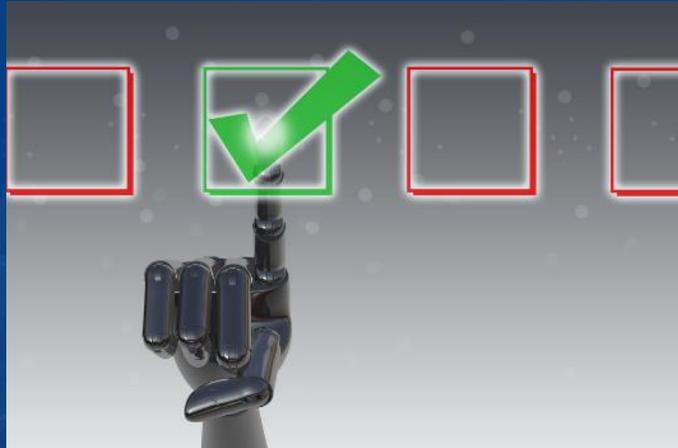


Penn State Directions: Technology and the Future of Higher Education



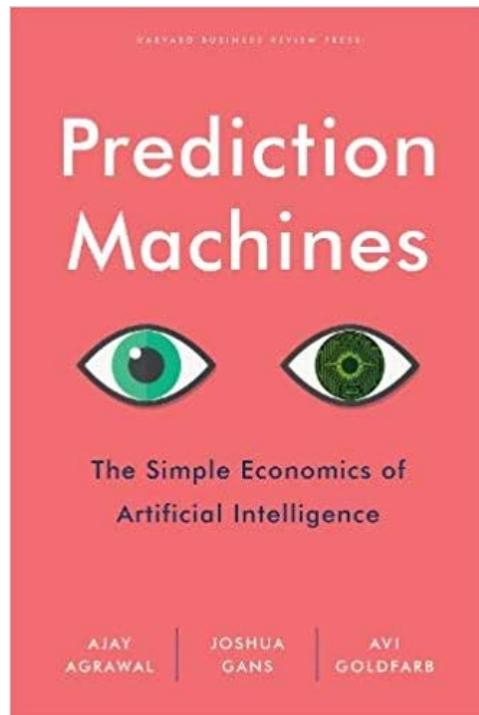
A Discussion with the Board of Trustees
February 21, 2020



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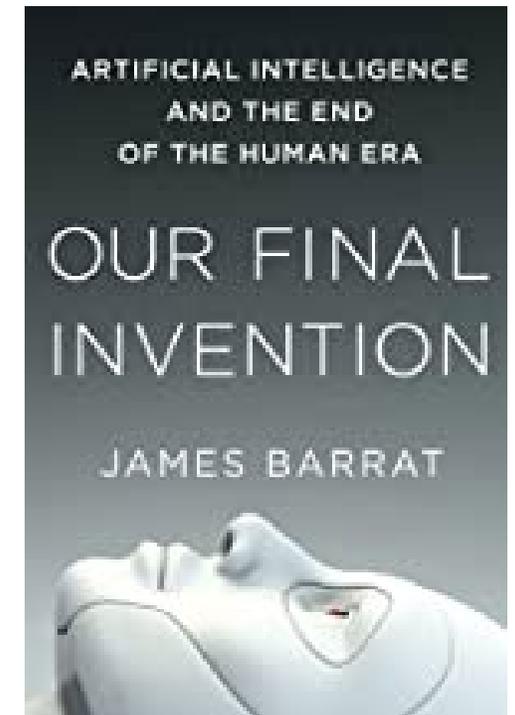
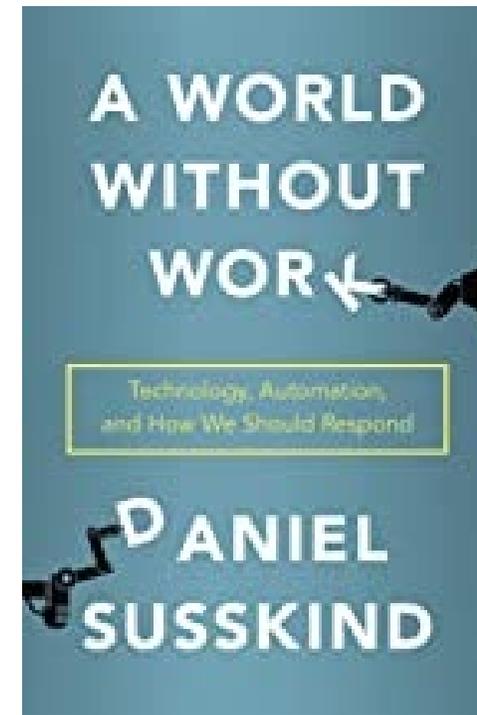
The Promise:

More Efficiency and Efficacy

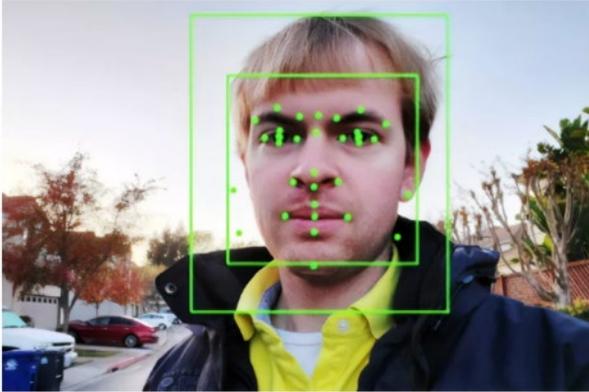


The Peril:

Ethical Breaches and No Work



Artificial Intelligence in the World



Output of an Artificial Intelligence system from Google Vision, performing facial recognition on a photograph of a man in San Ramon, California on November 22, 2019. | Smith Collection/Gado/Getty Images

Output from an AI system from Google Vision, performing facial recognition.



