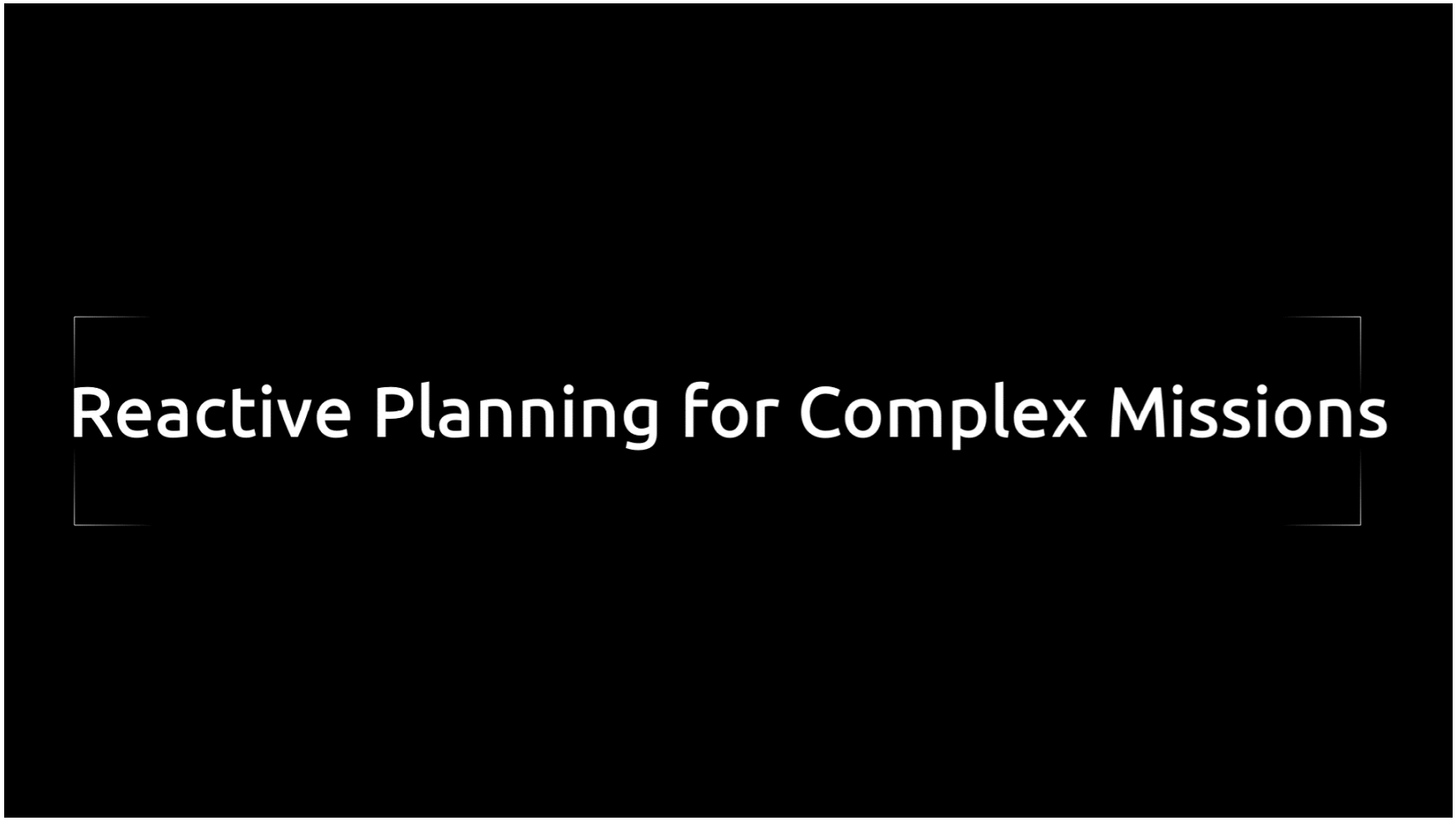
Source: RethinkRobotics.com

Source: intuitive.com

Robotic Co-worker

Profs. John Wen, Rich Radke

Autonomous Robots for Complex Missions



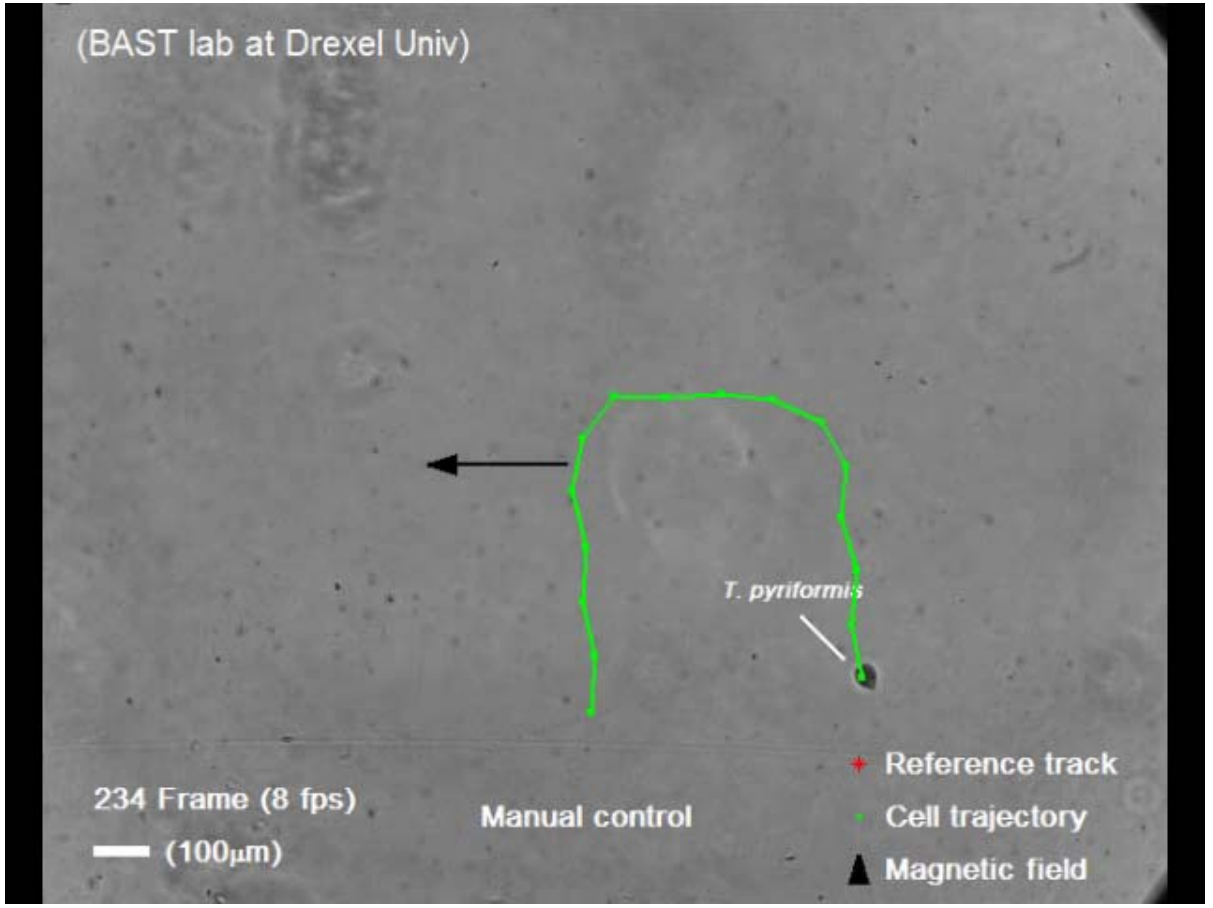
Prof. Agung Julius

Aggressive Maneuvers in microUAV

Profs. Sandipan Mishra, Agung Julius

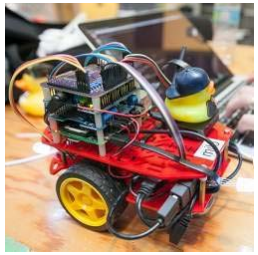
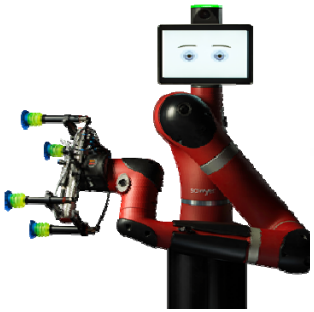
Microbial Robots

