

Teaching Seminar

Clinical Assistant or Associate Professor in  
Online Education Candidate

# **Shaping the Future of Online Education: A Game Design Perspective**

Welcome! Please come on in  
and have a seat.  
This live performance is part of  
the teaching demonstration.

**Dr. Yaguang Zhang**

**May 5, 2023 | 10:30-11:30 AM EDT**

**JOIN ZOOM**  
[bit.ly/5-5TS](https://bit.ly/5-5TS)

# Shaping the Future of Online Education: A Game Design Perspective

Dr. Yaguang Zhang  
May 5, 2023



College of Agriculture

- Shaping the Future of Higher Education?  
Becoming a Land-grant University for Our Times

# JAMES C. SNYDER MEMORIAL LECTURE

FEATURING

**Jay T. Akridge**, Trustee Chair in Teaching and Learning Excellence, Professor of Agricultural Economics at Purdue

Friday, April 21, 2023, 1:30 PM  
Pfendler Hall, Dean's Auditorium #241

***purdue.ag/snyder***



- Shaping the Future of Higher Education?  
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- Shaping the Future of Education as a  
Pioneering Institute

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PURDUE  
UNIVERSITY

Agricultural Economics

Encouraging 😊  
○ Title



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Agricultural Economics

Encouraging 😊

- Title
- Challenges

Discouraging 😥

- Experience
- No solutions



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PURDUE  
UNIVERSITY

Agricultural Economics

## High-level

- Public opinions
- College enrollment
- Campus experience
- Community
- ...



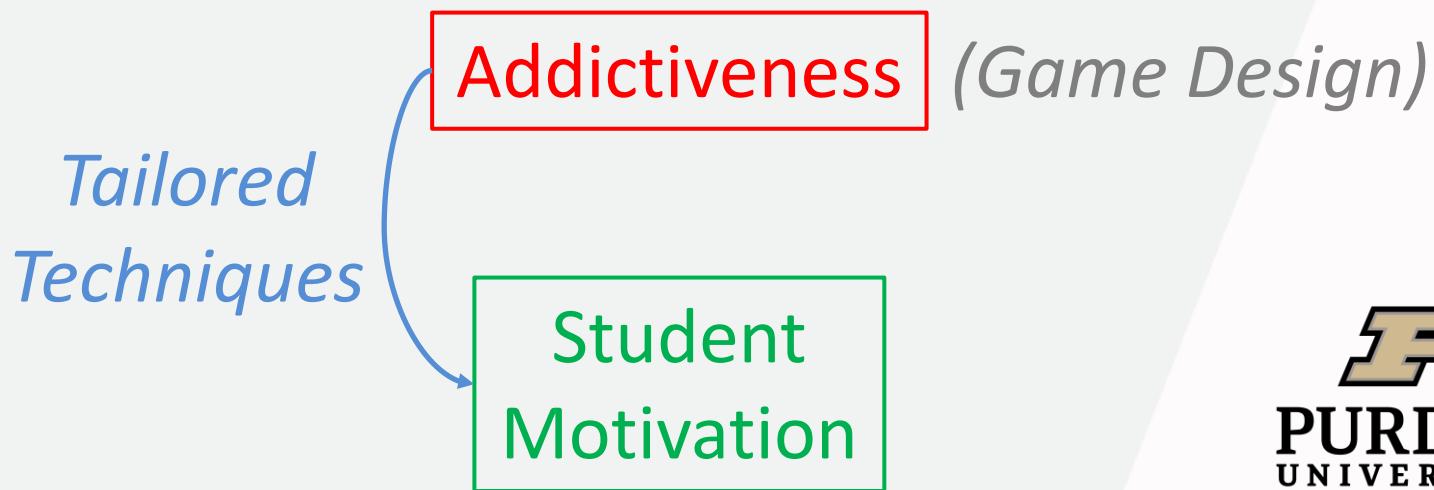
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Pioneering Institute

## Shaping the Future of Online Education: A Game Design Perspective

- Shaping the Future of Higher Education?  
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## Shaping the Future of Online Education: A Game Design Perspective



# Topics to cover

- More about Dr. Yaguang Zhang
- Pedagogical philosophy for online education
- Tailored game design techniques
- Applications in digital ag with AGR 333 (Data Science for Agriculture)
- Institutional strategies to lead in future online education

# About Dr. Yaguang Zhang

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↳ Family name, default setting

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- Ya-
- 亚
- guang
- 光

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- 亚**: second (best)
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甲骨文	金文	篆文	隶书	楷书	行书	草书	标准宋体
	 						
前三点三三	啟尊	令鼎	说文解字	史晨碑	张猛龙碑	王羲之	董其昌

↳ Oracle bone script  
(~3000 years ago)

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Far-fetched?

# About Dr. Yaguang Zhang

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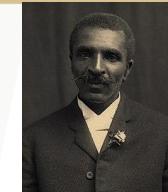
Far-fetched?

Still, I choose to interpret my name this way...

# Pedagogical philosophy: Goals

- What kind of students do we want to produce/cultivate?

Education, in the broadest of truest sense, will make an individual seek to help all people, **regardless of race, regardless of color, regardless of condition.**



GEORGE  
WASHINGTON  
**CARVER**

# Pedagogical philosophy: Goals

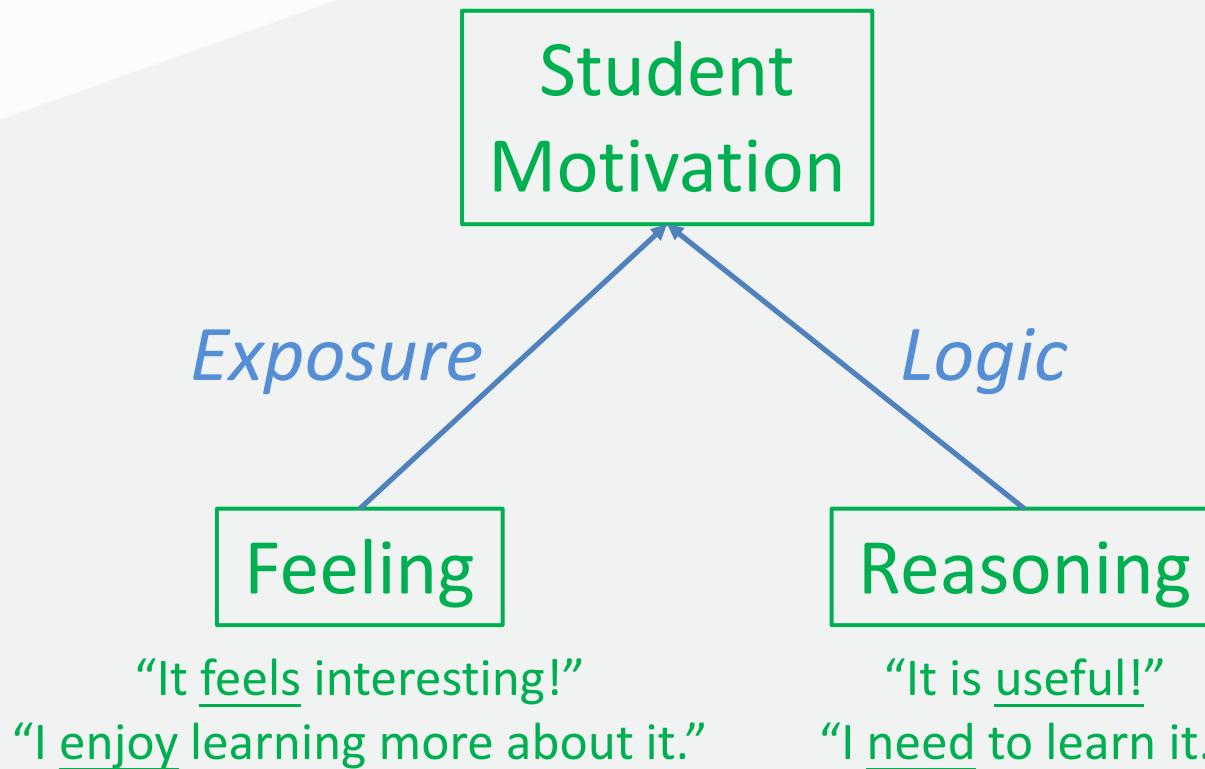
- What kind of students do we want to produce/cultivate?
  1. Motivated to serve others

Education, in the broadest of truest sense, will make an individual seek to help all people, **regardless of race, regardless of color, regardless of condition.**



GEORGE  
WASHINGTON  
**CARVER**

# Pedagogical philosophy: Approaches



# Teaching demo: Optimization

- A framework for guiding/making decisions
  - Data-driven
  - Can be used to set goals for AI
  - Good for AGR 333 - Data Science for Ag

# Teaching demo: Optimization

- A framework for guiding/making decisions
- Teaching goals:
  - Optimization is useful
  - Helping others is good

# Teaching demo: Optimization

- A framework for guiding/making decisions

$$\min_{\mathbf{x} \in A} f(\mathbf{x})$$

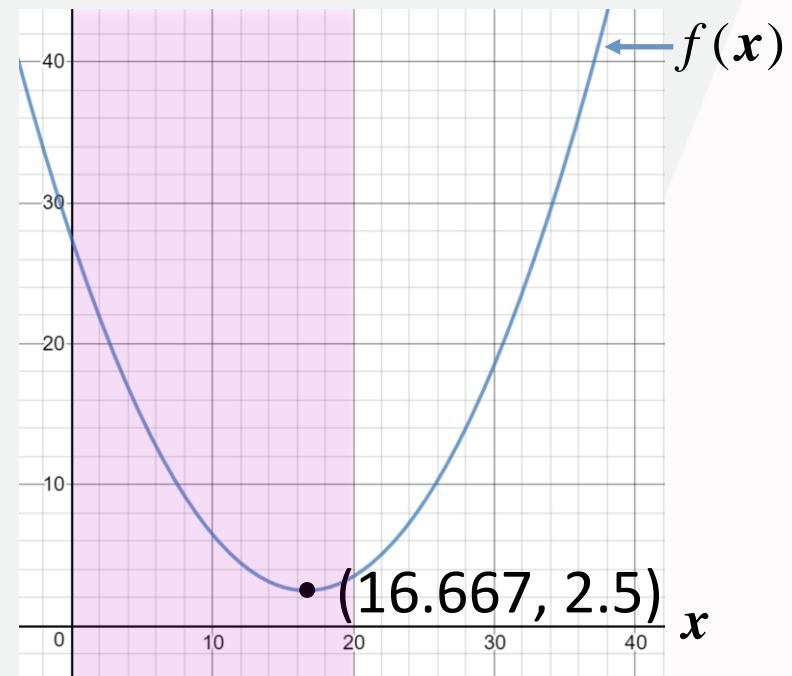
↑      ↑  
Action      Feasible region  
                    Cost function

# Teaching demo: Optimization

- A framework for guiding/making decisions

$$\arg \min f(x)$$

$x \in A$       ↑  
↑      Expense - yield  
[0, 20]  
Fertilizer amount



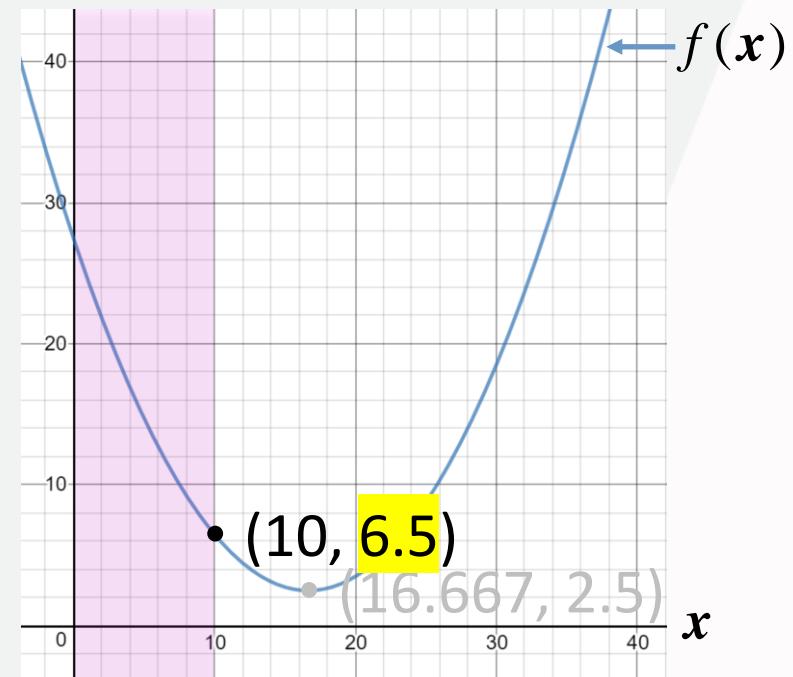
Example: How much nitrogen fertilizer should we apply?

# Teaching demo: Optimization

- A framework for guiding/making decisions

$$\arg \min f(x)$$

$x \in A$       ↑  
↑      Expense - yield  
[0, 10]      Fertilizer amount



Example: How much nitrogen fertilizer should we apply?

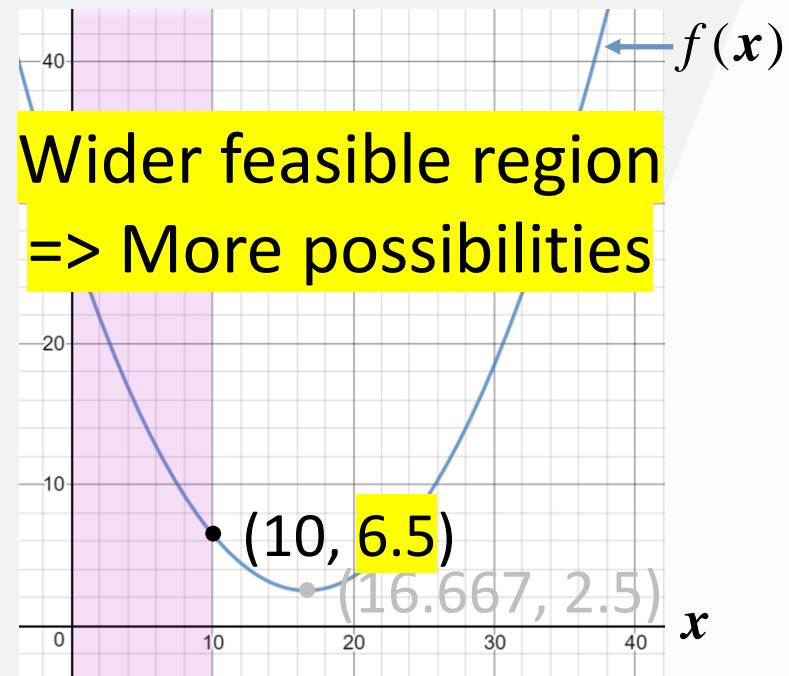
# Teaching demo: Optimization

- A framework for guiding/making decisions

$$\arg \min f(\mathbf{x})$$

$\mathbf{x} \in A$

↑      ↑      ↑  
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Example: How much nitrogen fertilizer should we apply?

