The Arch at Rensselaer

summer HERE. the world AWAY.

A transformative experience within your academic journey
Table of Contents

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/p9n0y9e8/z/thumb/?proto=true
The Arch at Rensselaer

- 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
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
# Academic Matriculation

*Four years to graduation and eight semesters of financial aid*

<table>
<thead>
<tr>
<th></th>
<th>FALL</th>
<th>SPRING</th>
<th>SUMMER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST YEAR</strong></td>
<td>Required On-Campus</td>
<td>Required On-Campus</td>
<td>You Choose</td>
</tr>
<tr>
<td><strong>SOPHOMORE YEAR</strong></td>
<td>Required On-Campus</td>
<td>Required On-Campus</td>
<td>Required On-Campus</td>
</tr>
<tr>
<td><strong>JUNIOR YEAR</strong></td>
<td>Semester Away**</td>
<td>Semester Away**</td>
<td>You Choose</td>
</tr>
<tr>
<td><strong>SENIOR YEAR</strong></td>
<td>You Choose</td>
<td>You Choose</td>
<td>You Choose</td>
</tr>
</tbody>
</table>

**Fall or spring semester away for experiential learning.**

See The Arch website for exception policy.
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.
The Unique Summer Semester
Sample Summer Class Schedule

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 – 10:05 a.m.</td>
<td>Thermal and Fluids Engineering II</td>
<td>Thermal and Fluids Engineering II</td>
<td>Thermal and Fluids Engineering II</td>
<td>Thermal and Fluids Engineering II</td>
<td>Thermal and Fluids Engineering II</td>
</tr>
<tr>
<td>10:30 a.m. – 12:35 p.m.</td>
<td>Elements of Mechanical Design</td>
<td>Elements of Mechanical Design</td>
<td>Elements of Mechanical Design</td>
<td>Elements of Mechanical Design</td>
<td>Elements of Mechanical Design</td>
</tr>
<tr>
<td>12:35 – 1:30 p.m.</td>
<td>Common Lunch Period</td>
<td>Common Lunch Period</td>
<td>Common Lunch Period</td>
<td>Common Lunch Period</td>
<td>Common Lunch Period</td>
</tr>
<tr>
<td>1:30 – 4:30 p.m.</td>
<td>Lab Period</td>
<td>Field Trips to Companies</td>
<td>Lab Period</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
CLASS - The Student Experience

- Clustered
- Learning
- Advocacy
- Support for
- Students

PROGRAMMING

COHORT SUPPORT

RESIDENTIAL CLUSTERING
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
Preparing for your Semester Away
Semester Away Opportunities

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

PETER D’ALMEIDA ’19
Biomedical Engineering
University of New South Wales
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
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
“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
“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
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.
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.
# Electrical Engineering (EE)

<table>
<thead>
<tr>
<th>SUMMER ARCH SEMESTER</th>
<th>Third Year</th>
<th>Fall or Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECSE-2050 Intro. to Electronics</td>
<td>4</td>
<td>ECSE-2900 Enrichment Seminar</td>
</tr>
<tr>
<td>ECSE-2410 Signals &amp; Systems</td>
<td>3</td>
<td>ECSE-2100 Fields &amp; Waves I</td>
</tr>
<tr>
<td>ECSE-2500 Engineering Probability</td>
<td>3</td>
<td>ECSE-2210 Microelectronics Tech.</td>
</tr>
<tr>
<td>Professional Development II</td>
<td>2</td>
<td>ECSE-2110 Electrical Energy Systems</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3-4</td>
<td>Math/Science Elective</td>
</tr>
</tbody>
</table>

# Computer Systems Engineering (CSE)

<table>
<thead>
<tr>
<th>Summer Arch Semester</th>
<th>Third Year</th>
<th>Fall or Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECSE-2010 Electric Circuits</td>
<td>4</td>
<td>ECSE-2050 Intro. to Electronics</td>
</tr>
<tr>
<td>ENGR-2050 Intro. to Eng. Design</td>
<td>4</td>
<td>ECSE-2410 Signals &amp; Systems</td>
</tr>
<tr>
<td>MATH-2010 Multivar Calc &amp; Matrix Alg.</td>
<td>4</td>
<td>ECSE-2500 Engineering Probability</td>
</tr>
<tr>
<td>Hum., Arts or Soc. Sci. Elective</td>
<td>4</td>
<td>Free Elective²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hum., Arts or Soc. Sci. Elective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECSE-2900 Enrichment Seminar</td>
</tr>
</tbody>
</table>
### EE/CSE Dual