Tetrahymena pyriformis



Prof. Agung Julius

Basic Ingredients of Control Systems



Plant

Actuator

Sensor

Controller

Signal Processing and Estimation

Knowledge Ingredients of Control Systems

- Mathematical model of control systems and data
  Differential Equations, Linear Algebra, Engineering Probability
- Signal processing
  Signals and Systems, Digital Signal Processing
- Controller design and implementation
  Control Systems Eng, Digital Control Systems, Mechatronics, Real-time Apps in Control and Comm
- Robotics
  Robotics 1, Robotics 2
- Advanced Control Theory
  Systems Analysis Techniques, Nonlinear Control, Optimal Control, Multivariable Control
- Related Topics
  Machine Learning, Computer Vision, Optimization

Artificial Intelligence @ ECSE

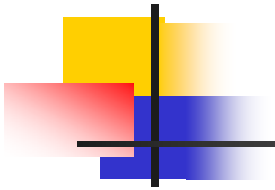
Qiang Ji

jiq@rpi.edu

Artificial Intelligence

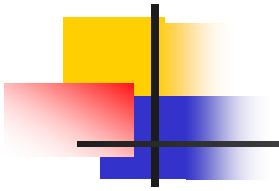
The goal of AI is to develop mathematical algorithms, computer software and hardware to replicate some of human's abilities in

- Learning
- Perception
- Decision making
- Planning
- Reasoning ..



Artificial Intelligence

- Artificial Intelligence (AI) is experiencing a resurgence and a tremendous growth
- It is transforming and revolutionizing many (in fact almost every) industry and business fields
- It is called the 4th industrial revolution and the new electricity
- ECSE has a long tradition of teaching and performing research in AI



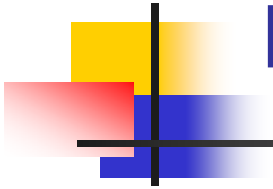
Artificial Intelligence

- **Machine learning** (Deep Learning)
- **Perception** (Computer Vision)
- **Robotics** (Control, kinematic, and dynamics)
- Planning
- Reasoning

ECSE AI Related Courses

- Machine Learning
  - ECSE-4962 Introduction to pattern recognition and machine learning
  - ECSE-4965 Introduction to deep learning
  - ECSE-4810 Introduction to probabilistic graphical models
- Perception
  - ECSE-6650 Computer Vision
  - ECSE 4969 Computer Vision and Graphics for Digital Arts
  - ECSE-4540 Introduction to Image processing
- Robotics
  - ECSE-4480 Robotics I (Kinematics)
  - CSCI-4490 Robotics II (Dynamics and path planning)

ECSE-4962 Pattern Recognition and Machine Learning



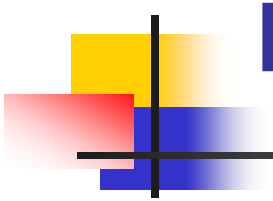
Introduce the fundamental algorithms in pattern recognition and demonstrate their applications.

Topics include

- Mathematical fundamentals
  - Random vectors, multivariate probability functions, linear algebra
- Supervised Learning
  - Linear discriminant analysis, nonparametric techniques (KNN), SVM, Logistic regression, Neural Networks
- Unsupervised learning
  - PCA and clustering

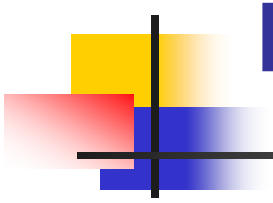
ECSE 6650 Computer Vision

- The goal of computer vision is to model, replicate, and more importantly exceed human vision using mathematical algorithms and computer software
- This class introduces important computer vision models and demonstrate their applications for different tasks.
- Topics include
  - Image formation and representation
  - Camera models, projection models, camera calibration, and pose estimation
  - 3D reconstruction from single and multiple images
  - Motion analysis, object tracking, and structure from motion
  - Feature extraction and object recognition



ECSE 4695 Intro. to Deep Learning

- Introduce the fundamental deep learning theories
- Introduce the well-established deep learning architectures and benchmark datasets
- Demonstrate the applications of deep learning to different tasks, including CV and NLP.
- Learn to use existing deep learning software platform (e.g. Tensorflow) for large applications.



ECSE 4695 Intro. to Deep Learning

- One of the most exciting technical developments in
- Machine Learning and
- Artificial Intelligence
- in last decade
- It has significantly advanced several fields, including
- Computer vision, Natural Language Processing, Robotics, Games, and ...

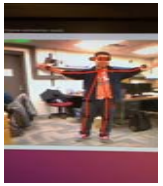
Deep Learning Class Topics

- Fundamentals and Traditional Machine Learning Techniques
  - Probabilities, Linear Algebra, Multivariate Calculus, and Optimization
  - Linear Regression, Linear Classification, Perceptron, SVM, Naïve Bayes classifier, and Logistic Regression
- Deterministic Deep Models
  - Neural Networks, Deep Neural Networks, and Convolutional Neural Networks, and Recurrent Neural Networks, Generative Adversarial Networks, and Deep Reinforcement Learning
- Probabilistic Deep Models
  - Probabilistic deep models (DBM, DBN, DRBN) and Bayesian deep models

ECSE AI Research

- Computer vision
  - Human facial behavior analysis


  - Human body tracking, gesture, and activity recognition




  - Natural human and robot (machine) interactions


ECSE AI Research (cont'd)

- Machine Learning
  - Probabilistic graphical models, deep learning, pattern recognition, and compressive sensing, etc..
- Robotics
  - Inspection, welding, drones, personal robotics.
- Applications
  - AI for Cybersecurity
  - AI for IoTs
  - AI for smart power systems
  - AI for smart lighting

ECSE AI Research

Affective Human and Robot Interaction

Natural Human and System Interaction with Hand, Face, and Eye Gaze

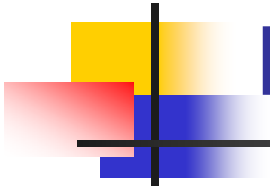
Driver Behavior Analysis and State Predication