# Teaching demo: Optimization

- A framework for guiding/making decisions

$$\arg \min_{\mathbf{x} \in A} f(\mathbf{x})$$

# Teaching demo: Optimization

- A framework for guiding/making decisions  
 $\Sigma \text{Resource} - \Sigma \text{"happiness"}$

$$\arg \min f(\mathbf{x})$$

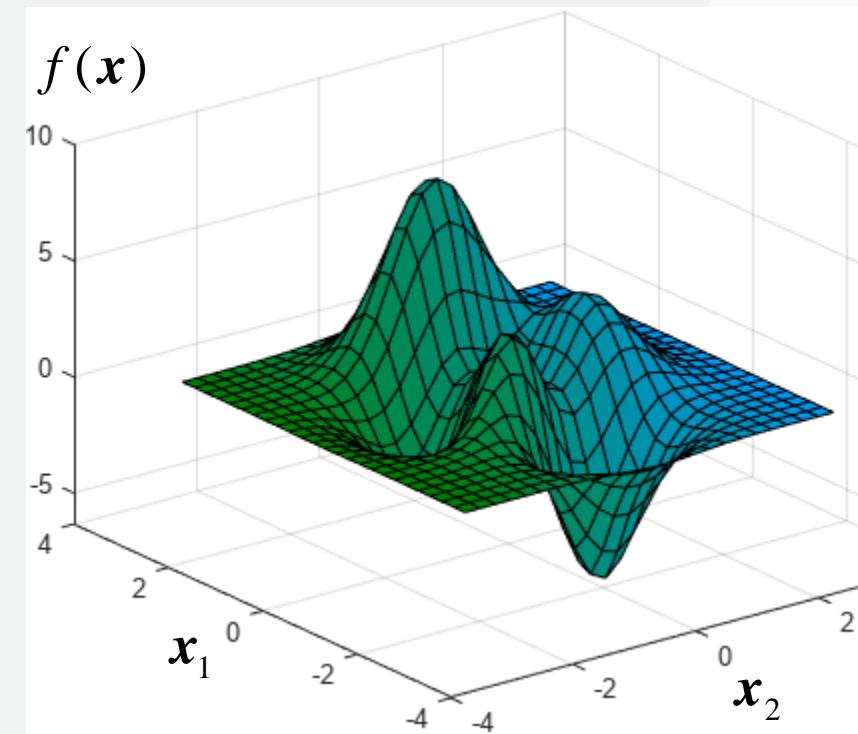
$\mathbf{x} \in A$  ← A high-dimensional region  
↑  
A vector  $(x_1, x_2, \dots)$

# Teaching demo: Optimization

- A framework for guiding/making decisions  
 $\Sigma \text{Resource} - \Sigma \text{"happiness"}$

$$\arg \min f(\mathbf{x})$$

$\mathbf{x} \in A$  → A high-dimensional region  
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# Teaching demo: Optimization

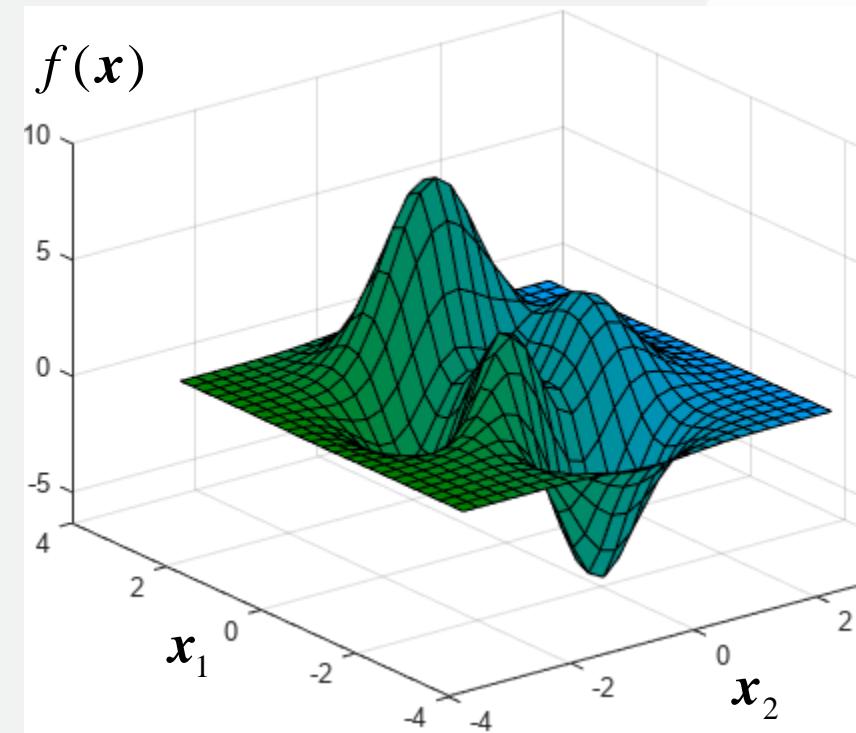
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$$\arg \min f(\mathbf{x})$$

$\mathbf{x} \in A$  → A high-dimensional region

A vector  $(x_1, x_2, \dots)$

$$A_{\text{Not helping}} \subset A_{\text{Helping}}$$



# Teaching demo: Optimization

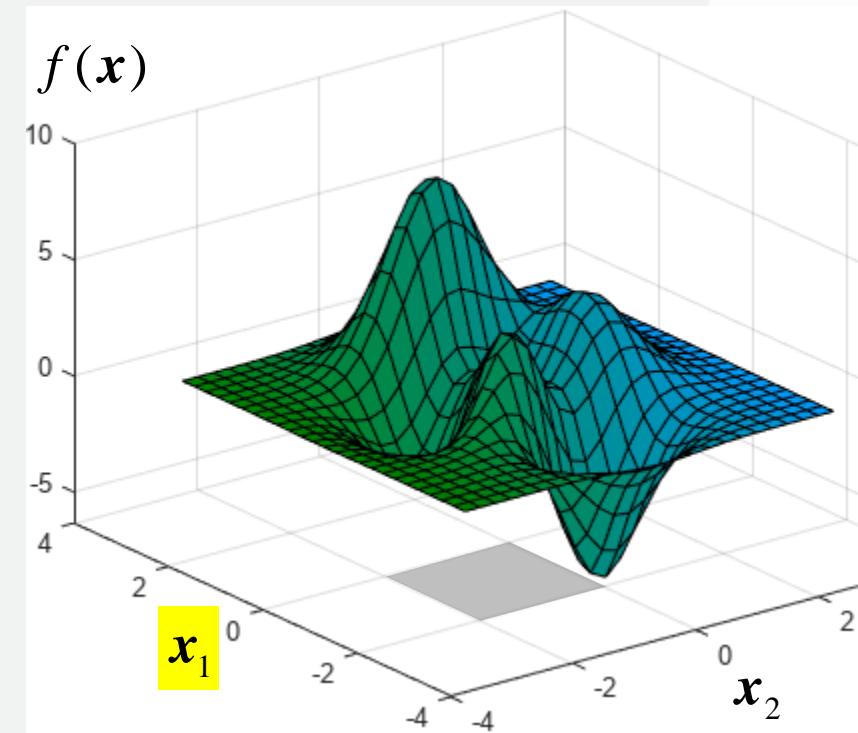
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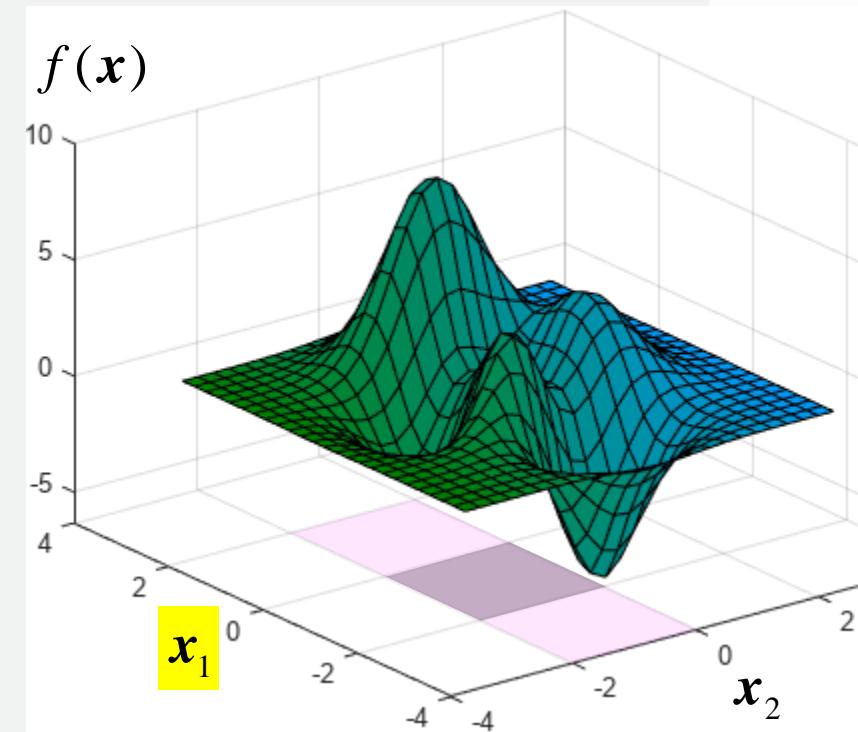
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- A framework for guiding/making decisions

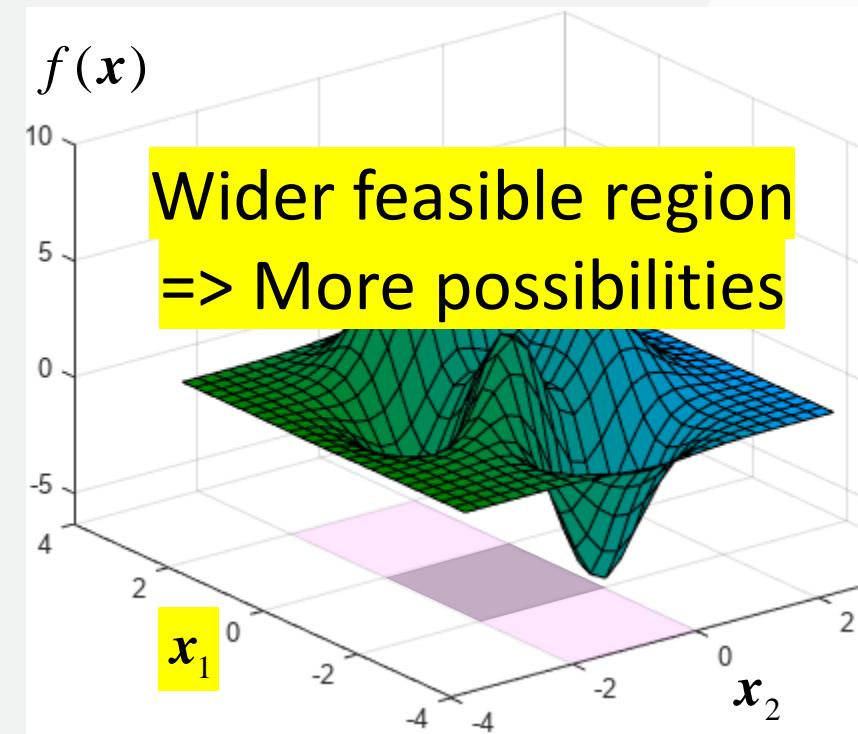
$\Sigma$ Resource –  $\Sigma$ “happiness”

$$\arg \min f(\mathbf{x})$$

$\mathbf{x} \in A$  → A high-dimensional region

A vector  $(x_1, x_2, \dots)$

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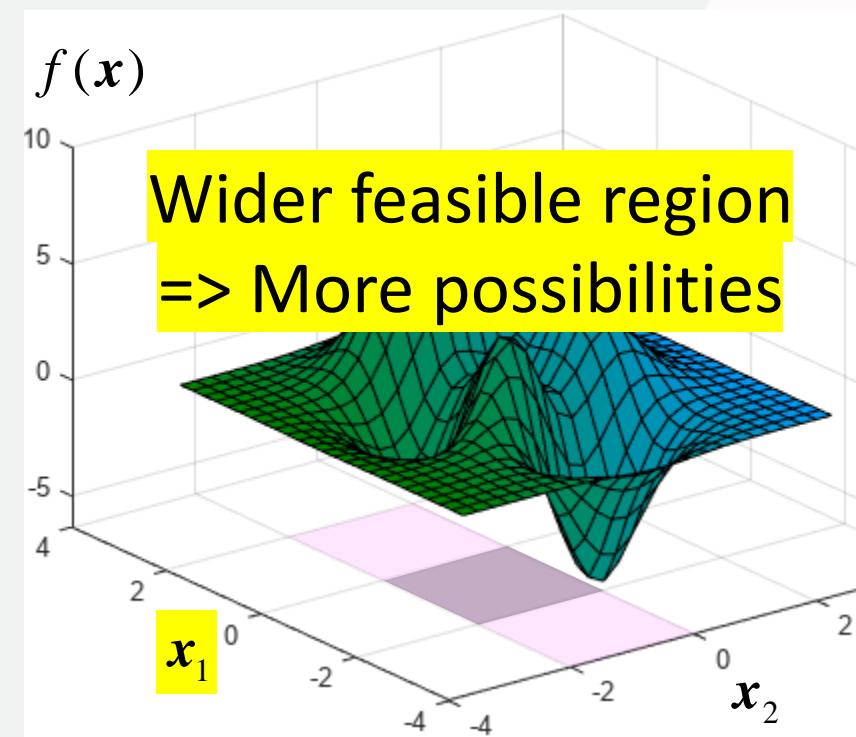