AI can help to reduce carbon footprint and manage environmental issues

Artificial intelligence-powered applications could help policy-makers and industry leaders manage greenhouse gas emissions and support sustainability initiatives



Creepy AI-Created Portrait Fetches \$432,500 at Auction at Christie's.

Living portraits

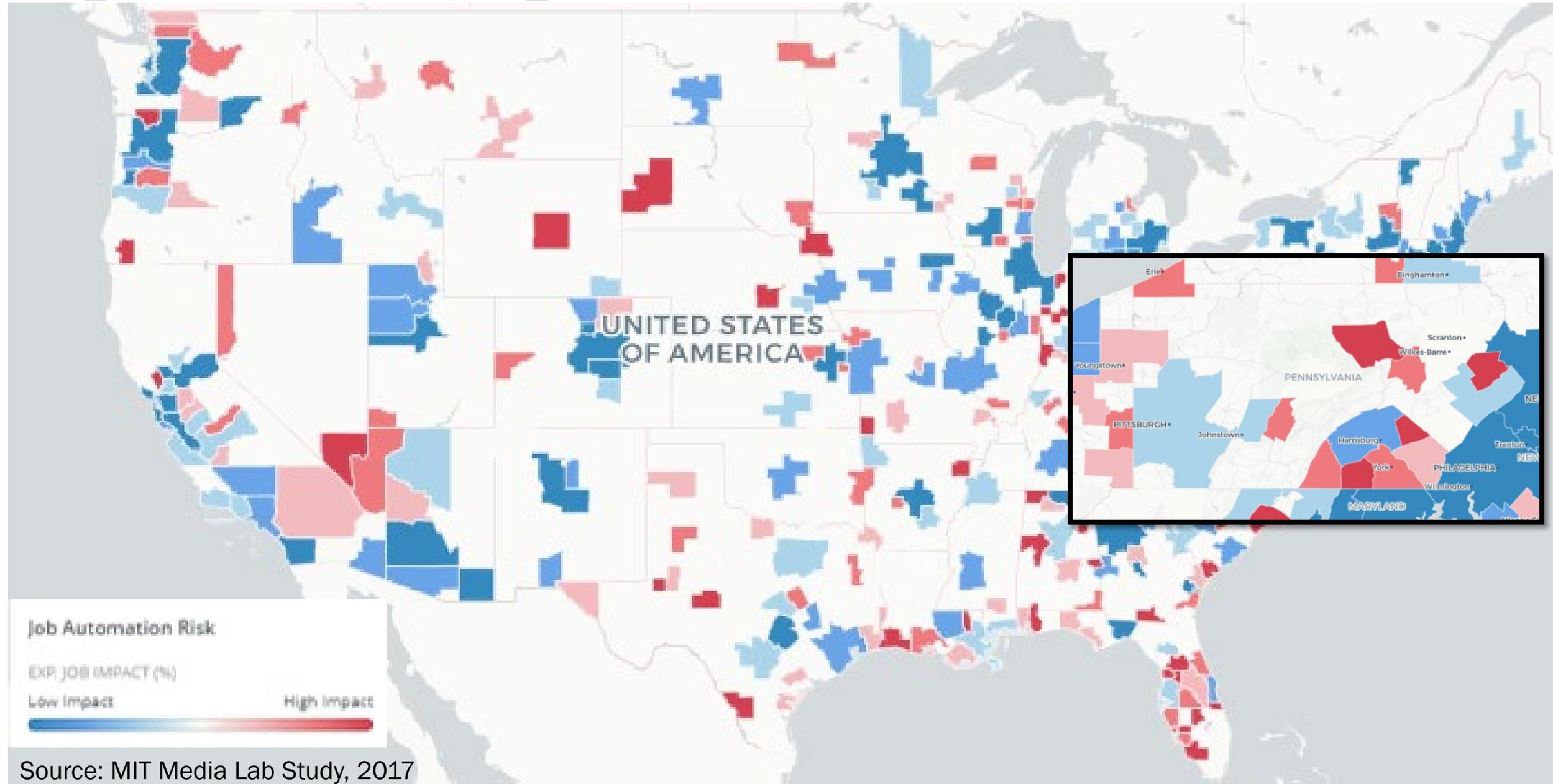


A **Samsung** lab in Russia showed it is possible to fake videos from just **one picture**



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Expected job impact from automation



Education Tech Trends: Opportunities

- Realize full potential of One Penn State 2025.
- Provide a personalized and seamless education:
 - AI can complete routine tasks to free up faculty and advisers to work more closely with students.
 - AI can adapt to behavior to better respond to student needs.
- Create unique learning experiences anywhere, anytime through Virtual and Augmented Reality.
- Give students a home base for their education and access to a larger higher education marketplace.
- Offer students a competitive advantage upon graduation.