Human Action and Activity Recognition for Surveillance

Biometrics

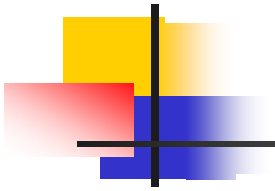
Eye and Hand Tracking for AR/VR

Head and Body Pose Tracking for Games



Background Needed

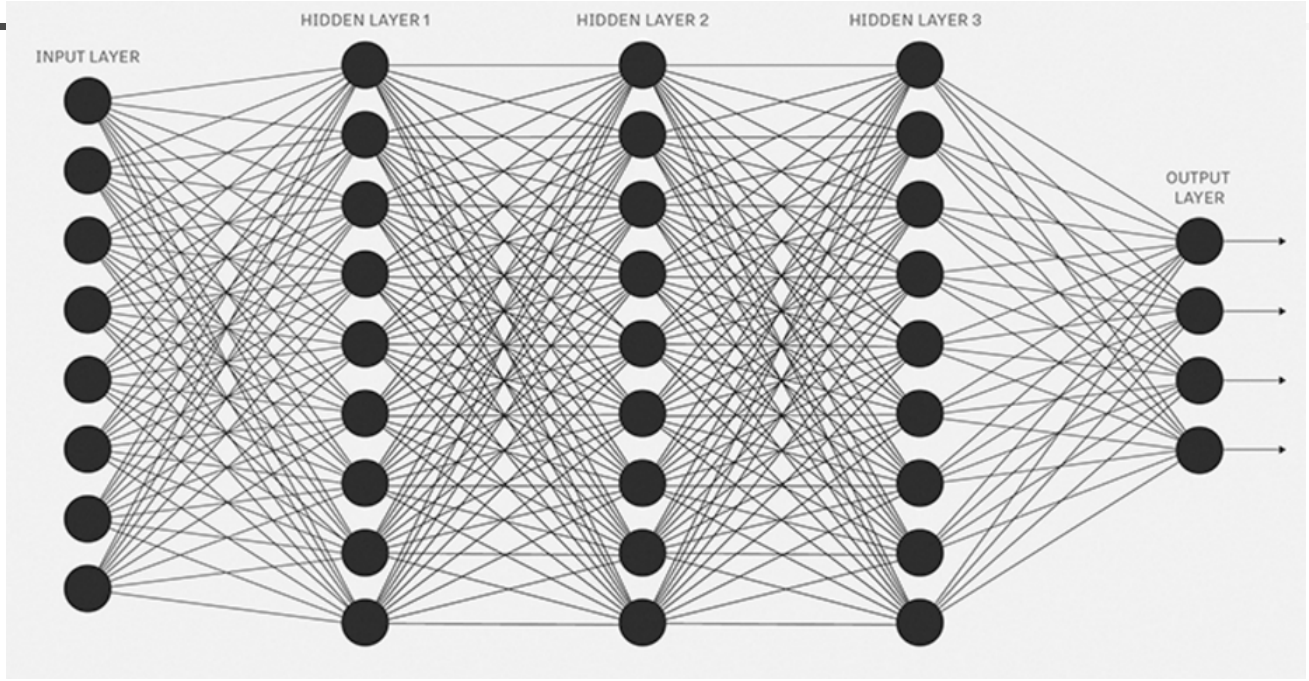
- Mathematical background (linear algebra, probability, statistics, and optimization)
- Strong programming skills (C/C++ or Python)
- Knowledge in signal processing, algorithms, data structure and neural science



AI Applications

- Finance
  - Asset allocation
  - Algo trading
- Fraud detection
- Cybersecurity
- eCommerce
- Search
- Manufacturing
- Medicine
- Law
- Business Analytics
- Ad serving
- Recommendation engines
- Robotics
  - Industry
  - Consumer
  - Space
  - Military
- UAV (cars, drones etc.)
- Scientific discovery
- Mathematical theorems
- Route Planning
- Virtual Assistants
- Personalisation
- Compose music
- Write stories

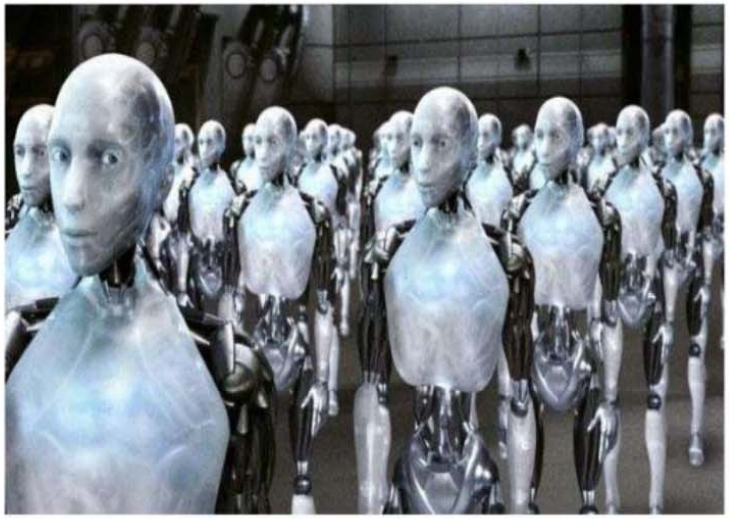
Deep Neural Networks



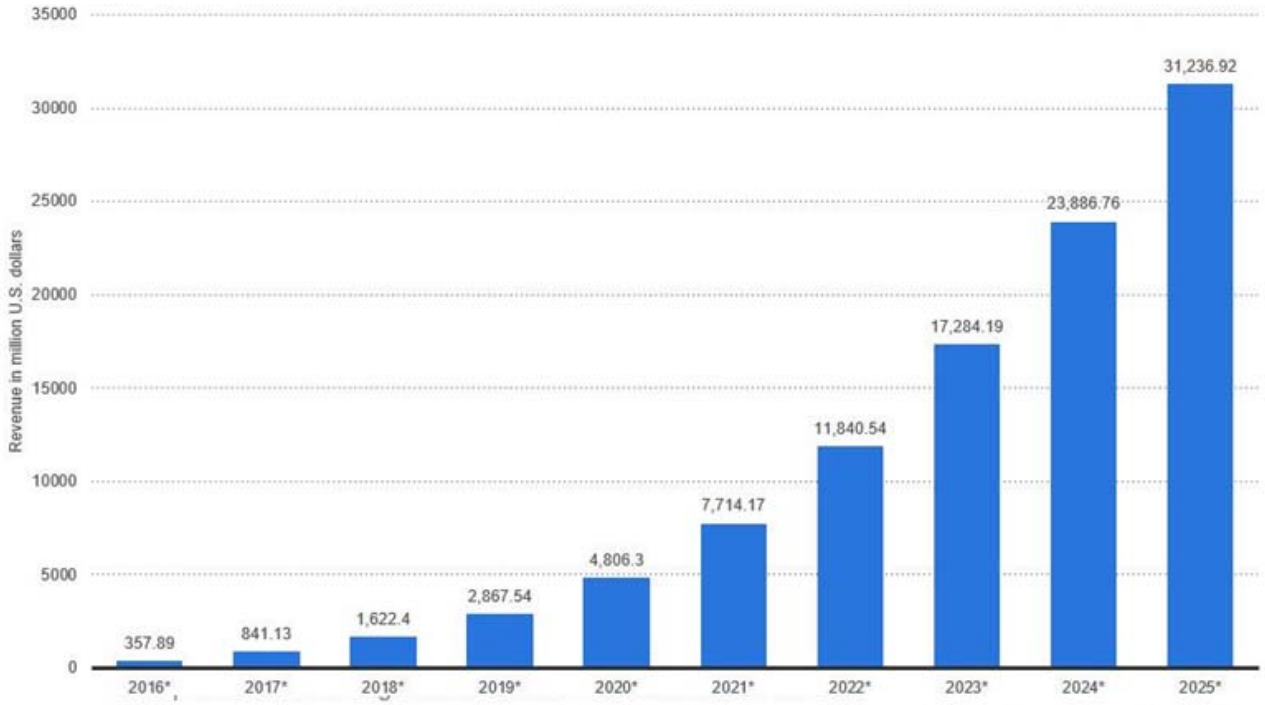
A network of neurons (nodes), each performs a simple linear operation. They jointly form a powerful representation of the input and a non-linear transformation that maps input to output

AI Applications (cont'd)

- Computer vision
- Speech recognition
- NLP
- Translation
- Call centres
- Rescue operations
- Policing
- Military
- Political
- National security
- Anything a human can do but faster and more accurate – creating, reasoning, decision making, prediction
- Google – introduced 50 ML products in last 2 years (Jeff Dean)



AI Growth World Wide 2016-2025



Revenues from the artificial intelligence for enterprise applications market worldwide, from 2016 to 2025 (in million U.S. dollars)

AI Applications (cont'd)

- Driver-less Transportation
- Automated Assembly Lines and Dangerous Jobs
- Surgery Aid Robots
- Next-Generation Traffic Control

AI Will Transform Many Fields

According to BusinessInsider.com, by 2025

Automotive - 10% of cars will be fully autonomous and many will drive themselves.
Agriculture - Farm will increasingly use AI technology and big data analytics to optimize crop output. More driverless tractors, drones and milk bots.
Service - Personal robots will take on easy, dangerous or repetitive jobs. Mowing your lawn, cleaning your windows, washing dishes.
Financial - Up to $2.2 trillion in investments will be made through AI-enabled computers that can learn markets
Healthcare - Robot assistance in critical surgery, elderly care, disabled patient assistance.
Manufacturing - 45% of the worldwide manufacturing tasks will be automated.