# Teaching demo: Optimization

- A framework for guiding/making decisions

## Implications

- Wider feasible region  
=> Better solution
- Equality

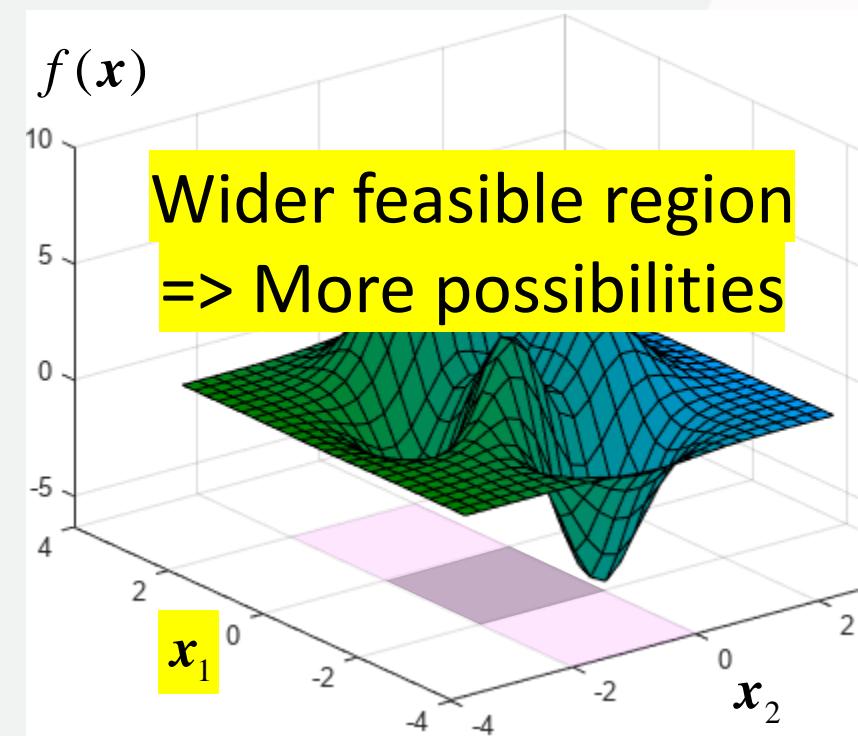


# Teaching demo: Optimization

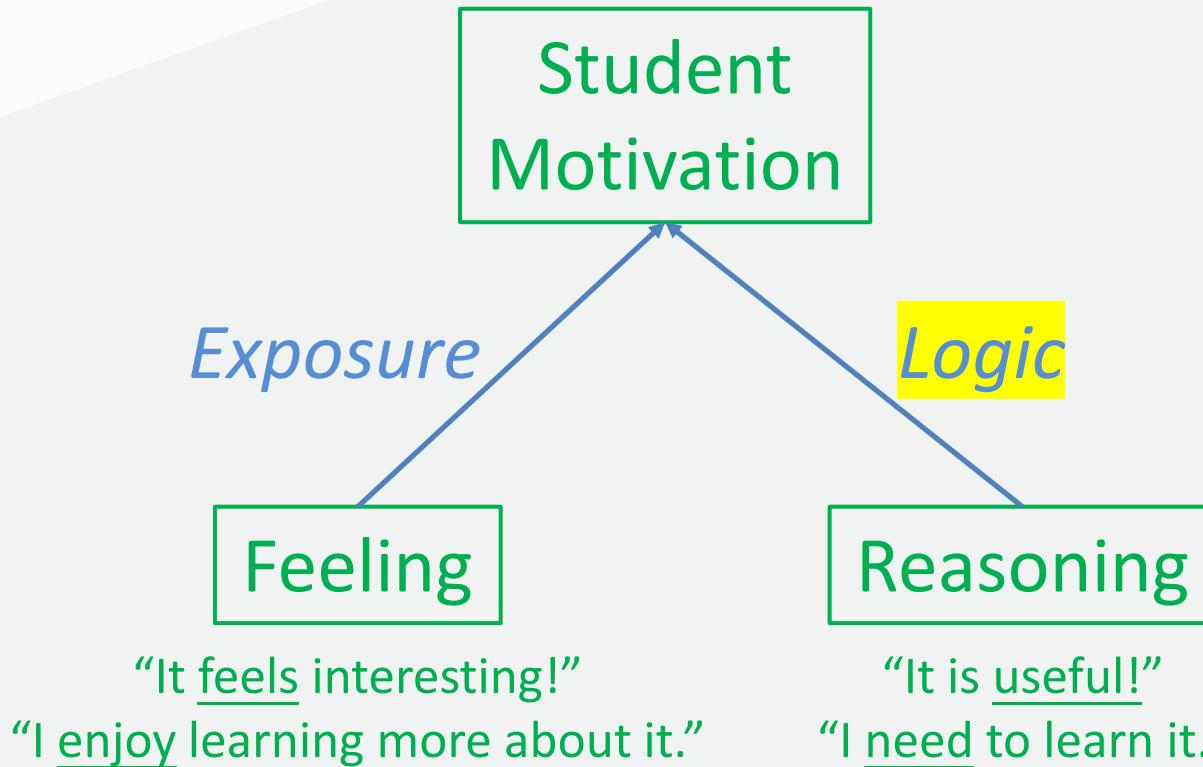
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## Implications

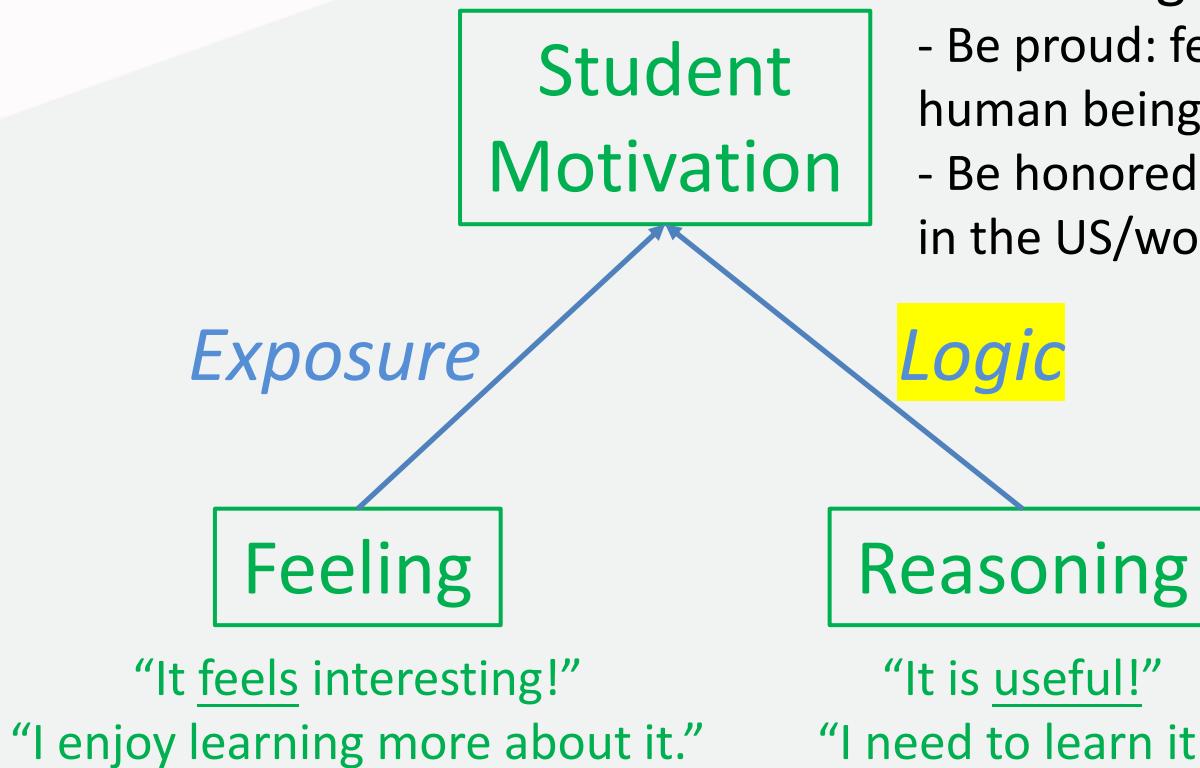
- Wider feasible region  
=> Better solution
- Equality
- Example limitations
  1. Quantification
  2. Communication
  3. Computation



# Pedagogical philosophy: Approaches



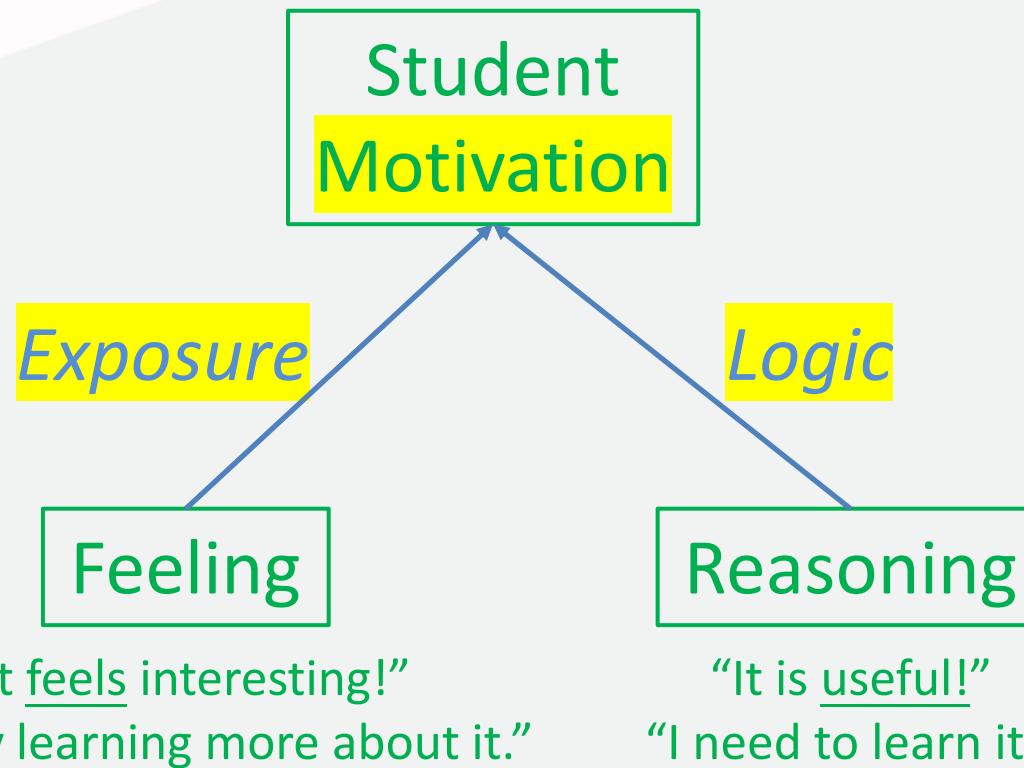
# Pedagogical philosophy: Approaches



More examples for  
Purdue Ag students

- Be proud: feeding the human being
- Be honored: best program in the US/world

# Pedagogical philosophy: Approaches



# Pedagogical philosophy: Goals

- What kind of students do we want to produce/cultivate?
  1. Motivated to serve others
  2. Able to self-learn/apply new skills  
(Meta skills)
  3. Domain-specific knowledge and skills

# Pedagogical philosophy: Goals

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# Pedagogical philosophy: Goals

- Reality today?
  1. Focus: Domain-specific knowledge and skills
  2. Byproduct: Meta skills
  3. Slogan: Motivated to serve others

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- Reality today?
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- The world is changing fast
  - Easier access to specific knowledge/skills.

# Pedagogical philosophy: Goals

- Reality today?
  1. Focus: Domain-specific knowledge and skills
  2. Byproduct: Meta skills
  3. Slogan: Motivated to serve others
- The world is changing fast
  - Easier access to specific knowledge/skills.
- Implications
  - Students with meta skills => more competitive
  - Instructions focusing on 1 may be replaced

# Pedagogical philosophy: Goals

- What kind of students do we want to produce/cultivate?
  1. Motivated to serve others Human beings are the ultimate judge on life values.
  2. Able to self-learn/apply new skills  
(Meta skills)
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(Meta skills) The world is changing fast.
  3. Domain-specific knowledge and skills Creators and developers  
(vs users) of technology

# More about me

- “The best that can be expected of an average student in the modern education system.”
  1. Motivated to serve others
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Journals & Magazines > IEEE Communications Magazine > Volume: 59 Issue: 12 

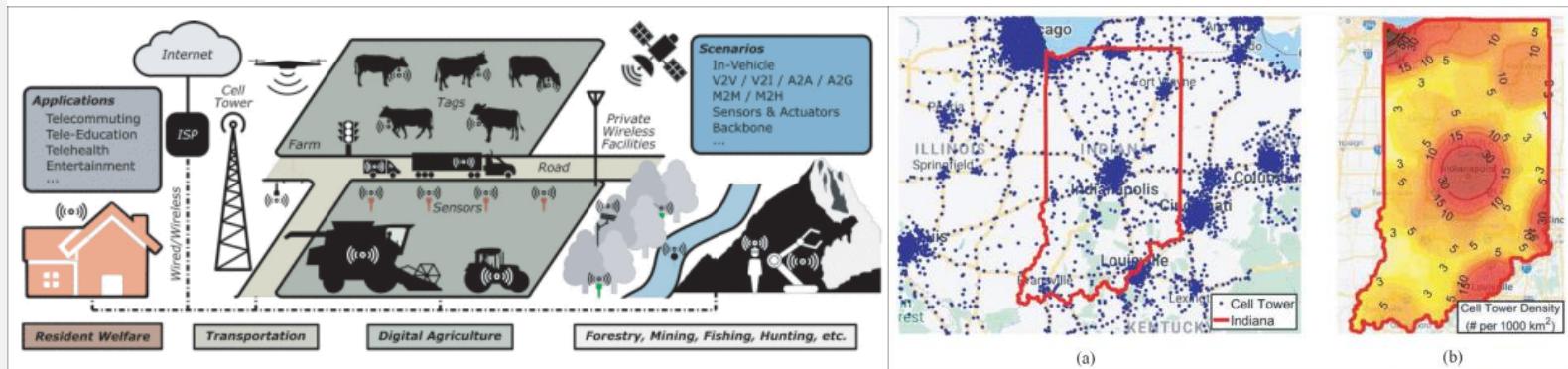
## Challenges and Opportunities of Future Rural Wireless Communications

Publisher: IEEE

Cite This

 PDF

Yaguang Zhang ; David J. Love ; James V. Krogmeier ; Christopher R. Anderson ; Robert W. Heath ; Dennis R. Buckmaster [All Authors](#)



# More about me

- “The best that can be expected of an average student in the modern education system.”

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[Top] Sing Sing4U for you – Let's order some songs~

March 15, 2017 | by Xiaowu

Welcome to order songs... Here are detailed instructions on the channels and rules of ordering songs, as well as the track list of children's shoes who have successfully ordered songs (and the seemingly dispensable copyright statement I oh! Almost forgot this self-introduction!)

Recent Posts | Recent Posts

December 31, 2021 Dedicated to Sister Ruirui – Li Ge

July 1, 2020 Dedicated to Fatty – Full of Dreams

January 21, 2020 To Tamara – Starlight

June 16, 2019 Dedicated to Walking in the Clouds – The Light Chaser

May 14, 2018 To Childon – Medal

Children:  
If I need be, please bravely declare war on the world.  
You are never alone in your struggles.  
Behind you, there will be a group of people who support you unconditionally (raise you high 😊)  
hope you will like it.

To Childon – Medal  
May 14, 2018 | by Xiaowu

"Hold on to the dream" Xiao Wu

To King Moon – Everything's Alright  
August 29, 2017 | by Xiaowu

To King Moon:  
Always loved this song, hope you will enjoy this version.  
When you get stuck, don't worry. Please believe that everything will be fine.  
I also hope that we can have more tolerance and patience, try our best to express for those who are willing to listen, and strive to understand for those who want to talk.