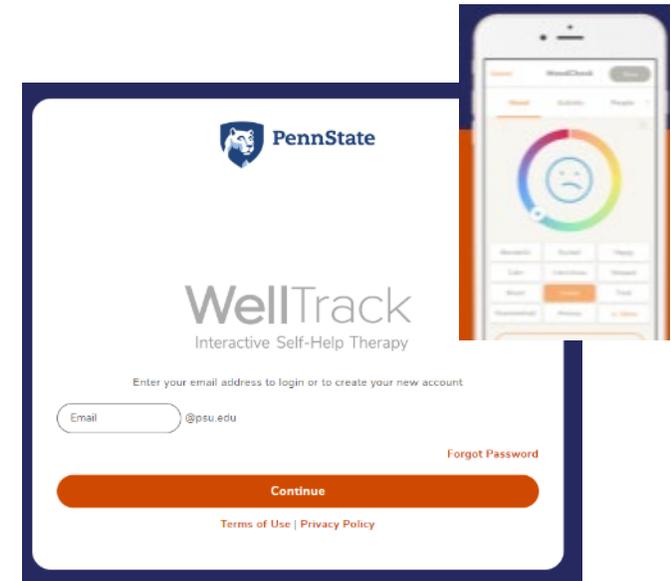


The Future of Technology at Penn State

- Student Support Projects include:
 - Advising, early warning, counseling and psychological services, engagement, and career services.
- Instructional Projects include:
 - Technology classrooms, immersive experience labs, AI-enhanced course materials, and research.
- Institutional Projects include:
 - Admissions, development, strategic communications, and HR.



Student Support Projects



Advising Goal: Improve response times and one-on-one advising by reducing time spent on routine tasks

- Advising Capacity Scaling with Artificial Intelligence pilot for World Campus.
- Uses AI to automate manual processes; allows advisers to spend more individualized time with students.
- Standardized tasks take 6,000+ hours annually, and that number is growing as enrollment increases.
- 86% accuracy in testing phase; system will be tracked for one year.



Early Intervention Goal: Enhance advising by predicting student performance based on past students' performance

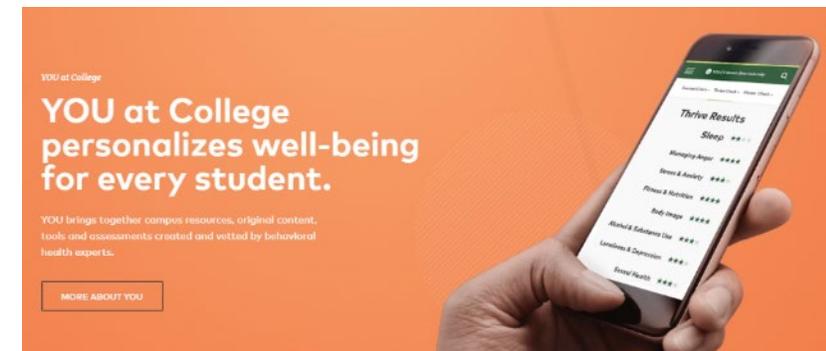
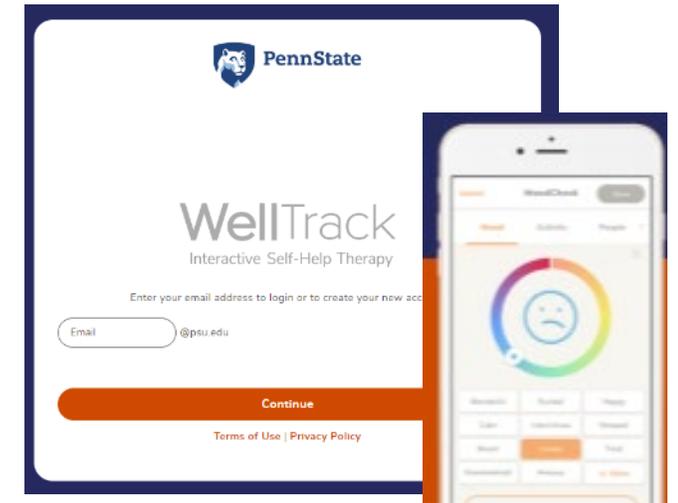
- Project LIFT leverages historical student data, and applies it to current, similar students to help advisers identify potential areas of concern.
 - AI flags at-risk students so the adviser can investigate further and follow up with personal contact.
- LIFT was tested last fall with 12 advisers from DUS, EMS, Science, and Lehigh Valley with 650+ student schedules.

Counseling and Psychological Services Goal: Serve more students with existing resources

Challenge: CAPS is operating at maximum capacity, and the highly-customized and high-risk nature of mental health treatment limits the benefits of tech solutions.

CAPS is testing these tech options:

- WellTrack, a self-guided app that offers self treatment tools and coping strategies
- CCAPS Screen (self-assessment)
- Penn State Crisis Line, Crisis Text Line
- ThrivingCampus (off-campus referrals)
- YOU at College Wellness Portal (coming this summer)



CAPS Future Possibilities: Tele-Services

- Tele-psychiatry: Commonwealth Campus Student Fee Board is considering increasing fees to fund this service (undecided).
- Tele-counseling: CAPS is exploring a pilot for University Park to evaluate the value of this service.
 - Some vendors make use of AI to "supervise" and "flag" interactions.
- Future funding for a university-wide contract has potential to offer same-day support to every student with oversight by CAPS.



Engagement Goal: Help students find opportunities related to their interests and activities

- Challenge: Students are overwhelmed with choices: 1,200 clubs, countless international experiences and engagement opportunities.
- Student Engagement Portal will use AI to refine options and make suggestions based on past activities (like Netflix).

The screenshot displays the Student Engagement Portal interface. At the top, there is a navigation bar with links for SEN, HOME, Engagement Type, Skills/Growth, College, Campus, Semester, Challenge Me, and My Dashboard. Below the navigation bar is a circular diagram illustrating a process: 'Tell your story' leads to 'Find your why' (via 'Cultivate'), which leads to 'Start your journey' (via 'Design'), which leads to 'Complete an experience' (via 'Prototype'), which then leads back to 'Tell your story' (via 'Process').