AI Will Become Ubiquitous !

Is Your Job at Risk?

Robots could steal 80 million U.S. jobs: BoE [1]

80 million jobs in the United States are at risk of being taken over by robots in the next few decades, a Bank of England (BoE) official warned

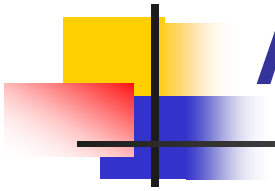
In a speech at the Trades Union Congress in London, the bank's chief economist, Andy Haldane, said that up to 15 million jobs in the U.K. were at risk of being lost to an age of machines, which is around half of the employed population.

AI Career Prospects

- Major companies and start-up companies are now heavily investing in AI research and products
- **Major Companies**
  - Google
  - Amazon
  - IBM
  - Microsoft
  - Facebook
  - Tesla
  - Nvidia

Startup

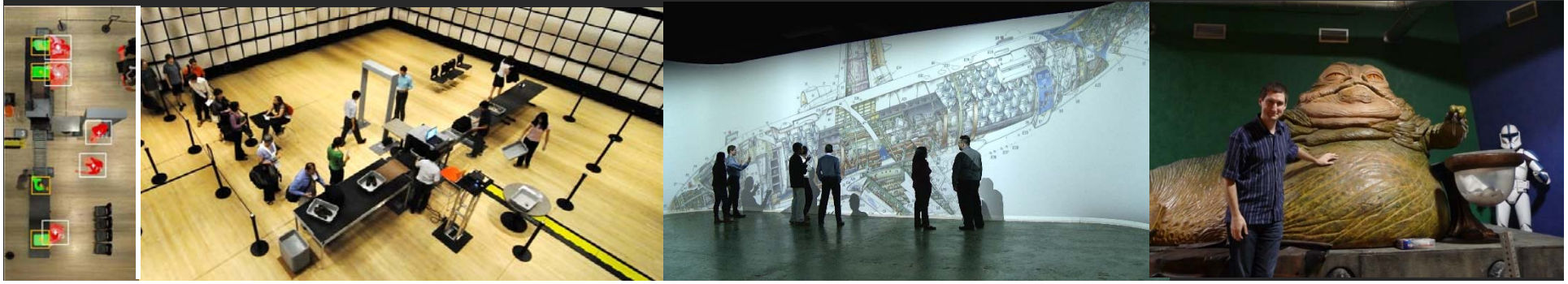
- Toutiao — $3.1B.
- Sensetime — $1.6B.
- Argo AI — $1B.
- Kreditech — $497.3M.
- Acorn — $486.3M.
- OpenAI- $1 B
- Soundhound — $215M



AI Career Prospects

- There are plenty of internship and full time job opportunities
- A recent analysis of LinkedIn finds machine learning engineer leading the list of skills in demand, and starting salaries for ML engineers are over 100k.

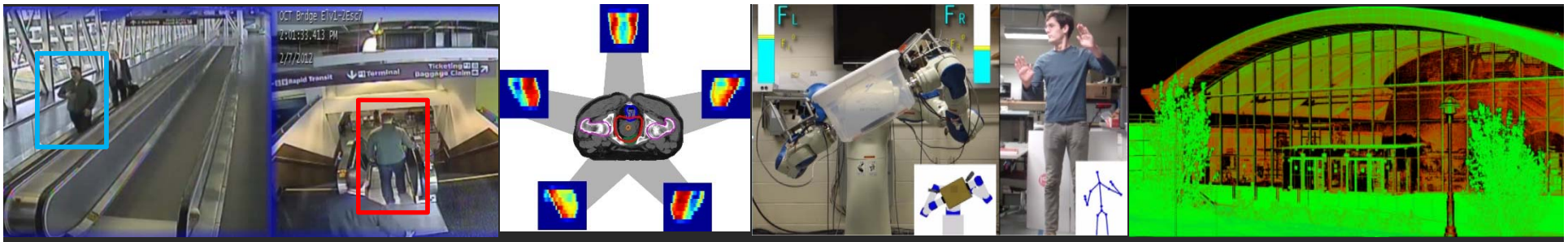
Any Questions ?



Electrical Engineering, Computer Vision, Smart Environments, and VFX

Rich Radke

Department of Electrical, Computer, and Systems Engineering



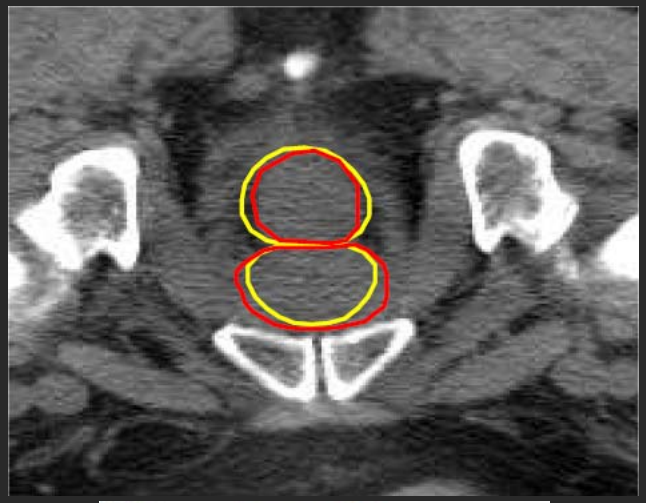
About me

- From Milwaukee, WI
- College @ Rice (Houston, TX)
- Grad school @ Princeton
- RPI professor since 2001

- Courses: DSP, Intro to Image Processing, Computer Vision for Visual Effects, Probability, Signals
- Research: Computer vision applied in all sorts of domains

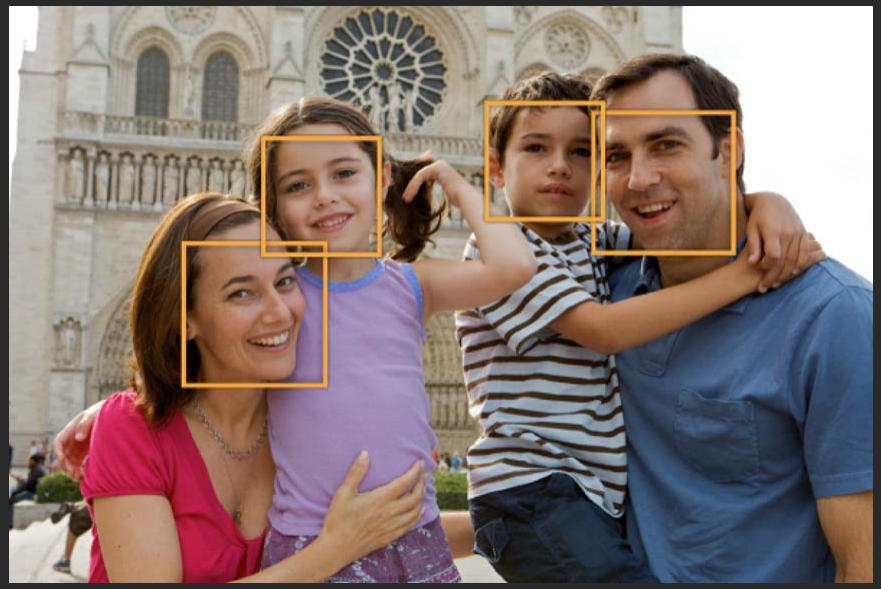
What is Computer Vision?