Bless,  
Xiaowu

# More about me

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The screenshot shows a grid of video thumbnails from a platform like YouTube or Bilibili. The thumbnails include:

- [Xiao Wu] Dedicated to Xiao Kiki-City of Stars (0:23)
- [Xiao Wu] The Halloween Goddess who was (0:57)
- [Xiao Wu] Pay tribute to Nier Automata with (0:27)
- my video (52 latest release, most played, most favorites)
- [Xiao Wu] Learn Guitar for Edge Walker Bobo Undead (0:50)
- [Boogie Sauce] Forcefully pull the tablemate to jump (0:21)
- [Xiao Wu] Singing "A Thousand Years Later" at (0:52)
- [Xiao Wu] Roaring "Immortal Body" at the (0:42)
- [Boogie Sauce] British style tabletop jumping (0:38)
- [Yuanshin] Inazuma Tsurukan "Faded" (0:30)
- [Xiao Wu] Enterprise-level understanding: There is a (0:39)
- [Yuan Shen/Zhong Li] The Rock Lord I drew may have (0:52)
- [Xiao Wu] Put a Christmas costume on the teacher (0:14)
- [Xiao Wu] Flowers and Girls (0:55)

video data

playback	coin	Comment
133,470	753	227
like	share	collect
1,315	428	2,231

# More about me

- “The best that can be expected of an average student in the modern education system.”
  1. Motivated to serve others
  2. Meta skills
  3. Domain-specific knowledge and skills
    - Drawing
    - Painting
    - Guitar
    - Piano
    - Singing
    - Video editing
    - Audio editing
    - Web development

# More about me

- “The best that can be expected of an average student in the modern education system.”
  1. Motivated to serve others
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What has made me who I am today?

How to duplicate the good characteristics?

# More about me

- “The best that can be expected of an average student in the modern education system.”
  1. Motivated to serve others
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## What has made me who I am today?

- Fully trusting the instructors
  - Not brilliant, but hard-working

## How to duplicate the good characteristics?

# More about me

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## What has made me who I am today?

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## How to duplicate the good characteristics?

Earn the trust

# More about me

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What has made me who I am today?

- Fully trusting the instructors
  - Not brilliant, but hard-working
- Exposed to challenges and opportunities

How to duplicate the good characteristics?

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## EDUCATION

### Purdue University, West Lafayette, Indiana, USA

PhD in Electrical and Computer Engineering

Western - US

August 2021

- Thesis **Zhang, Y.**, 2021. *Improved site-specific millimeter-wave channel modeling and simulation for suburban and rural environments*. Purdue University Graduate School.

### Purdue University, West Lafayette, Indiana, USA

MSc in Electrical and Computer Engineering

May 2015

### Tianjin University, Tianjin, P.R. China

BEng in Communication Engineering

Asian

June 2013

- Thesis title *Design and Simulation of LTE Semi-Persistent Scheduler*

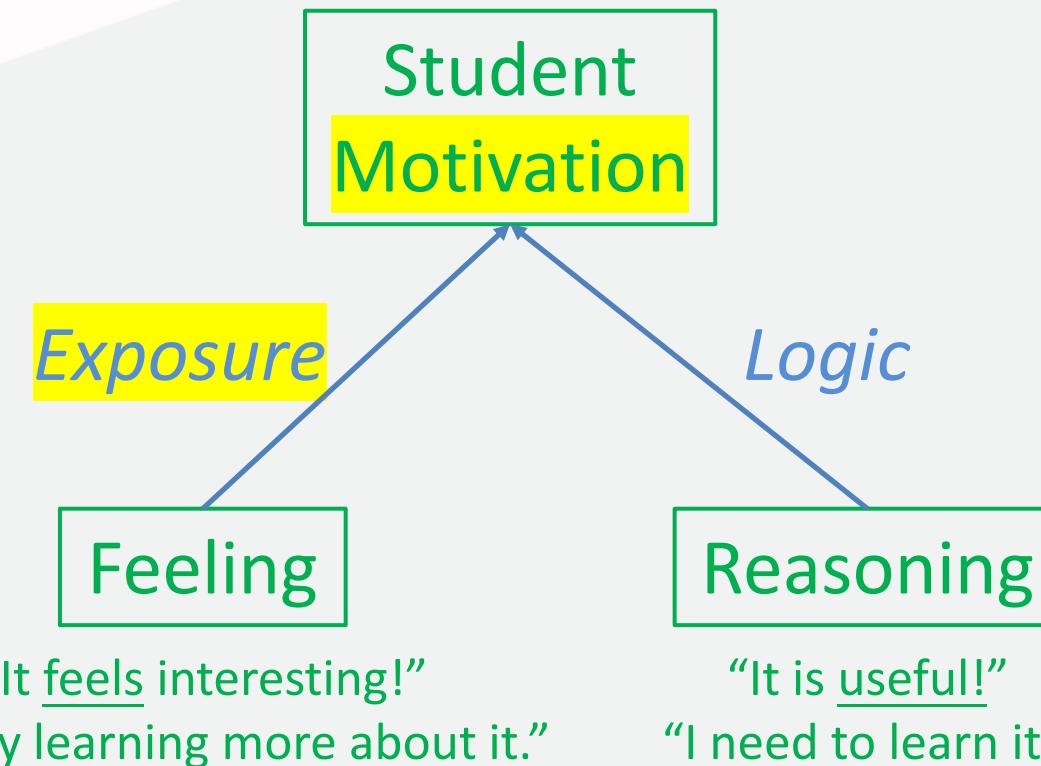
### University of South Australia, Adelaide, Australia

Exchange Student

Western - Australia

February – July 2012

# Pedagogical philosophy: Approaches



# Why online education?

July 2011. **Volunteer Teacher.** Jiantang Village Elementary School, Fenghuang County, Hunan Province, China.

- *College Student Summer Service Program:* Taught at a Hope Project school and co-authored a report on local economy and education.

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- A supplement (a cheaper alternative)
- A practical remedy for undeveloped areas

# Pedagogical philosophy: Emerging challenges

# Pedagogical philosophy: Emerging challenges

- Who are we (as online educators) competing with?

# Pedagogical philosophy: Emerging challenges

- Who are we (as online educators) competing with?
  - Online entertainment

Deliberately designed by experts to be addictive

# Pedagogical philosophy: Emerging challenges

- Who are we (as online educators) competing with?
    - Online entertainment
  - What are we competing for?
    - Next generation's attention
- Deliberately designed by experts to be addictive
- A limited resource for keeping ideas

# Pedagogical philosophy: Emerging challenges

- Who are we (as online educators) competing with?
  - Online entertainment Deliberately designed by experts to be addictive
- What are we competing for?
  - Next generation's attention A limited resource for keeping ideas

Useful ideas vs **fun** ideas

# Rethinking “best practices” in online education

- The world is changing fast
  - Common practices today are probably not best practices in the future

# Rethinking “best practices” in online education

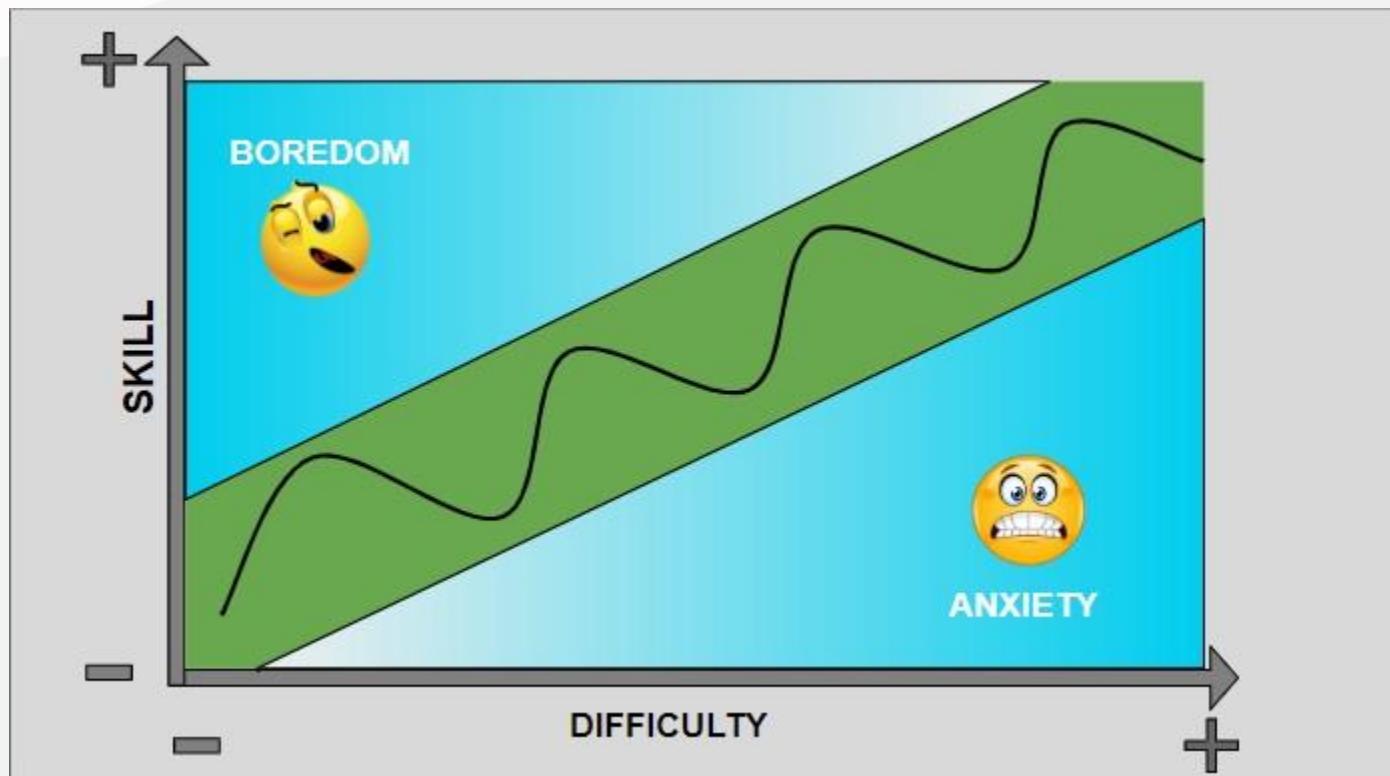
- The world is changing fast
  - Common practices today are probably not best practices in the future
  - Proposal, implementation, evaluation, and promotion of “better practices”

# Rethinking “best practices” in online education

- The world is changing fast
  - Common practices today are probably not best practices in the future
  - Proposal, implementation, evaluation, and promotion of “better practices”
- Candidates for better practices?
  - Most successful training tool: games
  - Most useful education content: real-life skills

# Game design

- The “flow” state



<https://thinkgamedesign.com/flow-theory-game-design/>

# Selected game design techniques

- Flow (as a rough guideline)
  - Progress control
  - Challenges
- Intuitive visual hints
- Frequent positive feedback
  - Points/virtual currency
  - Achievements
- Real-time preformation evaluation
- The power of habits
  - Daily/weekly/monthly missions

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- Huge amount of content
- Beta tests
- User survey
- High-quality arts  
(both visual and audio)
- Trailers/ads
- Localization  
(e.g., multi-language)
- Multi-platform
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- Real-life events/rewards
- Gotcha mechanism  
(gambling)
- ...

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Let's be do whatever we can to help students learn more easily?

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# Selected game design techniques



# Selected game design techniques

The image shows a screenshot of the Genshin Impact mobile game interface. At the top left, there's a player profile for "Chef Mao" with a level of 1/1. On the right side, there are various game icons and a notification badge with the number "8". In the center, there's a large banner for miHoYo and Genshin Impact, featuring age ratings: "EUROPE 12" (www.eeai.info) and "US/CANADA TEEN Alcohol Reference Fantasy Violence". Below this, a box highlights "Genshin Impact Live Player Users" with "Active Players (30D) 65,706,117" in green text, which is framed by a red border. To the right of this box is a user icon. Below the stats, it says "As of 5/4/2023 <https://activeplayer.io/genshin-impact/>". A news snippet from Pocket Gamer.biz states: "The game's earnings rose by 18.5 percent from the month prior, when it further stamped its mark as a mainstay of the mobile industry with its surpassing \$4 billion in lifetime revenue." The date "Mar 13, 2023" is mentioned. To the right of the news is a thumbnail image of two characters from Genshin Impact. At the bottom right, there's a "Google" logo and a user ID "UID: 601926817".

Chef Mao  
Battle 1/1

8

miHoYo TECH OTAKUS SAVE THE WORLD | GENSHIN IMPACT

EUROPE 12 www.eeai.info US/CANADA TEEN Alcohol Reference Fantasy Violence

Age Rating

Genshin Impact Live Player Users

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Pocket Gamer.biz <https://www.pocketgamer.biz> > news > genshin-impact-re...

Genshin Impact revenue reached an 11-month high in ...