Student Engagement Portal

Share Your Experience Add and Engagement Opportunity
My Network/People Community Impact and Alumni Stories
View Student Stories Workshops and Resources
Collaborate with others

Recently Completed

- Alt Spring Brk
- Men's Choir
- Chem Club
- Dell Intern
- SA in Spain

Top Recommendations

- Research
- STEM Club
- Volunteer
- Level 1
- Level 2
- Level 3

Recently Added/New

- STEM Club
- + Opportunity

My College (s)

- Symposium
- Physics Club
- Research Opp

Trending Now

- + Opportunity
- + Opportunity

Career Services Goal: Improve students' resumes to pass AI screening processes

- As recruiters increasingly use AI for screening resumes/candidates, Career Services is leveraging AI to pinpoint the top resume criteria for selecting students for interviews.
- Educating students on the resume criteria that employers value most offers a competitive advantage.



Penn State Berks Resilient Resumes team built a web app to help students create better resumes.

Ethical Considerations: A critical part of all projects

- New Penn State Center for Socially-Responsible Artificial Intelligence.
 - Promote the thoughtful development and application of AI and study its impact on all areas of human endeavor.
 - Support research focused on AI for social good and mitigate against threats from the misuse of AI.
 - Encourage that all AI R&D activities consider social and ethical implications as well as intended and possible unintended consequences.
- Through co-hires with the Rock Institute, IST has hired two faculty focused on ethical issues in data science and AI.



Instructional Projects

Teaching and Learning with Technology (TLT) Collaborations



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TLT Goal: Discover and explore innovative ideas that advance student learning

- 1,484 faculty engagements every year.
- \$6,278,382 in faculty research support over the past 4 years.
- Initiatives include learning spaces, professional development, teaching and learning research, competitions, and innovation.
- Represents Penn State in the Unizin Consortium, which provides solutions for critical issues facing higher ed.



Annual Open Innovation Challenge (March 21, 2020)

- Faculty compete to win support for their transformative ideas involving education and technology.
- Finalists are chosen from the pool of proposals and given 5 minutes to present their ideas to an audience of 500+.
- Audience votes online for the winner.



Open Innovation Challenge Examples

- **2019 Winner Rodney Trice, professor, graphic design.** His “Walk a Mile...” project is an immersive virtual reality experience designed to build empathy.
- **Penn State Beaver IST instructor Ashu Kumar** created a voice-enabled classroom assistant that takes attendance and keeps track of participation points.
- **Penn State Mont Alto assoc. prof. Angela Hissong** presented NittanyPause: Building & Sustaining Mindful Teaching-Learning Experiences.



Immersive Experiences Labs



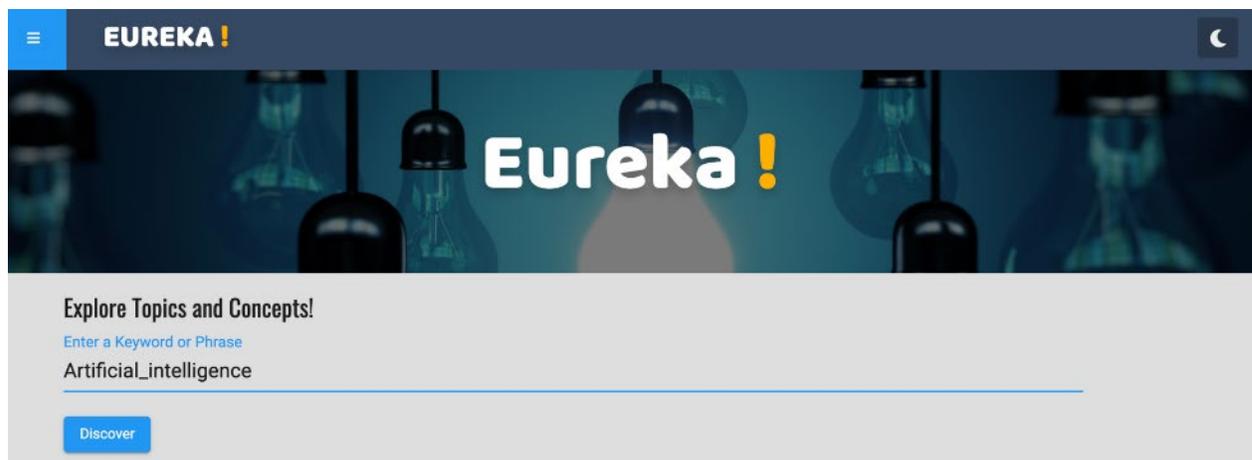
- Labs across colleges and campuses where students, faculty and staff can explore virtual reality and immersive technologies.
- Encourages cross-disciplinary collaboration, research, and student engagement.