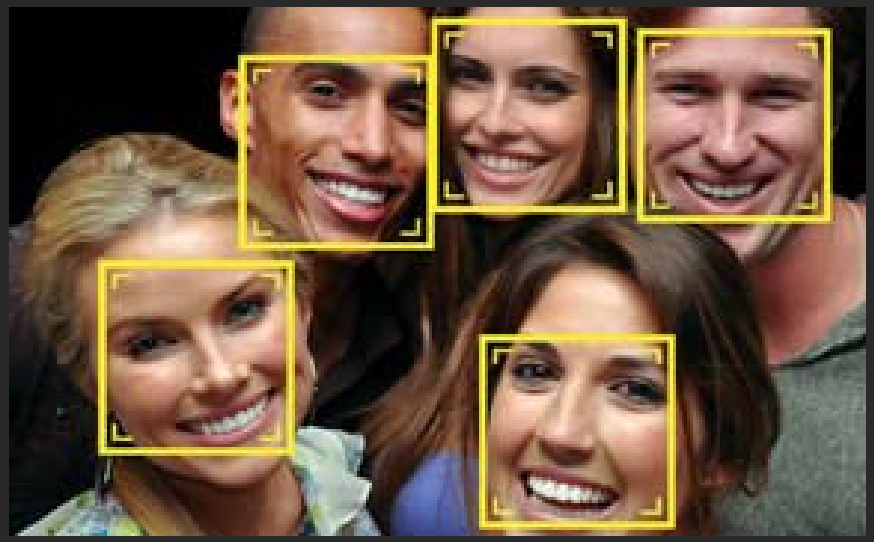
- **Automatically understanding images in the same way that people do**

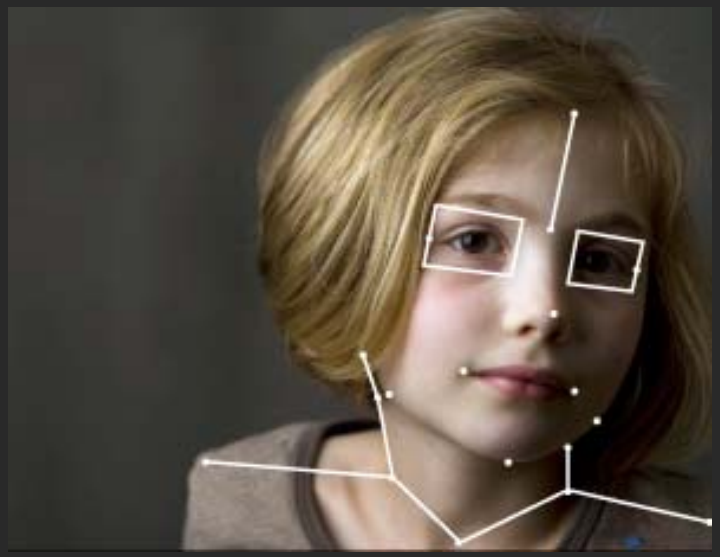


"man in black shirt is playing guitar"