Google

1 2 3 3 8

UID: 601926817

# Selected game design techniques



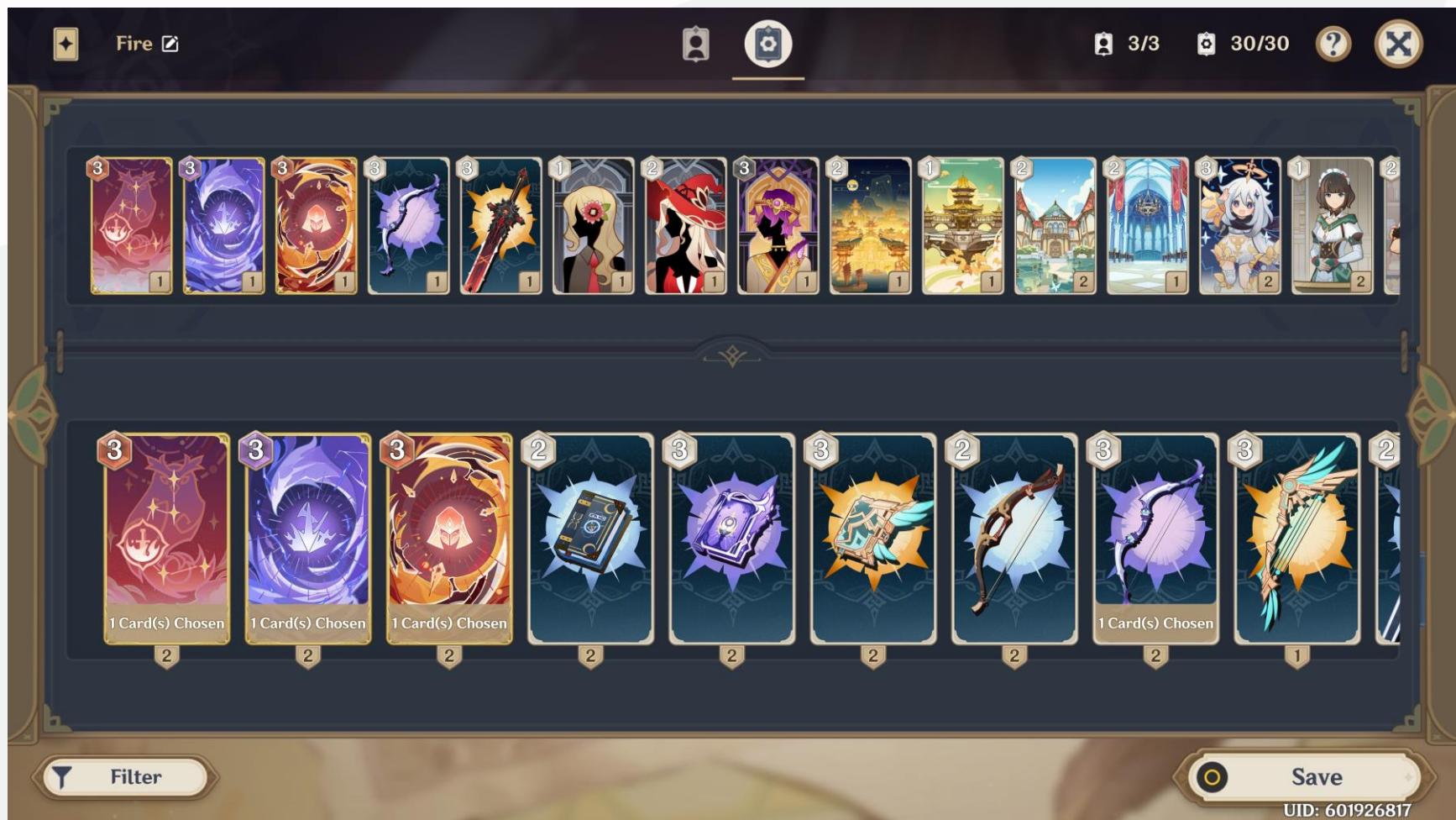
# Selected game design techniques



# Selected game design techniques



# Selected game design techniques



# Selected game design techniques

The screenshot shows a web browser window displaying the Genius Invocation TCG page on the Genshin Impact Fandom wiki. The page has a dark theme with a yellow sidebar on the left containing links for FANDOM, FAN CENTRAL (BETA), GAMES, ANIME, MOVIES, TV, VIDEO, and WIKIS, along with a 'START A WIKI' button. The main content area features a video player at the top showing a 16-second clip from 0:16 to 0:33. Below the video is a summary of the game: "A tabletop card dueling game that is all the rage in Teyvat. Join as a 'Genius Invocation TCG' player, collect cards, build your deck... and go toe-to-toe with various opponents at the table!" A link to the "Official Website" is provided. The text continues: "Genius Invocation TCG is a permanent game mode introduced in Version 3.3. Players can unlock the tutorial quest *Come Try Genius Invocation TCG!* by reaching Adventure Rank 32 and completing Archon Quest Prologue: Act III - Song of the Dragon and Freedom." To the right, there's a large image of three cards with a triskelion symbol, labeled "Genius Invocation TCG". Below the image is a table with two rows: "Type" (Game Systems) and "Group" (Progression Activities). At the bottom of the page, there are social media links for Instagram, TikTok, and Fan Lab, along with a link to Fandom Quizzes.

Follow on IG | TikTok | Join Fan Lab | Check out Fandom Quizzes and cha

# Selected game design techniques

- Flow (as a rough guideline)
  - Progress control
  - Challenges
- Intuitive visual hints
  - Make the learning experience effortless
  - Reduce effort/cost in fetching study materials

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Huge amount of content  
for all levels with progress  
control and rewards

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# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Rough guidelines
  - The “flow” state
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# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

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- Actionable items
  - Expanding content

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Data-driven decision-making:  
Optimization

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

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Data collection & processing:

Digital signal processing

Data-driven decision-making:

Optimization

# Live demo for digital signal processing

- Extremely good example for intuition
  - Sensors => Microphone
  - Data => Sampled & quantized air pressure
  - Processing => In time & frequency
- Easy access + “tangible”

# Live demo for digital signal processing

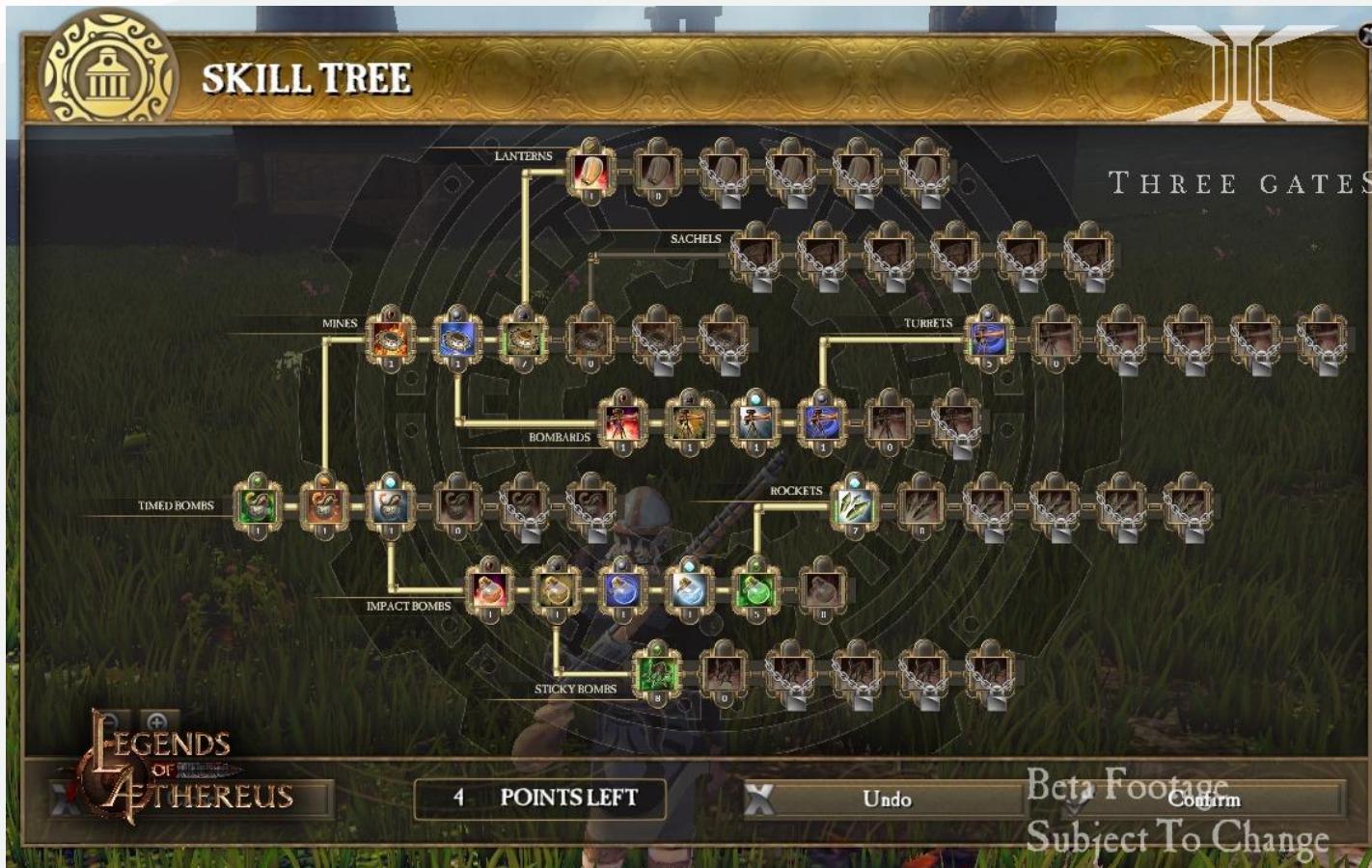
- Extremely good example for intuition
  - Sensors => Microphone
  - Data => Sampled & quantized air pressure
  - Processing => In time & frequency
- Easy access + “tangible” + interesting
- Teach the skill first + cover the topics

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Rough guidelines
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- Actionable items
  - Expanding content
  - Skill tree

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

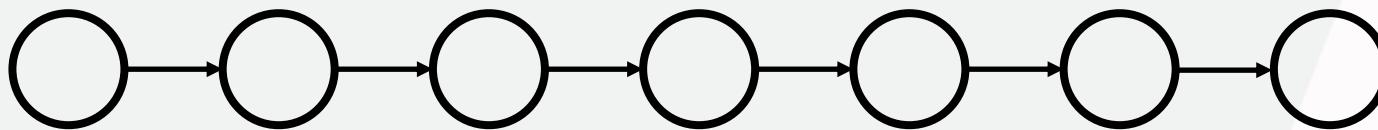
- Skill tree – Non-linear structure



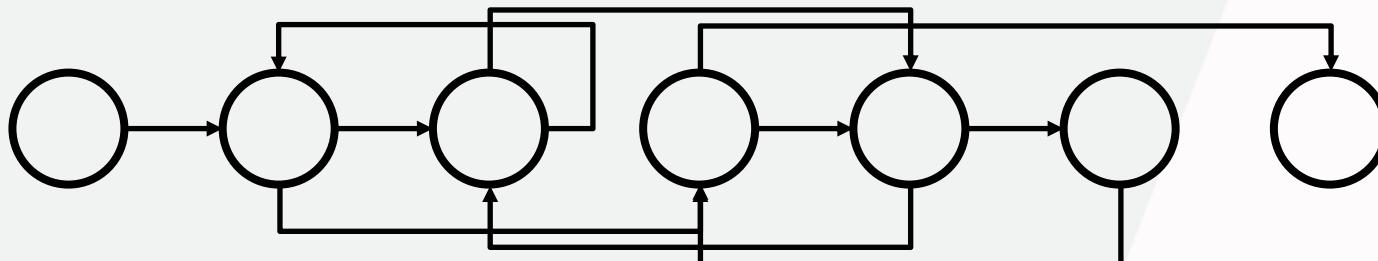
# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Skill tree – Non-linear structure
  - Why do we need a “non-linear” structure?

Traditional teaching: topics covered once are assumed to be mastered by the students.



Fact: repetition is required for learning.



# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

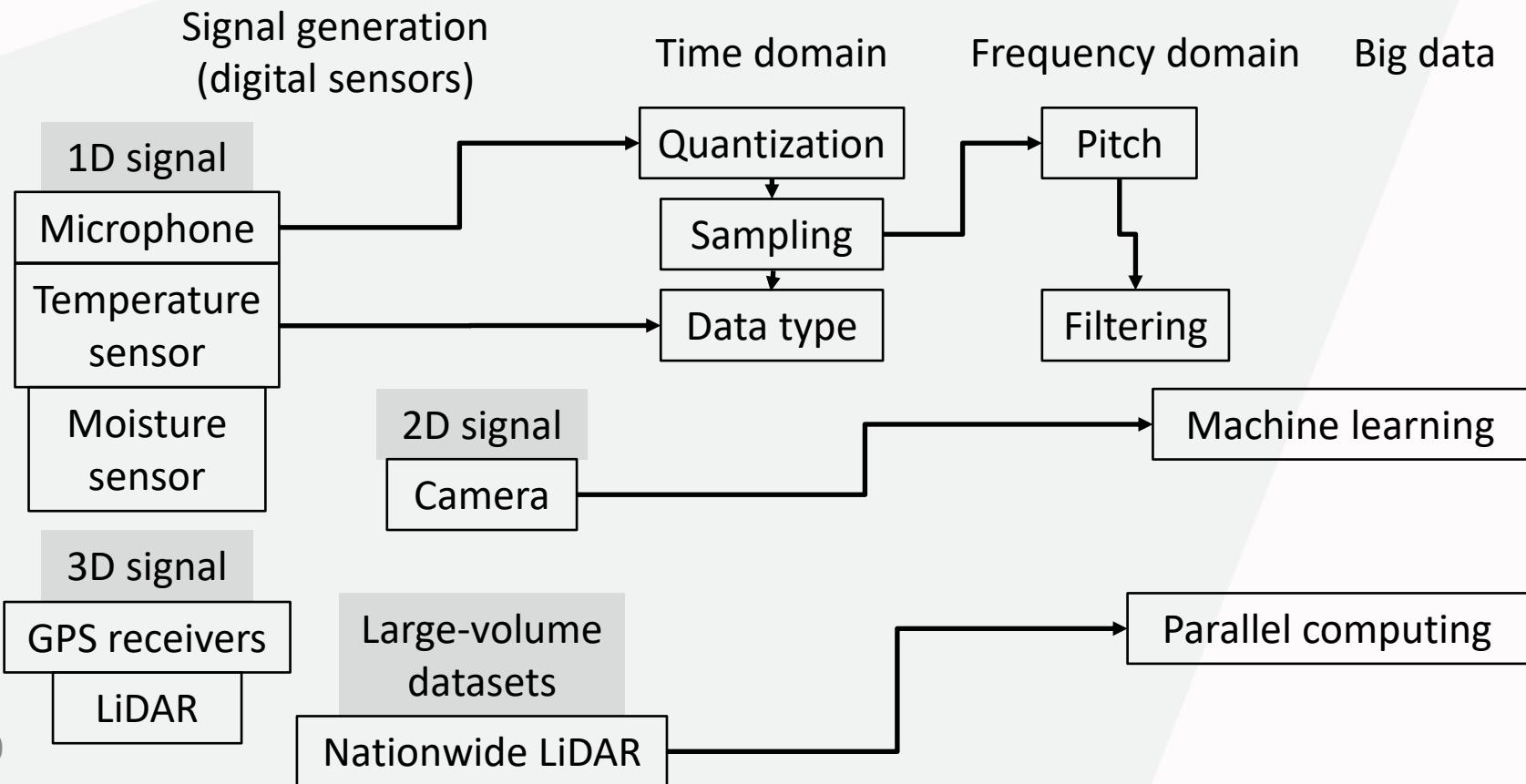
- Skill tree – Non-linear structure

Add a new column

	Date	Skill	Topic	Details	Quizzes and Assignments
Wk 1: INTRO	Recorded		Faculty Introductions		
	Jan 10 Class		Orientation to data cycle, with an overview of all processes, FAIR concept. Volume, veracity, velocity		
2-3: FOOD SCIENCE, FENG	Jan 12 Lab		Beginning to work with data	Import of CSV into Excel & R with some statistical computations	
	Recorded		Food Science Applications		
Wk 2: DATA CYCLE	Jan 17 Class		Identify a research question Identify data needed		
	Jan 19 Lab		Working with Food Science data	Introduce multiple data files, including consumption, Pesticide residue, EPA RPF references	
	Jan 24 Class		Ethics of data (ownership, storage, access)		
	Jan 26 Lab		Food Science data	Conduct cumulative risk assessment of organophosphate (OP) pesticide group for this population.	

