Pressing questions about AI

- How will AI technology affect humans & society?
- What is the next generation of AI technology?
- How should AI technology be designed & deployed?

Applications of AI should enhance and augment humans, not replace them.

The development of AI must be guided by its human impact.

AI technology should be inspired by human intelligence.

Upcoming Events

2021 Spring Conference: Intelligence Augmentation: AI Empowering People to Solve Global Challenges

https://hai.stanford.edu/events/intelligence-augmentation-ai-empowering-people-solve-global-challenges
AI NEEDS USER EXPERIENCE (UX) DESIGN

Tesla Model S "Autopilot"
Future of autonomous cars
How do we design the UX?

AI NEEDS USER EXPERIENCE (UX) DESIGN

Amazon Echo, Google Home, Baidu DuerOS & other Smart Speakers use Voice UI
How do we design them to deal with natural human conversation?
How do we design to support multimodal input? (e.g., + screen or vision)

AI NEEDS USER EXPERIENCE (UX) DESIGN

Computer vision-based skin cancer detection getting better
What is appropriate to show a patient?
What should be the interface for the doctor?
Is there a set of design patterns for these Smart UIs?

More Questions than Answers

How do we help people become better at their tasks & activities?

How will people communicate with AI agents & systems?
How do we find balance between instructing systems on every small action or giving up total control to an automated system?

How do we invent the important interface metaphors that will make understanding and using these systems easier (as WIMP did for the GUI)?
Smart Interfaces for Human-Centered AI

James A. Landay
Stanford University

March 17, 2021

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50% ABANDONED AFTER 6 MONTHS

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WHO IS ZUKI?

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AMBIENT DISPLAYS TO ENCOURAGE BEHAVIOR CHANGE

lock screen
home screen wallpaper
in app

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WHO IS ZUKI?

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SURPRISING RESULT 出人意料的结果

Thought multiple chapters would simply be more engaging

3-week pilot study (n=16)
Multi-chapter (3) vs. single chapter narrative

Results:
- single chapter users app engagement dropped over study
- users ranked higher on narrative engagement did more physical activity
- multi-chapter users logged more exercise
- had better mood
- showed more positivity towards exercise

Narrative is key with multiple chapters boosting positive & buffering negative effects over time!

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RESEARCH QUESTIONS

- Do multi-scene stories lead to longer engagement?
- Does mixing sustainability goals with physical activity goals lead to more sustainability?
- Does appropriate cultural feedback have bigger impact (e.g., positive vs. negative)?
Conformity and efficiency rather than innovation?

E D U C A T I O N 教育

68% of US 8th graders can’t read at grade level, & most will never catch up. [The broad foundation]

SCHOOL IS NOT PERSONALIZED FOR LEARNERS

And then she discovered a beautiful flower
SMART PRIMER

Narrative + Fun Educational Activities + Personal Media + Physical Surroundings, Location & Context

WHEN A CHILD STARTS A CHAPTER...

The child (and his/her adventure partner) will appear as the main protagonists

When a child starts a chapter...

Too long, too hard, & reading levels/interest varied

What to do when they get stuck?

A MATH TASK EXAMPLE

The tutoring bot can assess the child’s level & provide adaptive hints to help them solve a task

Smart Primer Study with 72 Grade 3-5 Kids

Educational Task
Condition A

Educational Task + Narrative
Condition B

Educational Task + Narrative + Hint System
Condition C

Educational Task + Narrative + Chatbot
Condition D

Smart Primer Study with 72 Grade 3-5 Kids

Educational Task
Condition A

Educational Task + Narrative
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Educational Task + Narrative + Hint System
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Educational Task + Narrative + Chatbot
Condition D
NARRATIVE-BASED LEARNING IS MORE ENGAGING

Quiz Score Improvement

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CHATBOTS MAKE LEARNING MORE EFFECTIVE

User Engagement Score

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LEARNING IMPROVEMENT PERSISTED 30 DAYS LATER

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SMART PRIMER

RESEARCH QUESTIONS

• Does a compelling narrative motivate students to engage in learning activities?
• How to best leverage context (e.g., location, objects) to make the story more engaging?
• Can AI-based chatbots help students when they are stuck & can we make a chatbot effective by targeting a problem domain?

ADMINISTRIVIA

• Project Fair on Friday
  – be in OhYay at 6 PM to set up and prepare
  – public presentations will start at 6:30 PM
  – 166 RSVPs → about 75-100 guests will come
• Questions about the Project Fair or Final Assignments?

IMPORTANT ISSUE

• Zero tolerance policy for harassment & discrimination
• Had a racially-motivated attack on a student of color in studio
• THIS IS UNACCEPTABLE
Americans spend 87% of their time inside buildings.

Building Features
- Noisy
- Unnatural light
- Artificial materials
- No nature

Individual Outcomes
- Stress
- Anxiety
- Distraction

Organizational Outcomes
- Unproductive
- Wasteful
- Disconnected

Societal Outcomes
- Economic
- Environmental
- Public health

Building Features
- Lack of nature

Individual Outcomes
- Higher stress
- Lower attention
- Less engaged

Organizational Outcomes
- ~10% Absenteeism

Societal Outcomes
- ~$23 Billion in the U.S. Economy

Absenteeism Costs US Companies $226B/yr

Greenery (living walls) improves mood.

How do we get to this future?
natural lighting leads to better concentration

social engagement reduces stress

KEY STEPS TO CREATING BUILDINGS THAT SUPPORT OUR WELLBEING

1) Establish the Science
2) Understand Acceptance Constraints
3) Design Adaptations to Support Wellbeing

PRELIMINARY STUDY (216 PARTICIPANTS)
CONTROLLED LAB STUDY (N=400)

2x2x2 conditions
(natural vs. artificial light and materials, diverse vs. non-diverse iconography)

Artificial light led to lower valence (more negativity) after stressful task (p < .05)

Building Features
- Views to nature
- Diverse symbols

MEASURING WELLBEING OUTCOMES

Outcomes
- Stress
- Belonging
- Creativity
- Physical Activity
- Environmental Behavior

Personal Devices
- Building Data
- Environmental efficacy
- Energy & Recycling
- Self-Report

Technology We Will Use to Measure Stress
- ESM
- Stress
- Mobile phone
- Trackpad usage
- Laptop

Technology We Will Use to Measure Environmental Behavior
- ESM
- Building data
- Energy & Recycling
- Self-Report
- Smartwatch
- Elevator/stair detection
**PRIVACY, CONSENT & CONTROL**

- Mixed methods assessments w/ stakeholders
- All studies are opt-in
- Security

**DESIGN ADAPTATIONS - PHYSICAL**

- Modular green walls
- Natural ventilation

**DESIGN ADAPTATIONS - DIGITAL**

**HYBRID PHYSICAL DIGITAL SPACES**

**RESEARCH QUESTIONS**

- How do building attributes (e.g., materials, light, sound) impact occupant states in naturalistic settings over long periods?
- How to use AI to detect occupant states (e.g., stress, creativity, belonging) without needing self-report?
- Can we design non-creepy digital interventions based on tracking building occupant states & behavior?