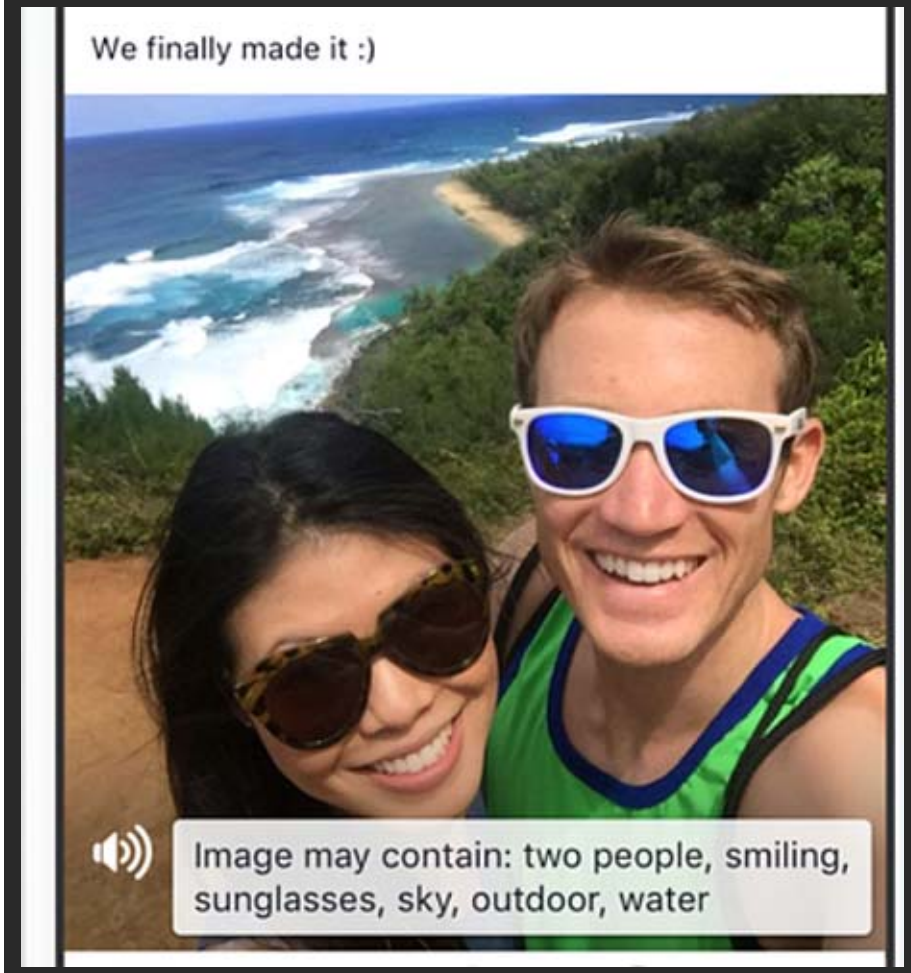
Digital Camera Face Detection



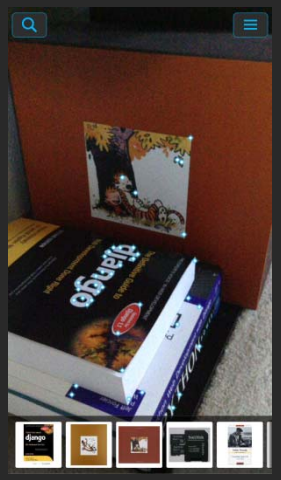




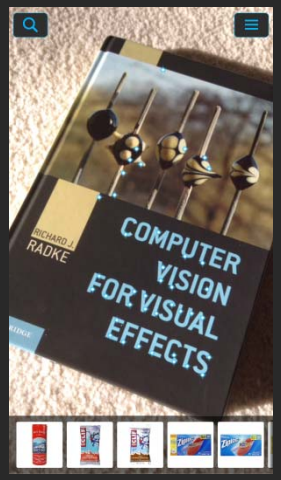
Social media



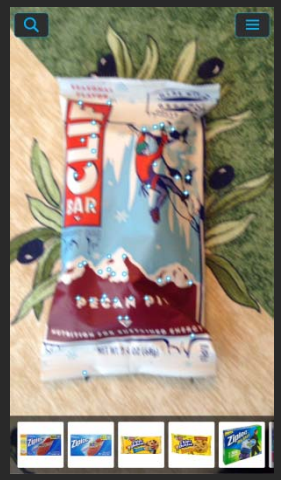
Amazon Flow




2
Ziploc
QUART
Freezer
VALUE PACK
40 BAGS


RICHARD J.
RADKE
COMPUTER
VISION
FOR VISUAL
EFFECTS


SEA SALT
BALEINE


CLIF
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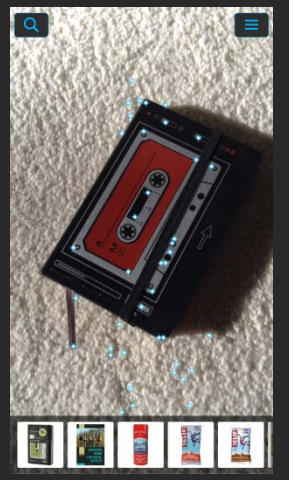
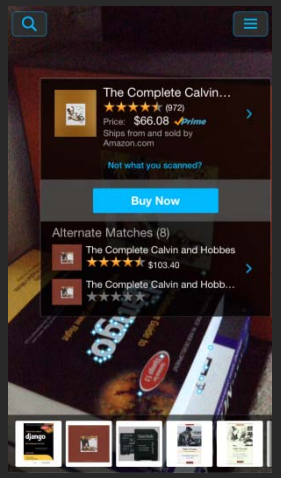
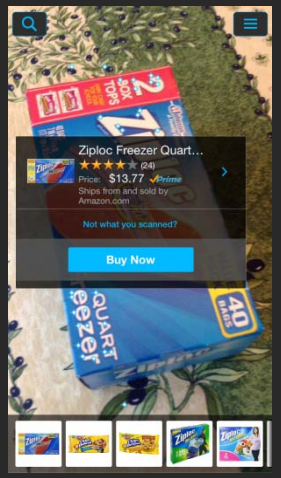



The Complete Calvin…
(972)
Price: $66.08 Prime
Ships from and sold by Amazon.com
Not what you scanned?
Buy Now
Alternate Matches (8)
The Complete Calvin and Hobbes
$103.40
The Complete Calvin and Hobb…


Ziploc Freezer Quart…
(24)
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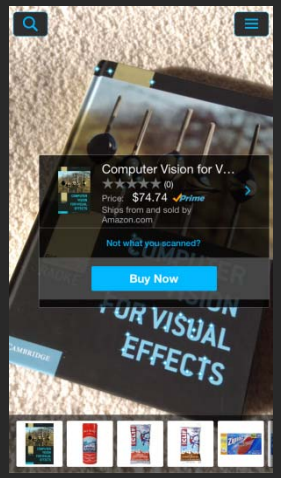
Ships from and sold by Amazon.com
Not what you scanned?
Buy Now
QUART
Freezer
40 BAGS


Computer Vision for V…
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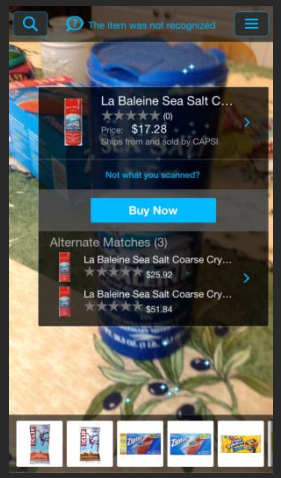
Buy Now
FOR VISUAL
EFFECTS


The item was not recognized
La Baleine Sea Salt C…
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Price: $17.28
Ships from and sold by CAPS!
Not what you scanned?
Buy Now
Alternate Matches (3)
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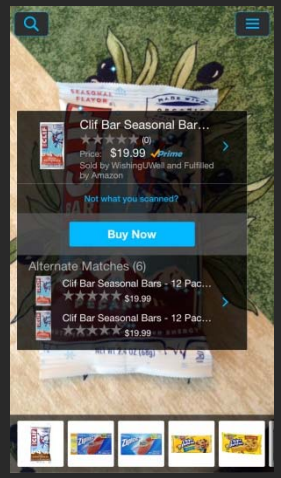
$25.92
La Baleine Sea Salt Coarse Cry…
$51.84


Clif Bar Seasonal Bar…
(0)
Price: $19.99 Prime
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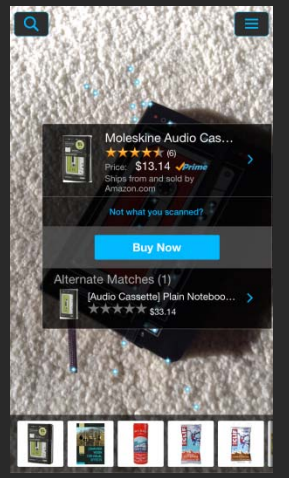
$19.99
Clif Bar Seasonal Bars - 12 Pac…
$19.99


Moleskine Audio Cas…
(6)
Price: $13.14 Prime
Ships from and sold by Amazon.com
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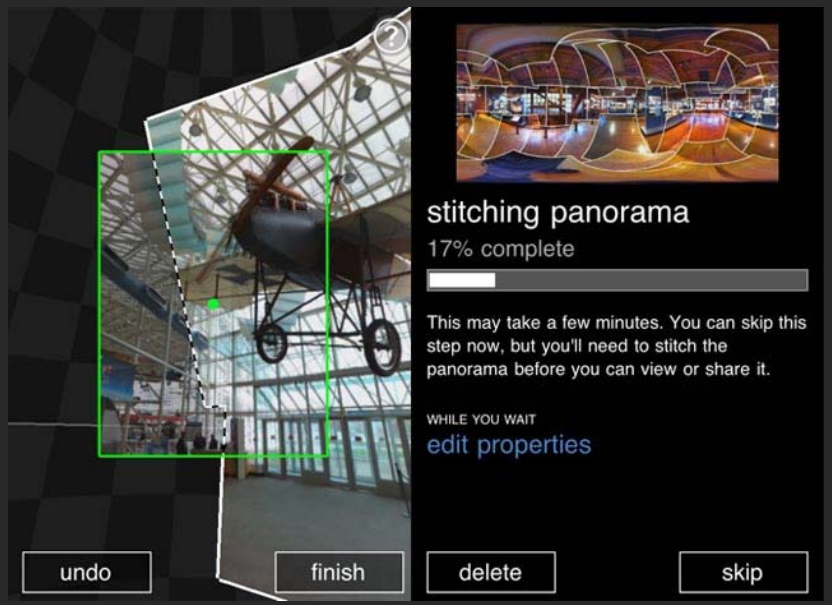
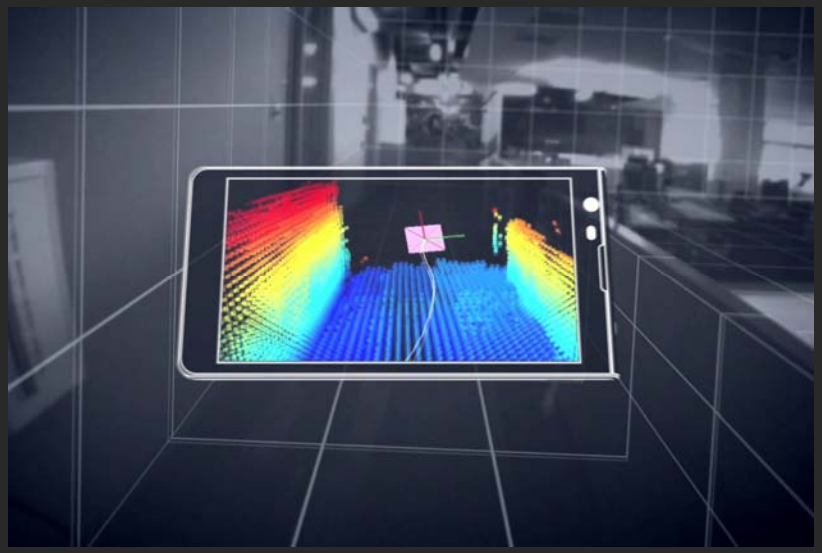
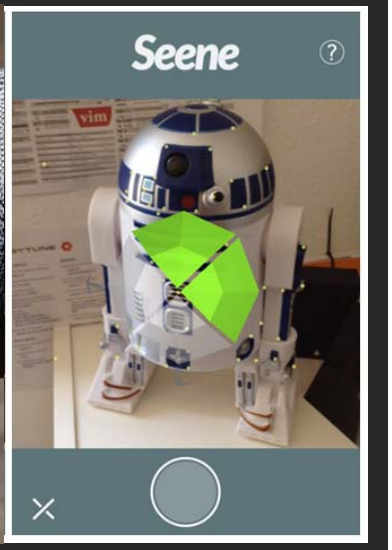
Buy Now
Alternate Matches (1)
[Audio Cassette] Plain Noteboo…
$33.14