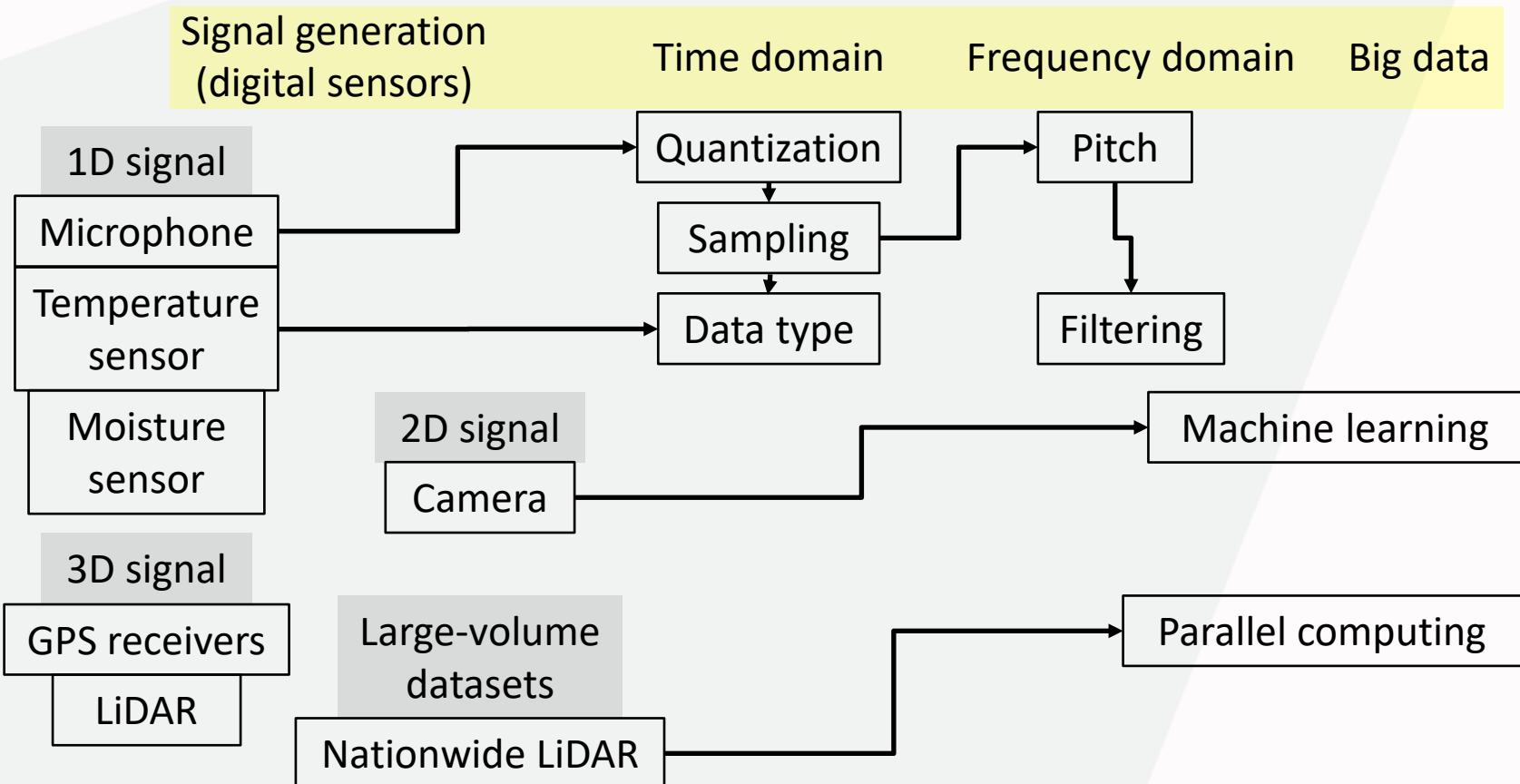
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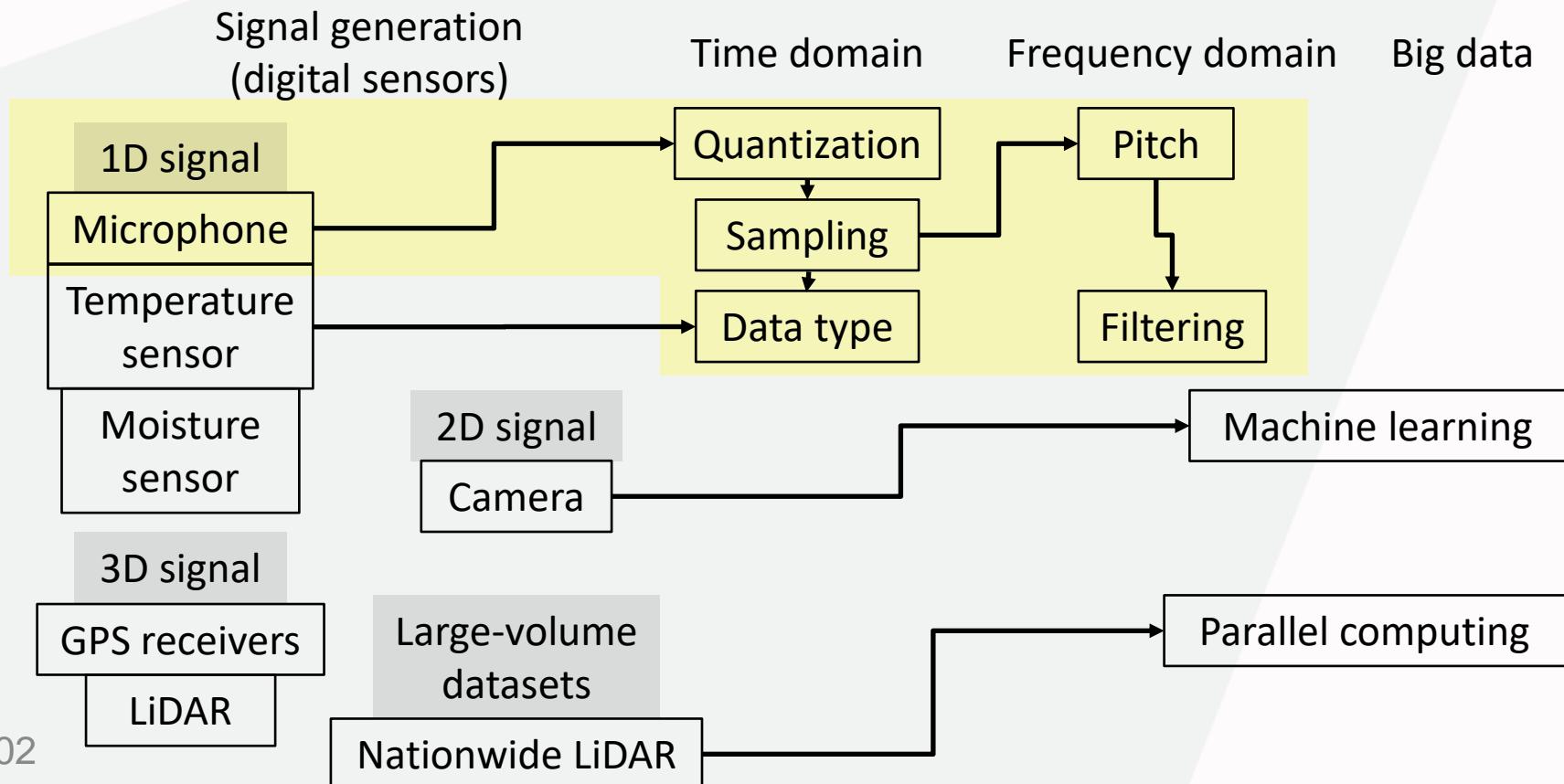
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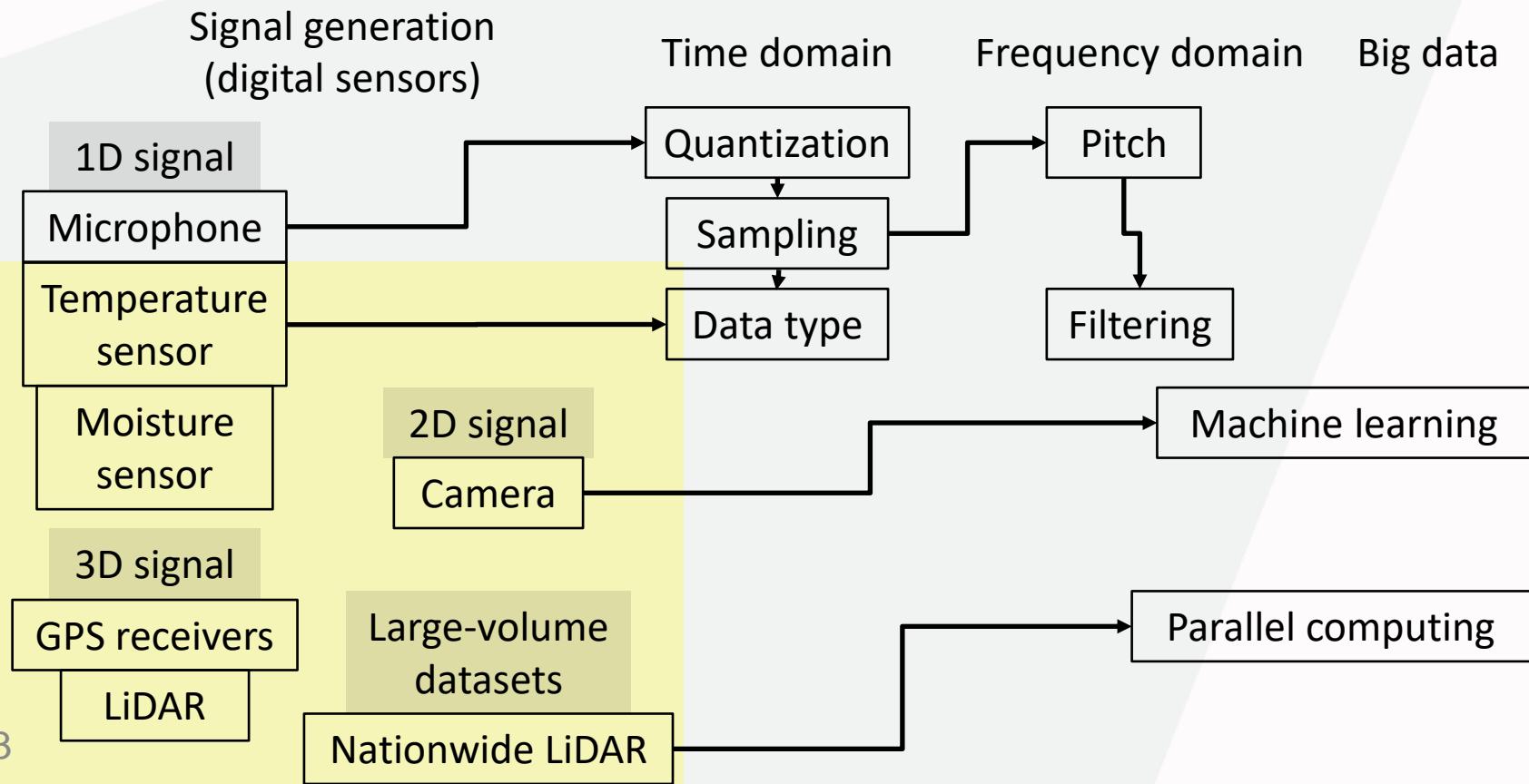
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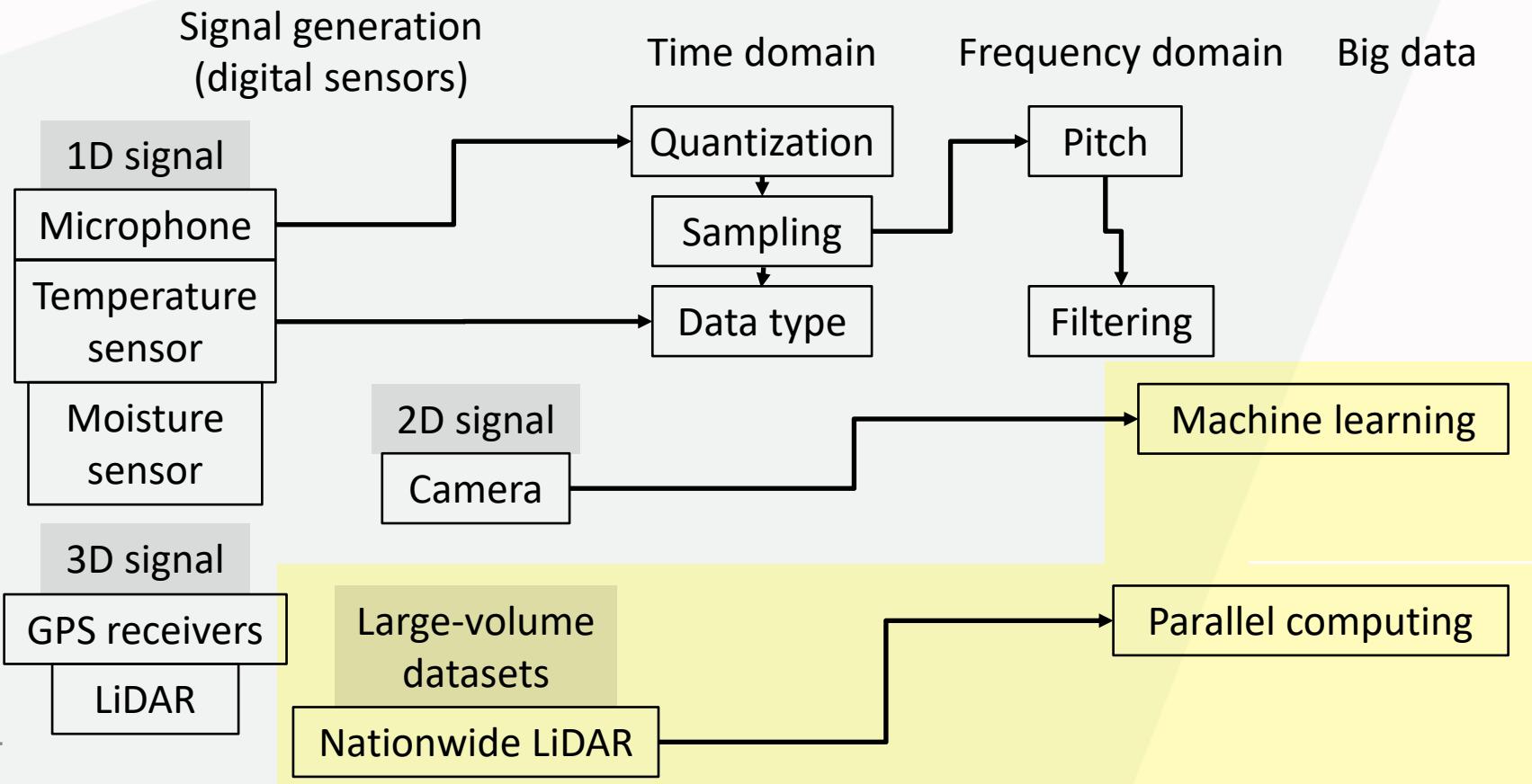
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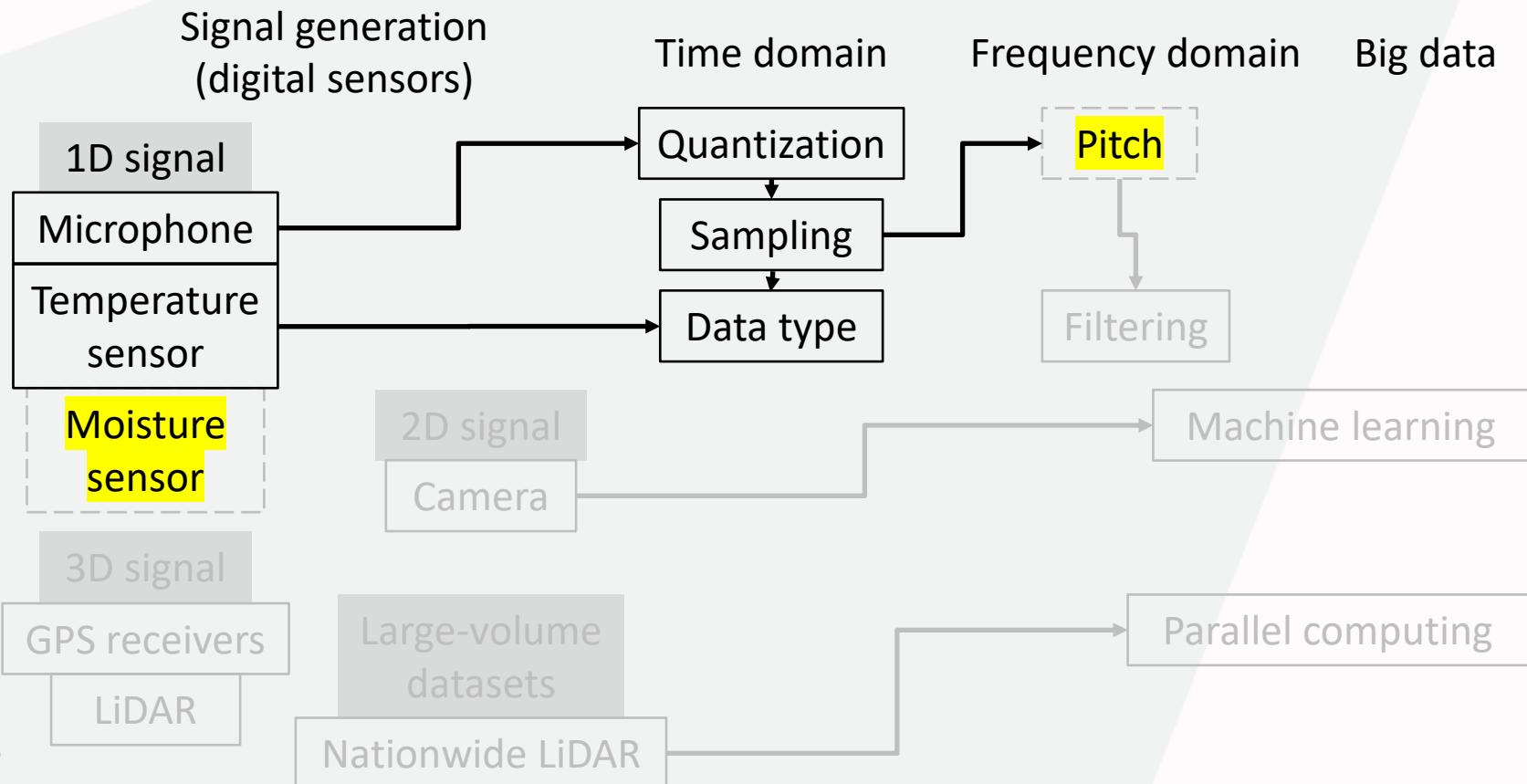
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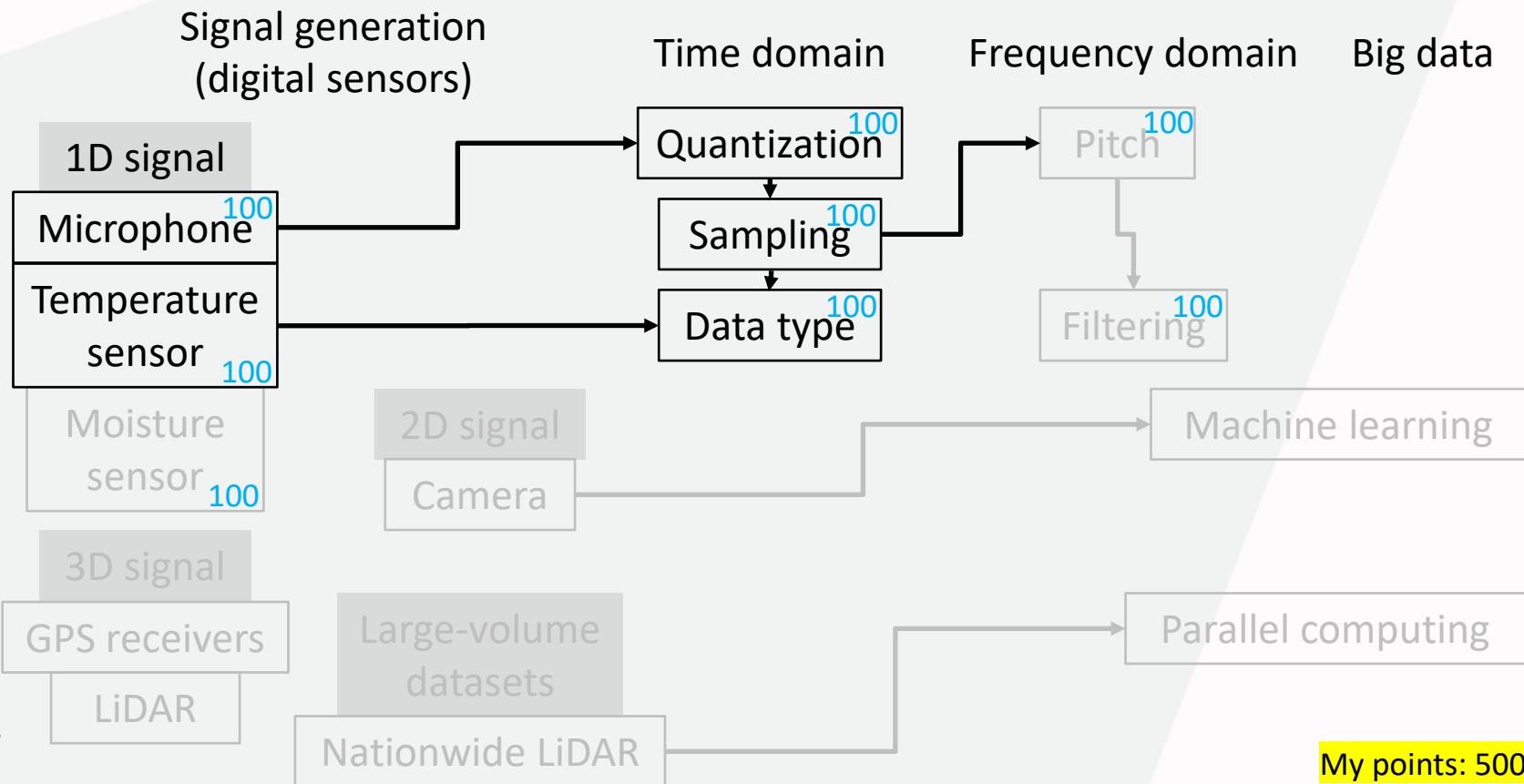