<table>
<thead>
<tr>
<th>Summer</th>
<th>Third Year</th>
<th>Spring or Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR-2050 Intro. to Eng. Design</td>
<td>ECSE-2900</td>
<td>ECSE Enrichment Seminar</td>
</tr>
<tr>
<td>ECSE-2010 Electric Circuits</td>
<td>ECSE-2050</td>
<td>Intro. to Electronics</td>
</tr>
<tr>
<td>Multidisc. Elective(^1)</td>
<td>ECSE-2100</td>
<td>Fields &amp; Waves I</td>
</tr>
<tr>
<td>MATH-2010 Multivar Calc &amp; Matrix Alg</td>
<td>ECSE-2410</td>
<td>Signals &amp; Systems</td>
</tr>
<tr>
<td>Hum., Arts or Soc. Sci. El.</td>
<td>ECSE-2500</td>
<td>Engineering Probability</td>
</tr>
<tr>
<td></td>
<td>ECSE-2110</td>
<td>Electrical Energy Systems</td>
</tr>
</tbody>
</table>

### EE/Mechanical Engineering Dual

<table>
<thead>
<tr>
<th>Summer</th>
<th>Third Year</th>
<th>Fall or Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECSE-2050 Intro. to Electronics</td>
<td>ECSE-2100</td>
<td>Fields &amp; Waves I</td>
</tr>
<tr>
<td>ECSE-2500 Engineering Probability</td>
<td>MANE</td>
<td>Mechanical Eng. Core Mod.</td>
</tr>
<tr>
<td>MANE Mechanical Eng. Core Mod</td>
<td>ECSE-2110</td>
<td>Electrical Energy Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional Devel. II(^1)</td>
</tr>
</tbody>
</table>
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
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

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

Collaborators:
- Richard Radke
- Art Sanderson
- TKae Woodstock
- Indrani Bhattacharya
VLC Receiver R&D

- 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.”

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?
- Solar?
- Big data?
- Drones?
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
About me

- Co-terminal BS/MS Electrical Engineering student graduating in May 2019
  - Very enthusiastic about power systems and energy!
- 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: RethinkRobotics.com

Source: bostondynamics.com

Source: intuitive.com
Robotic Co-worker

RPI Robotics Lab

Profs. John Wen, Rich Radke
Autonomous Robots for Complex Missions

Reactive Planning for Complex Missions
Aggressive Maneuvers in microUAV

Trajectory Tracking with Quadrotor

Profs. Sandipan Mishra, Agung Julius
Microbial Robots

*Tetrahymena pyriformis*

(BAST lab at Drexel Univ)

Prof. Agung Julius
Basic Ingredients of Control Systems

Actuator \rightarrow\text{Plant} \rightarrow\text{Sensor} \rightarrow\text{Controller} \rightarrow\text{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
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
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.
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)
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!

WHERE WERE YOU WHEN I NEEDED TO GO TO THE STORE LAST NIGHT?!

WHY SELF-DRIVING CARS ARE A BAD IDEA... REASON #38
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.
Digital Camera Face Detection
Social media

We finally made it :)

Image may contain: two people, smiling, sunglasses, sky, outdoor, water
Vision on smartphones

*stitching panorama*
17% complete

This may take a few minutes. You can skip this step now, but you’ll need to stitch the panorama before you can view or share it.

*WHILE YOU WAIT*
edit properties

1. Let’s remove distracting clutter from the grass.
2.
3.
4.

Select an area to patch
Virtual reality
Self-driving cars
Full-scale simulation of a checkpoint
Tracking and associating objects
Human re-identification
Privacy-preserving (time-of-flight) tracking
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!