Vision on smartphones

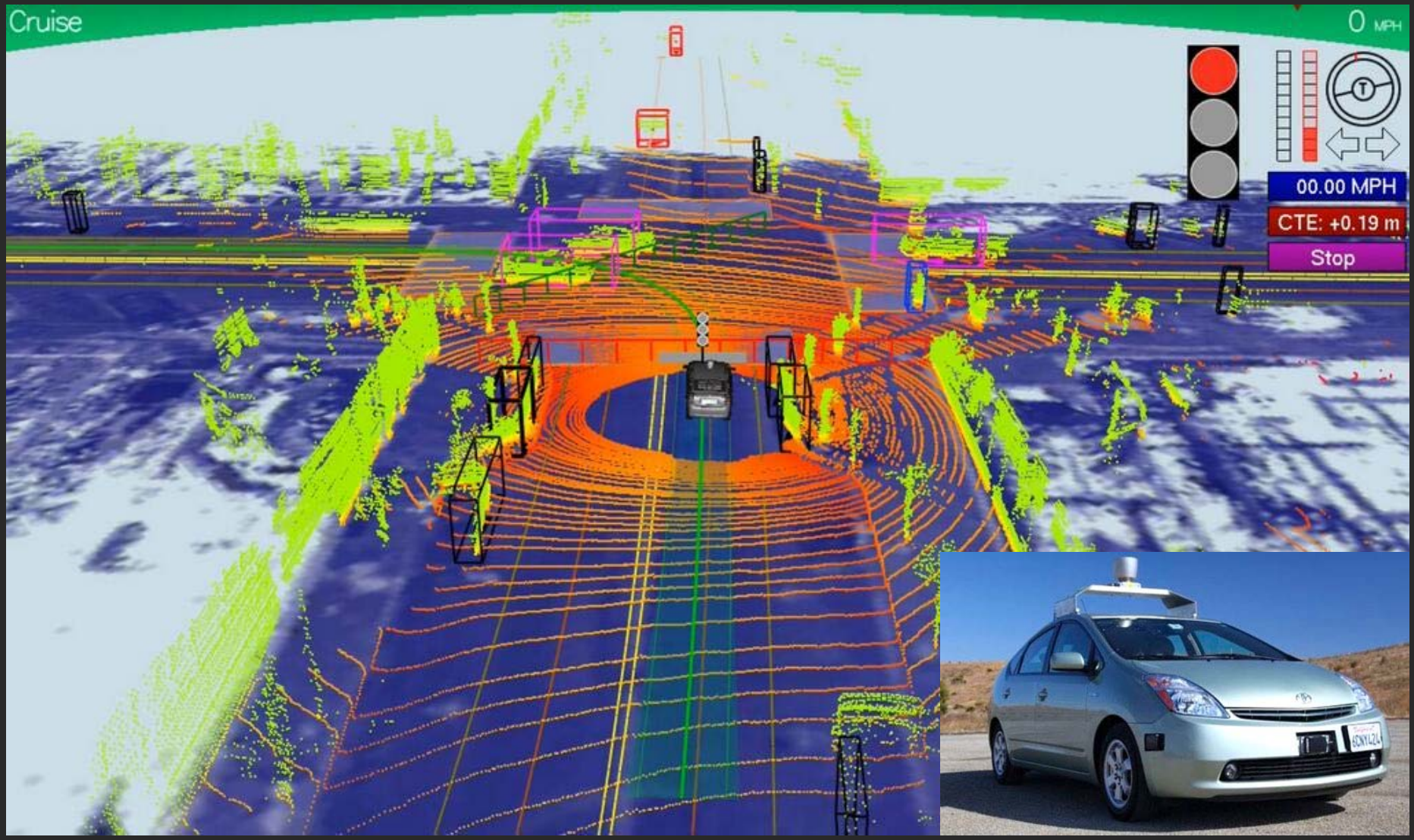






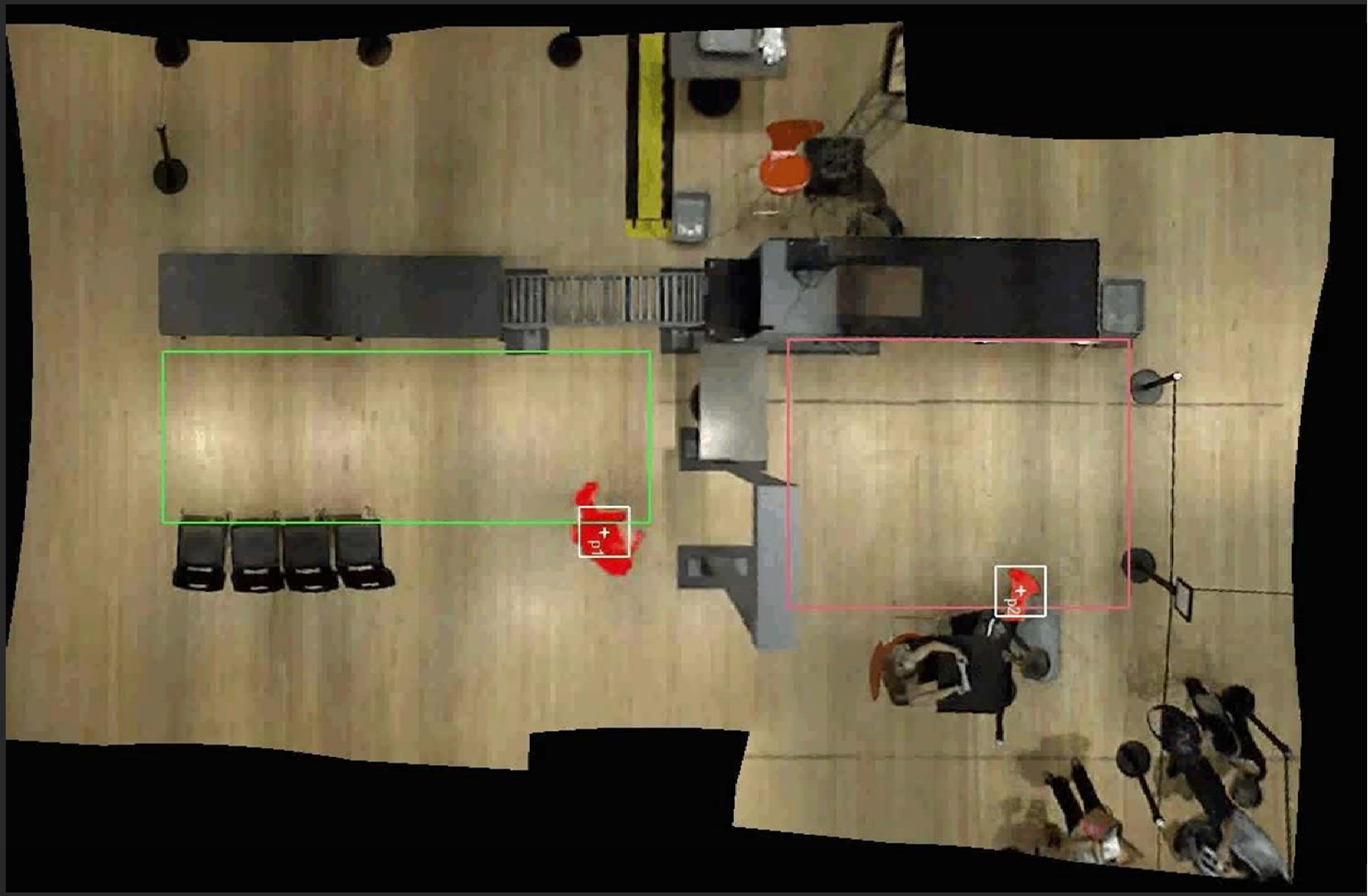
Virtual reality

Self-driving cars

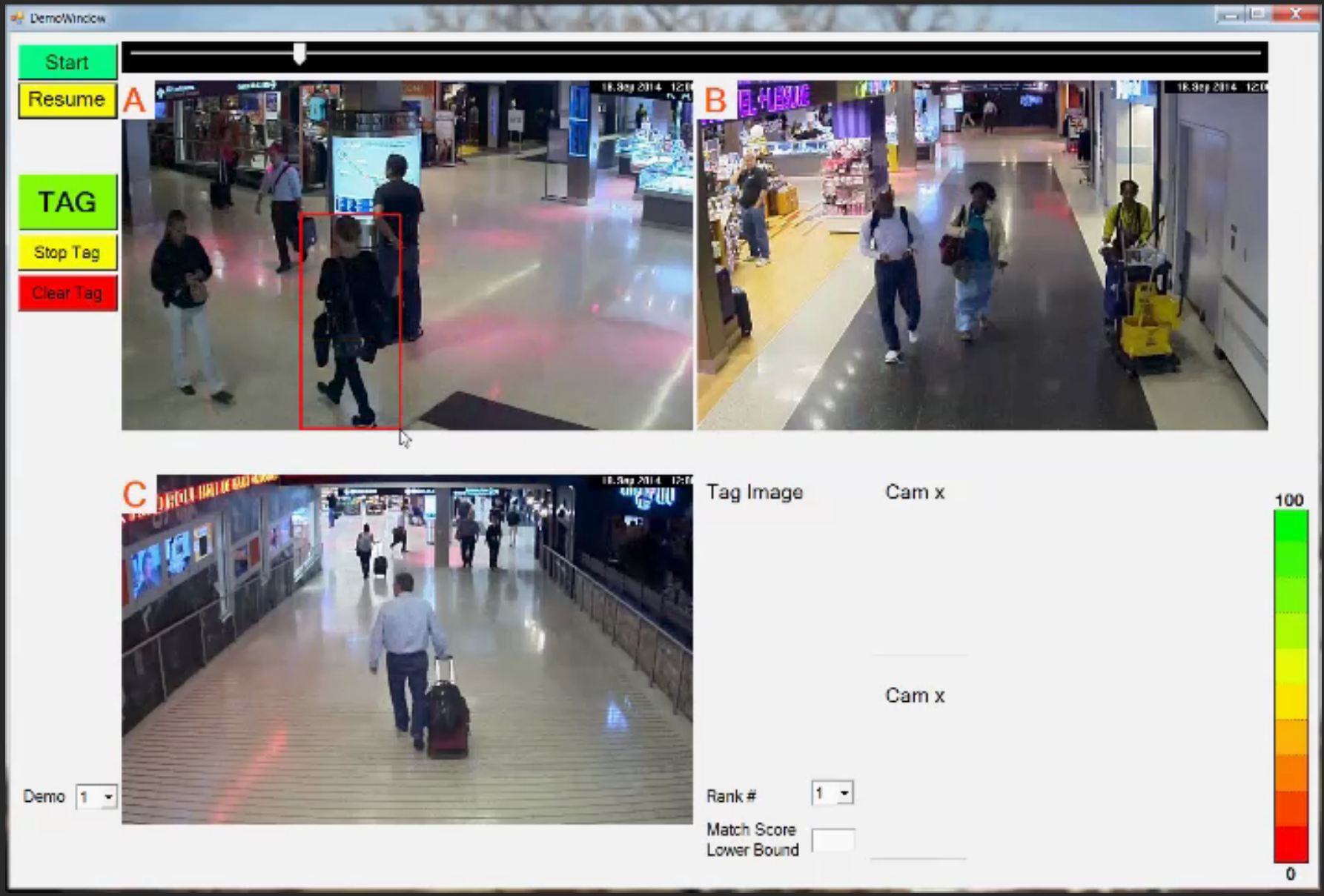


Full-scale simulation of a checkpoint

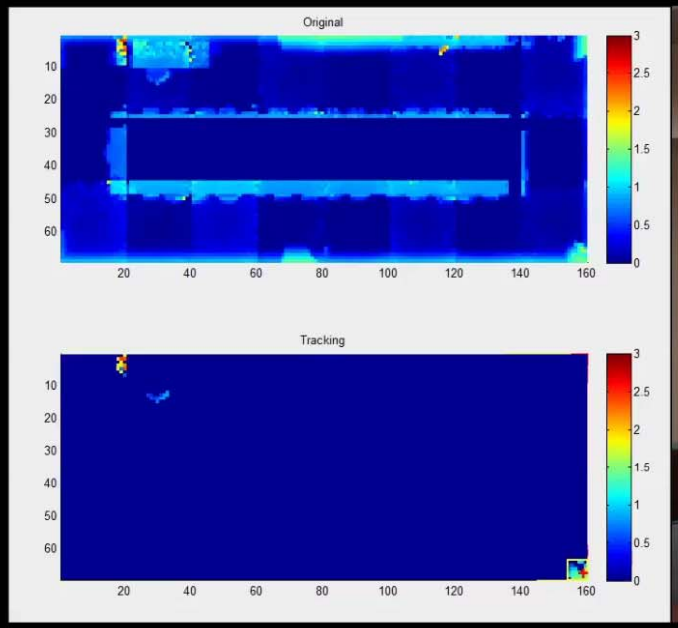
Tracking and associating objects



Human re-identification



Privacy-preserving (time-of-flight) tracking



Number of people: 1

	ID	Position	Height
1	1	[158, 67]	1.52

The CRAIVE Lab

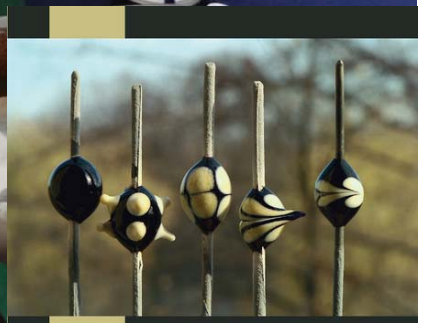
Vision for robotics

Applying computer vision to visual effects

ECSE 4961/6961
Fall 2017 - MR 2-3:20 PM

Computer Vision for Visual Effects

Learn the theory and algorithms behind Hollywood visual effects!



My former students work at:

- Netflix
- Apple
- LinkedIn
- Pratt and Whitney
- Siemens
- Intel
- AS&E
- Kitware
- Sturfee
- HERE
- SRI
- Morgan Stanley

Thanks!