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- Rough guidelines
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  - Huge amount of content for all levels with progress control and rewards
- Actionable items
  - Expanding content
  - Skill tree
  - Point system

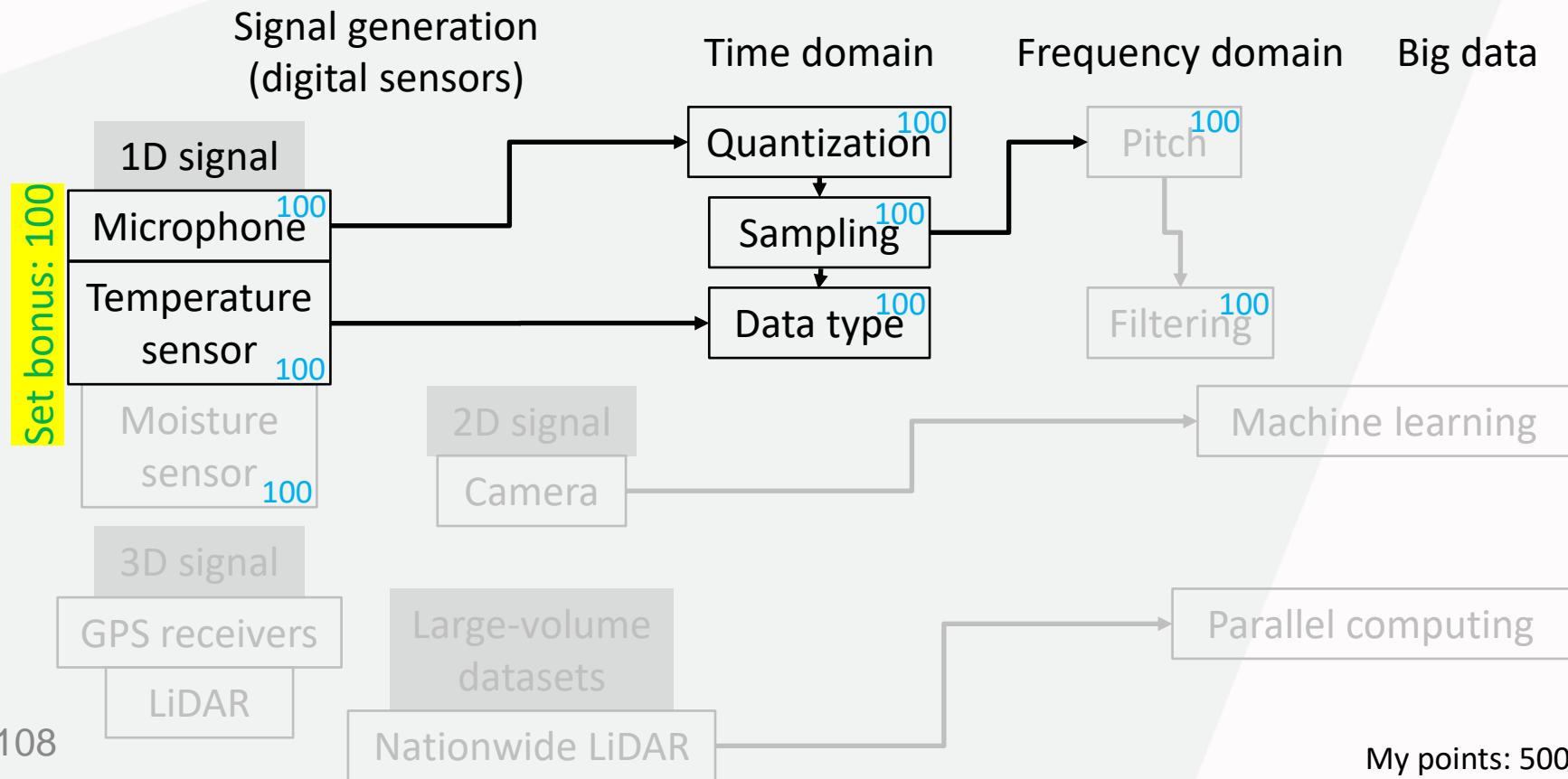
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- Point system – Positive feedback to encourage progress