Artificial Intelligence: Making Free Textbooks

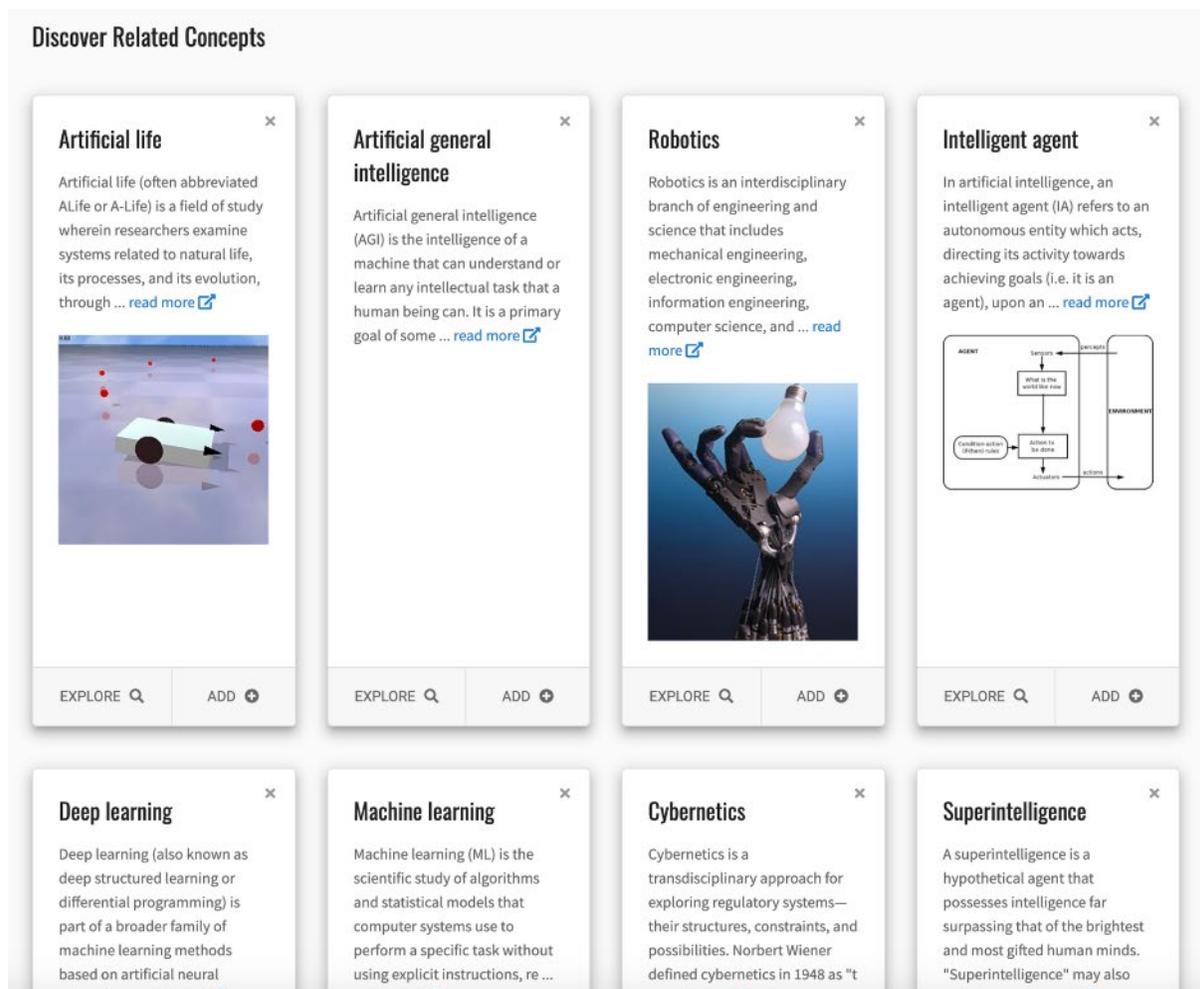


- Developed by IST Professor Lee Giles, this uses open source material to create textbooks and specialized materials.
- Relevant resources can be combined, remixed, and re-used to support specific learning goals.
- Has saved over \$200K in IST and hotel and restaurant management courses.
- Joins the University's open, affordable textbook effort that has saved students \$4.8M in potential expenses on textbooks over 3 years.

