Some big, unanswered questions of AI

- What is the next generation AI technology?
- How do we align machine values with human values?
- How can AI technology be best designed & deployed?

Human-Centered AI @ Stanford

AI technology should be inspired by human intelligence.
The development of AI should be guided by its human impact.
The goal of AI should be enhancing humanity, not replacing it.

1990

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2000
Thought activity inference the key feature.

3-month field trial (n=28)
3 key conditions
- Full system (garden/activity)
- No activity inference (garden)
- No garden/ambient display (activity)

Only garden participants maintained exercise

Ambient display is the key feature!

Thought ambient display simply for information

4-week pilot study (n=12)

Results
- Several wanted to keep using
- Saw some behavior "change"
- Many liked unfolding story or game

Use story to drive long-term engagement
AMBIENT DISPLAYS TO ENCOURAGE BEHAVIOR CHANGE

MULTIPLE CHAPTER NARRATIVES FOR BEHAVIOR CHANGE

SURPRISING RESULT

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 activities
- Multi-chapter users had better mood, more positivity towards exercise, & progressed further in transtheoretical stages of change at study end

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

EDUCATION

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

Conformity and efficiency rather than innovation? 填鸭式教育，还是创新?
SCHOOL IS NOT PERSONALIZED FOR THE LEARNERS

And then she discovered a beautiful flower

SMART PRIMER

Narrative + Fun Educational Activities + Personal Media + Physical Surroundings, Location & Context
Archimedes Story
by Smart Primer Group

The History
For nearly one hundred years, the ancient Syracuse and Carthage had been at war as ruler after ruler fought each other for the throne. Finally, in 275 BC, the troops from Syracuse grew weary of the inefficiency and selfishness of their leaders and elected commanders from amongst themselves. One of their chosen leaders was a young general named Hero.

Her mind is filled with mathematics and he is determined to lead his troops to victory. The leaders of Carthage, however, are not so easily deterred. They have a plan, and they are not afraid to use it.

King Hiero

King Hiero, the ruler of Carthage, has a plan. He decides to build a crown for himself that will be made of gold. The crown will be so beautiful that it will be worth its weight in gold.

Preparing the Crown

King Hiero begins preparations for the ceremony in which he will place the crown on the head of his chosen leader. But something has gone wrong. The king is furious, the festival has been put on hold, and the city is in turmoil.

Sherry's Task

Sherry is a talented mathematician. She is called upon to help solve the problem. She is given a box of chocolates and is told to use her knowledge of mathematics to help solve the problem.

Ready to go undercover?

She agrees to do so, and she goes to the city to help solve the problem. She begins by measuring the dimensions of the box. Using these observations, she calculates the volume of the crown and determines the amount of gold needed to make it. She then sets about making the crown.

Level 1: Determine the Dimensions

Using the observations, how can Sherry approximate how many candies fit in the box without actually counting the candies?

Note that you will need the following tools: a package box shown below, a pair of scissors, stretch paper, and a pen. Also, feel free to write your construction on the paper.

Level 2: Calculate the Volume

Find the volume of the crown and of the chocolate box, and use this to determine how many chocolate bars were used to make the crown.

Sherry decides to use her knowledge of mathematics to help solve the problem. She begins by measuring the dimensions of the box. Using these observations, she calculates the volume of the crown and determines the amount of gold needed to make it. She then sets about making the crown.

Level 3: Solve the Problem

"Now, I'm desperately in need of a bath, but I think with the knowledge we have, we can solve the problem. Don't you?" Will you write up a proposal for an experiment and bring it to me in the bath house just down the street when you are done?"
CHATBOTS WILL CHANGE THE FUTURE OF EDUCATION

Even the most complex and subjective disciplines could be taught with the help of educational chatbots as tutors.

— Bill Gates

DOMAIN-SPECIFIC CHATBOTS

What are the units of density?
How do I measure volume?
What are coordinates?
What’s density?

INTEGRATING CHATBOTS WITH ACTIVITIES

INTEGRATING CHATBOTS WITH READING
overstressed

overweight

unmotivated

wasteful

unhappy

feeling isolated
Americans spend 87% of their time inside buildings

Imagine the worst room you’ve spent time in

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

Individual Outcomes
- Stress
- Anxiety
- Distraction

Organizational Outcomes
- Unproductive
- Wasteful
- Disconnected
“We shape our buildings; thereafter they shape us.”

– Winston Churchill
How do we get to this future?

greenery (living walls) improves mood

natural lighting leads to better concentration

social engagement reduces stress

Preliminary Study (304 participants)

How Can Our Buildings Support Wellbeing?

“When you cannot measure it...you have scarcely advanced to the stage of science.”

- Lord Kelvin
How Can Our Buildings Support Wellbeing?

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Establish the Science
- Technology
- Experiments

Understand Acceptance
- Constraints

Design Adaptations

Building Features
- Views to nature
- Diverse symbols
- Airflow variability
- Water features
- Living walls
- Water features

Measuring Wellbeing Outcomes

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

Building Data
- Occupancy
- Temperature
- Air flow / quality
- Water / energy use
- Recycling / waste

Personal Devices
- Phones
- Wearables
- Computers

Self Report
- Experience-Sampling Method (ESM)

Technology We Will Use to Measure

Belonging
- ESM
- Sense of belonging
- Mobile phone
- Other people nearby

Environmental Behavior
- ESM
- Environmental efficacy
- Building data
- Energy & recycling
- Mobile phone
- Elevator/stair detection
Establish the Science
Design Adaptations to Support Wellbeing

Hybrid Physical + Digital Spaces
For Enhanced Sustainability & Wellbeing

A D M I N I S T R I V I A
• Landay Friday office hours moved to 2:30 pm this week
• Midterm regrade requests due by 5 PM today (Wed)
• Final versions of posters & pitch slide due today
  – need to get posters to the printer so you can get back in time (usually 24 hours required)
  – pitch slides go in a google slides deck that TAs will share (see Piazza). It needs to be final by 5/2, we will download as PDF
  • [link]
• Project fair
  – arrive at 6 PM to set up (show starts at 6:30)
  – dress code: none, but recommend treating as if it were a job interview
• Questions on project?
Smart Interfaces to Tackle Global Grand Challenges
CS 147 – HCI+D: User Interface Design, Prototyping, & Evaluation
Autumn 2018
Professor James A. Landay
Stanford University

Action 1: Stop

I think all people tend to like higher places and don’t like to be low.
HOVERING HAPTIC DEVICES
DRONES FOR HAPTIC FEEDBACK IN VR

Virtual Environment
Drone simulating object’s biome

HOVERING HAPTIC DEVICES
DRONES FOR HAPTIC FEEDBACK IN VR

AEROQUAKE
DRONE AUGMENTED DANCE

SMART INTERFACES TO TACKLE GLOBAL GRAND CHALLENGES

James A. Landay
Stanford University
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