Eureka: Improving Course Content

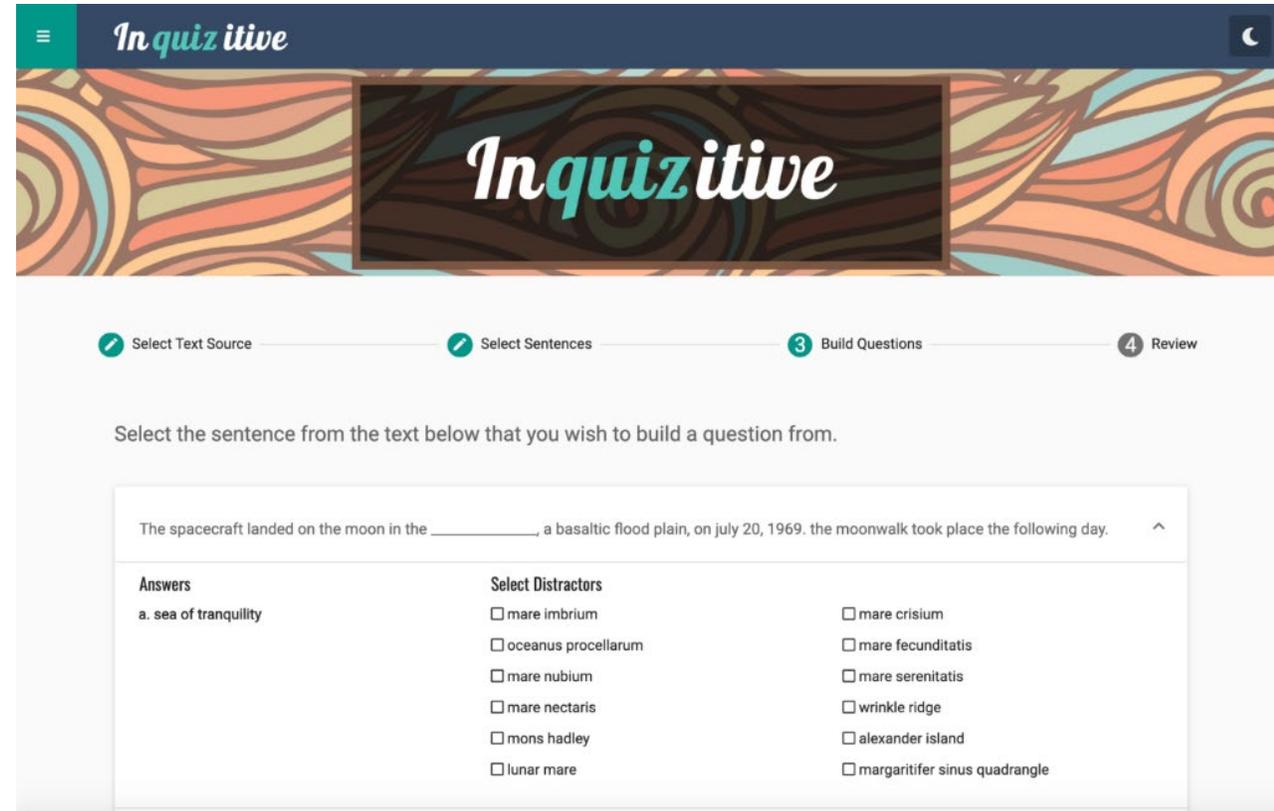


- Recommendation engine to help faculty discover new information relevant to their coursework.



Inquizitive: Building Test Question Banks

- Developed by Computer Science Professor Rebecca Passonneau, this helps faculty come up with plausible distractors (wrong answers).
- Allows faculty to efficiently develop large question banks.

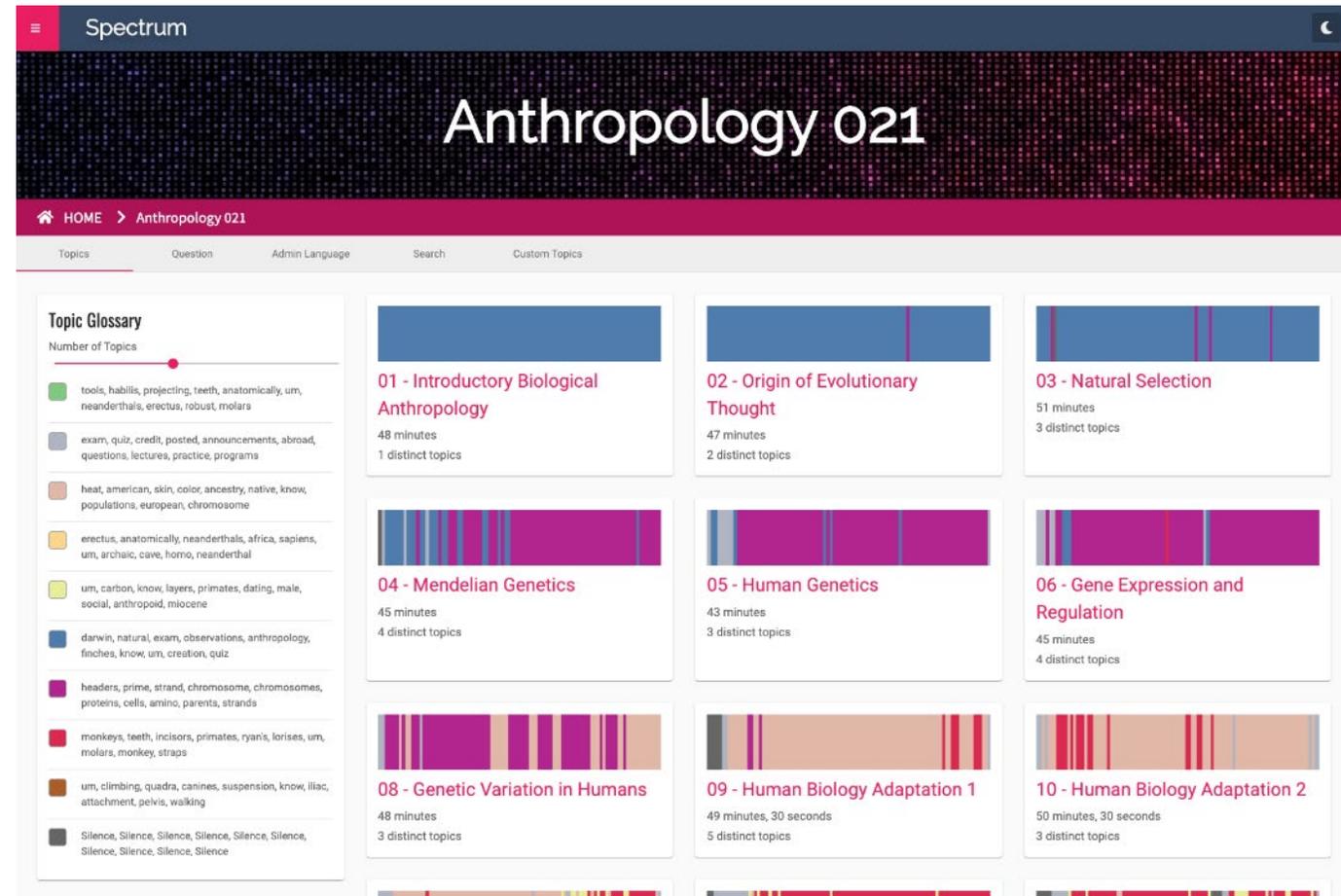


The screenshot shows the Inquizitive web application interface. At the top, there is a dark blue header with the "Inquizitive" logo and a moon icon. Below the header is a decorative banner with a colorful, abstract pattern and the word "Inquizitive" in a stylized font. The main content area features a progress bar with four steps: "Select Text Source", "Select Sentences", "Build Questions", and "Review". The "Build Questions" step is currently active. Below the progress bar, there is a text input field with the sentence: "The spacecraft landed on the moon in the _____, a basaltic flood plain, on July 20, 1969. The moonwalk took place the following day." Below the text input field, there are two columns of options. The first column is labeled "Answers" and contains the option "a. sea of tranquility". The second column is labeled "Select Distractors" and contains a list of lunar features with checkboxes: "mare imbrium", "oceanus procellarum", "mare nubium", "mare nectaris", "mons hadley", "lunar mare", "mare crisium", "mare fecunditatis", "mare serenitatis", "wrinkle ridge", "alexander island", and "margaritifer sinus quadrangle".



Spectrum: Improving Course Evaluations

- Provides an overview of teaching and learning over the course of a semester.
- Enables teachers to understand their areas of strength and weakness class by class.



Invent Penn State

- Gov. Tom Wolf has announced a proposal to provide \$2.35M in funding for Invent Penn State as part of a \$12.35M spending initiative focused on technology and innovation programs.
- Invent Penn State is accelerating the transfer of new ideas into useful products and building new businesses in PA.



Student companies at the Startup Showcase.

Annual Nittany AI Challenge

- Teams develop AI-based solutions to improve the world.
- Three phase process with a \$50K prize pool.
- Interest areas for 2020 AI Challenge include:
 - AI in Education
 - AI in Health
 - AI for Humanitarianism
 - AI for Sustainability and Climate Change



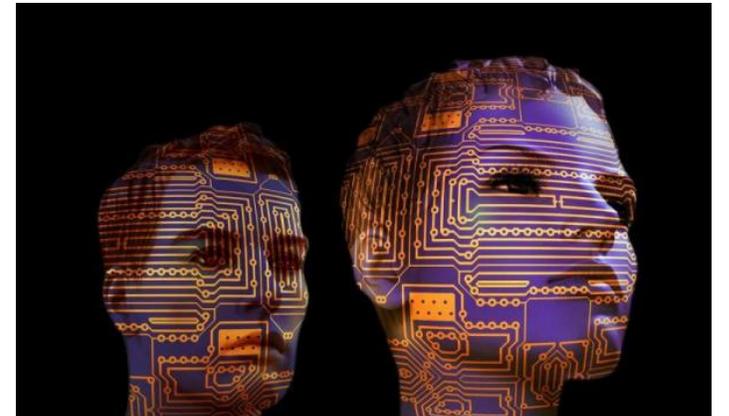
AI in Healthcare Symposium held last fall in Hershey

- Focused on clinical applications, challenges and opportunities of AI in healthcare at the College of Medicine and Penn State Health.
- Promoted collaboration between campuses in areas of machine learning, AI, and the study of biological structure.



Teaching and Research

- Collaborations, seminars, and other advances are transforming research possibilities.
- IST research includes: AI for Suicide Prevention among College Students; AI Based Intelligent Tutoring Systems for Children with Autism; Using AI to Detect Discrimination; and Using AI to Detect Severe Weather.
- IST is hiring multiple new faculty in AI to build on the College's existing strengths, data sciences, biomedical informatics, and other interdisciplinary research areas.



Institutional Projects

Nittany Ai Alliance projects engage current students in the process.



The Penn State
Nittany Ai Alliance



 PennState |  NittanyAiAlliance

nittanyai.psu.edu



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Admissions Goal: Streamline submission of 85,000 high school transcripts received annually

- The challenge: there's no standardized high school transcript format, so high school students manually type in transcript info.
- Nittany Ai Alliance student team is working on an AI-Driven Transcript and Processing tool.
- AI will parse the data and present it back to the student for validation and submission.



Transfer Admissions Goal: Enable prospective transfer students to easily calculate transferable credits

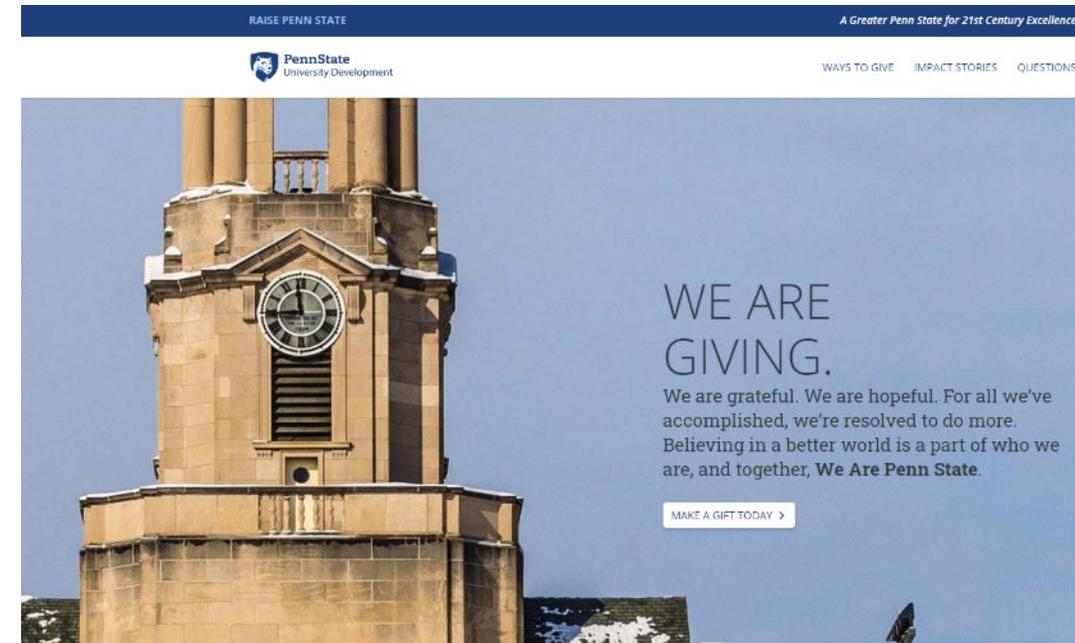
- Building on the 2018 AI Challenge winner Lion Planner, the team is working on a smart recognition tool to allow students to scan/key in their courses to get an instant preliminary estimate of their transferable credits.
- Before they apply, they'll have an accurate estimate of their progress toward a Penn State degree.



2018 Lion AI Challenge winner:
The LionPlanner team

Development Goal: Generate more online giving

- Intelligent Matching Tool can tap into donors' passions and interests and make the online environment more engaging and fun.
- New process will narrow options based on donors' search history.
- The more donors who participate, the stronger the alignment between interests and designations.



Development Goal: More accurately identify prospects

- Leverage readily available big data to inform predictive analytics strategy.
- Sophisticated modeling tools will use data-driven insights, variables and their synergies to better understand which donors are inclined to engage with Penn State.



Recruitment Advertising Goal: Optimize the effectiveness of enrollment ads

- AI determines which creative assets perform best for different audiences.
- Takes basic components (image, video, title, description) and creates a series of variations; then tests options to determine the best combinations.
- The result: more relevant, higher performing ads in Google paid search and social media.

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Human Resources Goal: Talent Acquisition

Penn State is in the early stages of investigating:

- Automated Candidate Sourcing
 - Analyzes talent profiles from professional social channels simultaneously.
 - Automates and personalizes candidate engagement (text, emails, chat bots).
- Automated candidate pool screening
 - Analyzes candidate data to screen/shortlist candidates.
 - Analyzes existing candidate database (Workday Recruiting) for strong past candidates.
- Video/Digital Interviews
 - Provides structured interviews and consistent decisions.
 - Flexibility allows candidates to interview anytime, on any device.

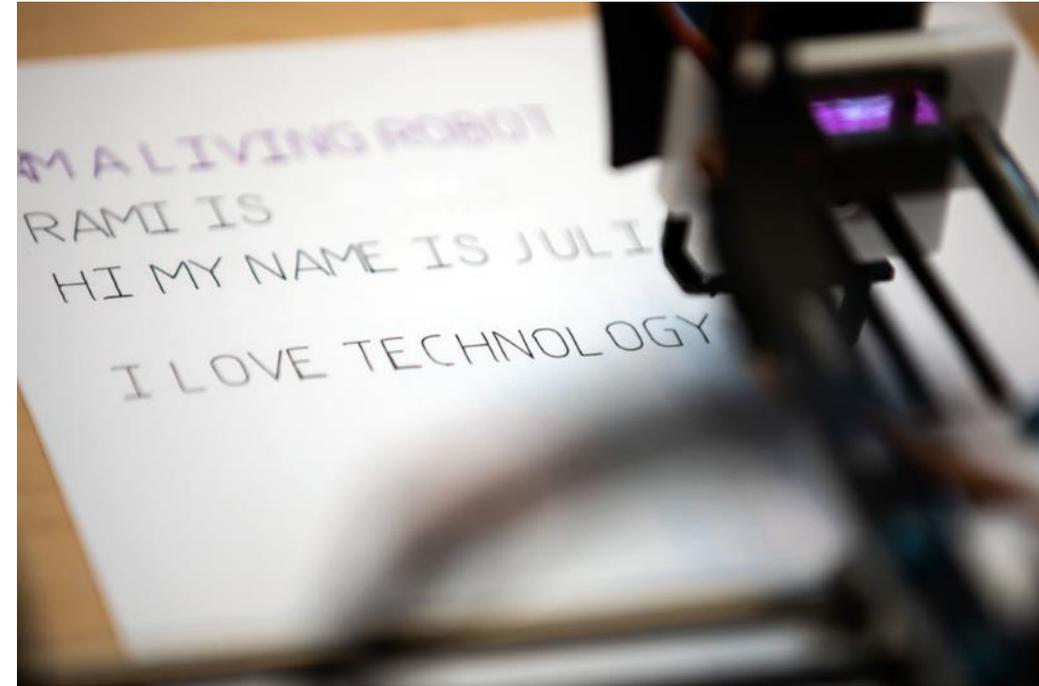
Blue Band Goal: Enhance recruitment

- Blue Band Director Greg Drane has created a thrilling virtual reality experience that allows people to go from the Blue Band Building to the stadium on game day.
- Project was student-planned and executed with a 360° camera mounted on a hat during the white-out game. Students used a 3-D printer to create the camera mount.



Summary:

- Penn State is using technology to transform institutional, student support and instructional areas at our institution and around the world.
- Potential impacts include retention, financial aid, pedagogy, workforce development, business processes, and delivery systems.
- Consideration of ethical implications a priority.
- Technology is a key area of investment with innovation dollars.



The "Draw Assist" device converts speech into text written by a machine through machine language code. It won the top overall prize at HackPSU 2019.