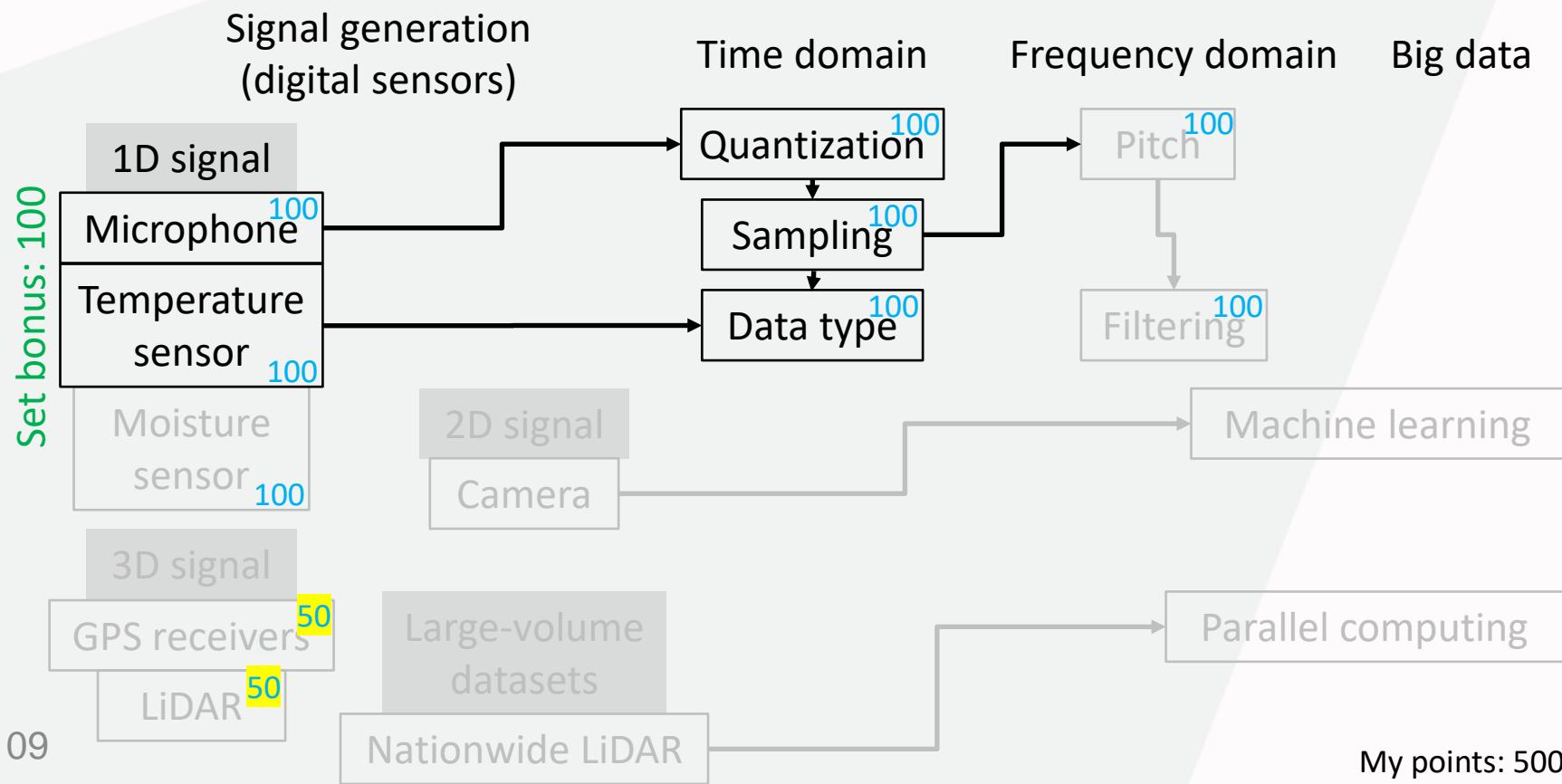
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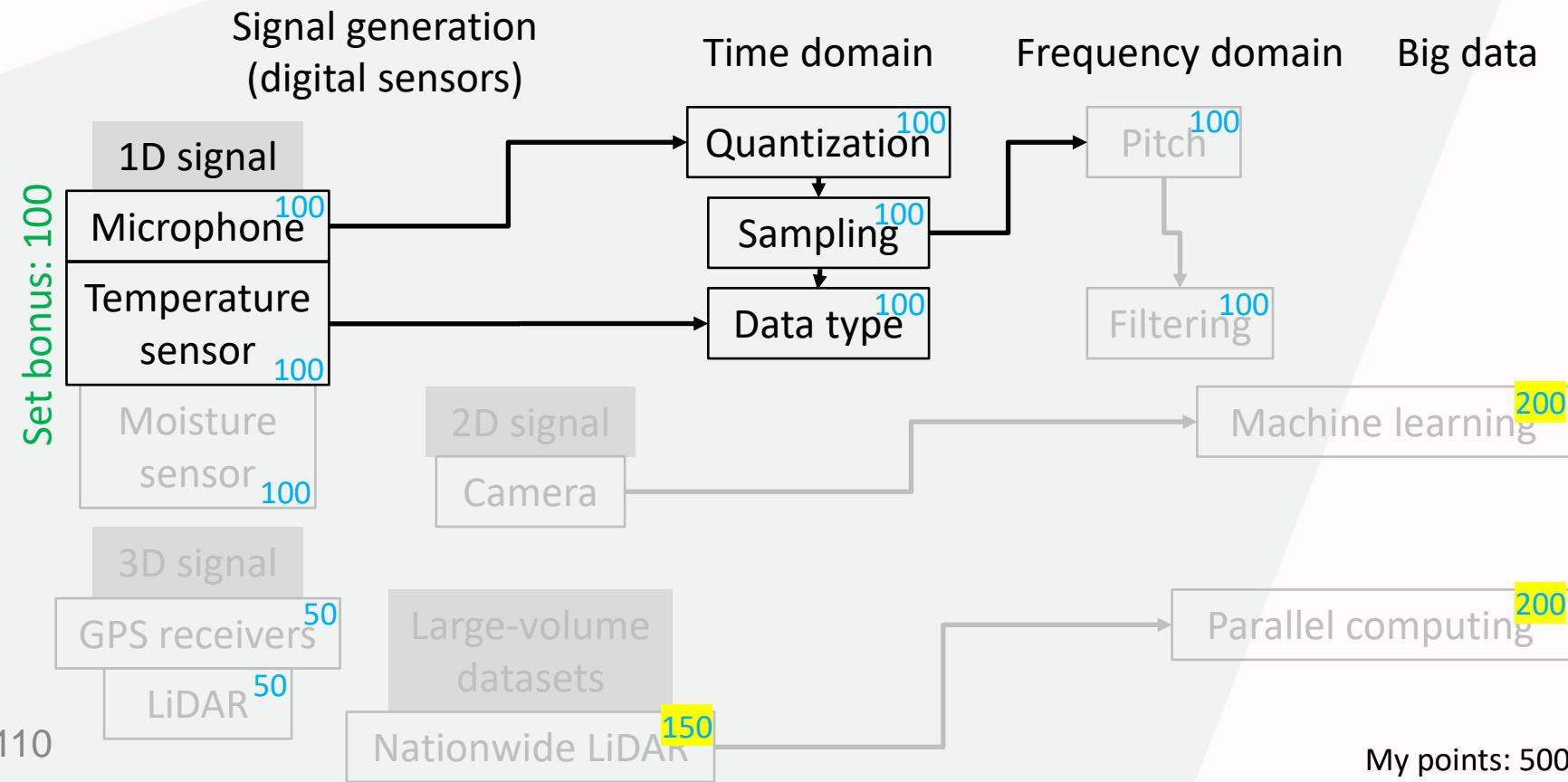
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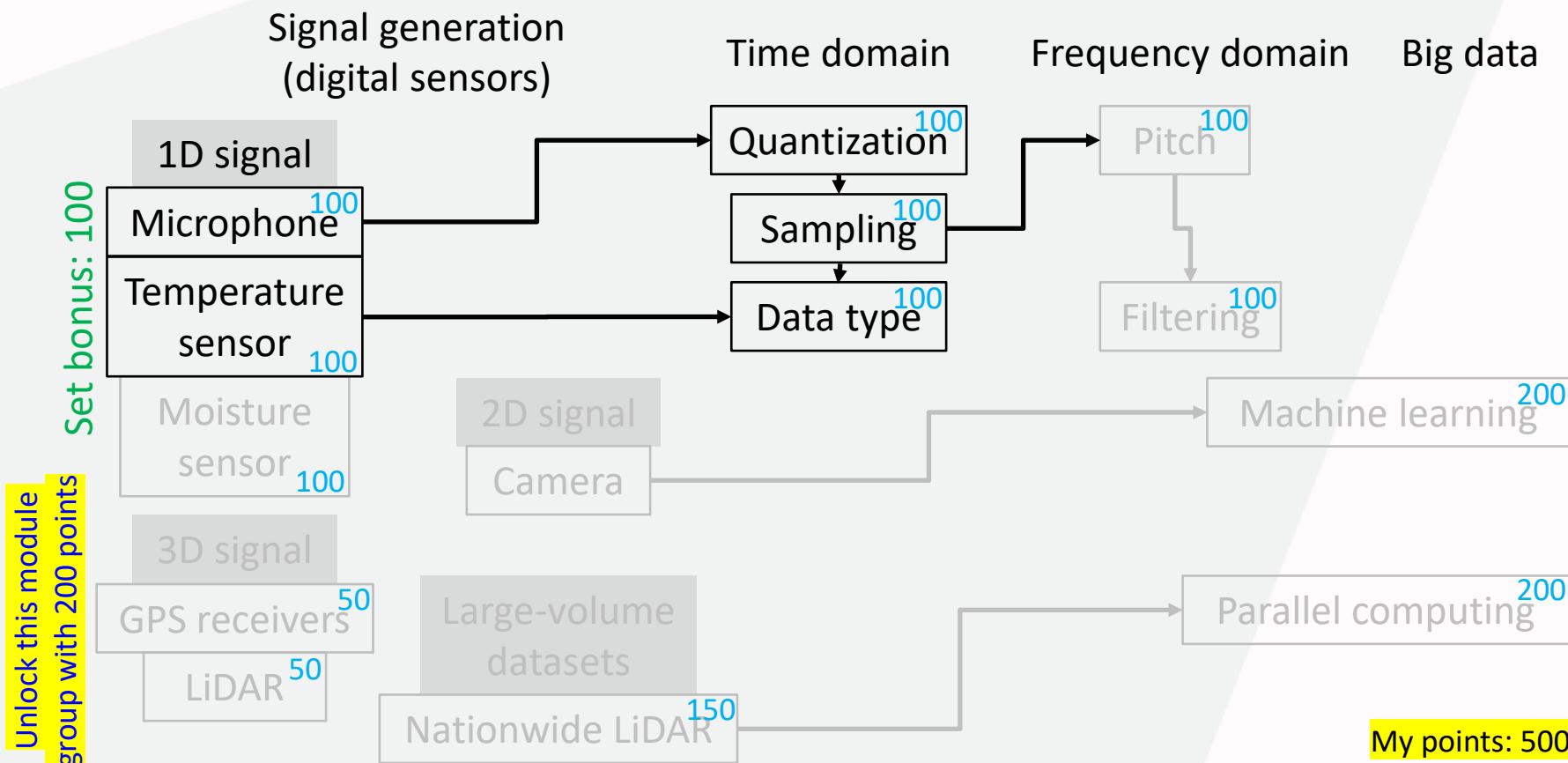
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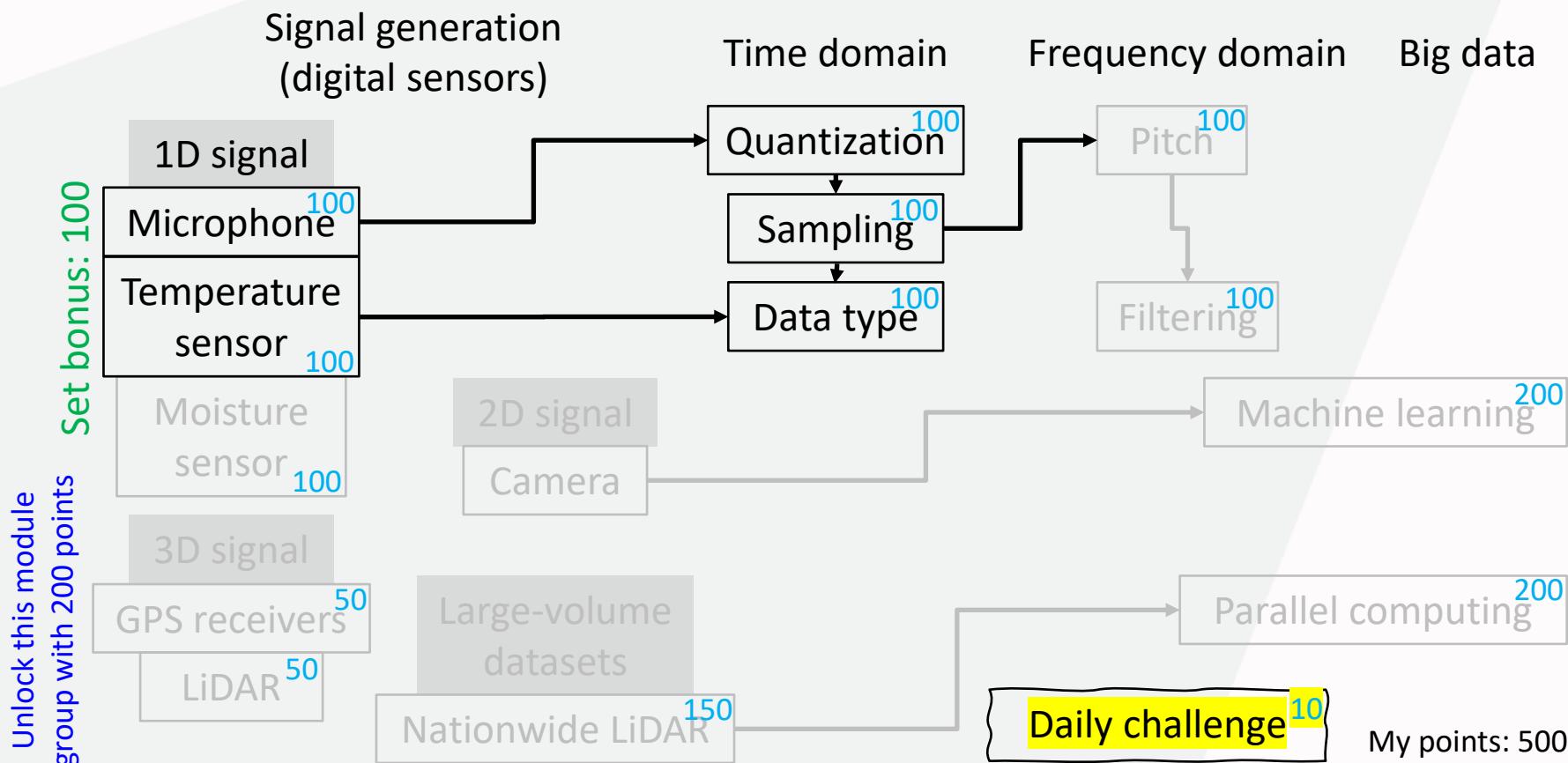
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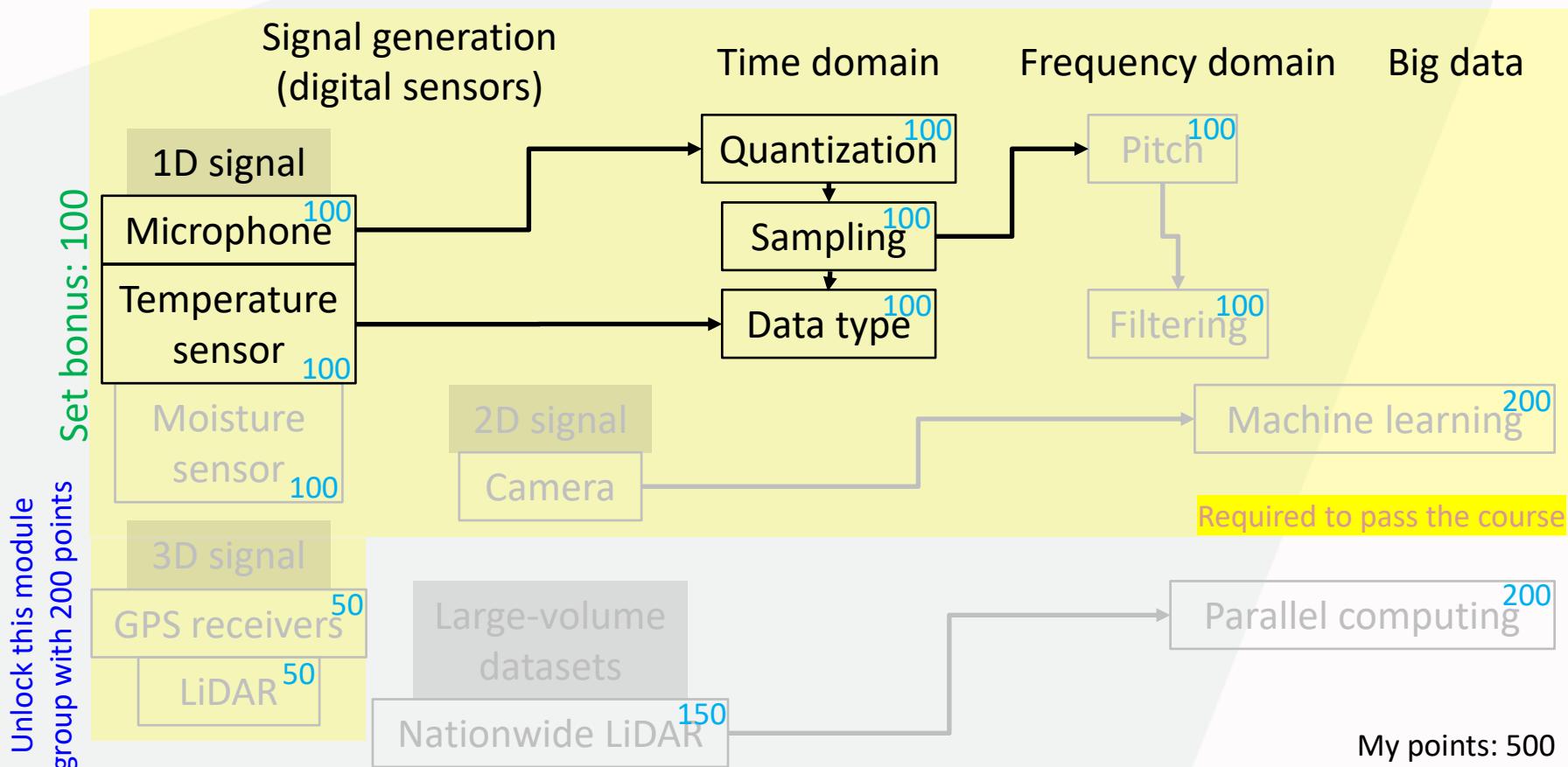
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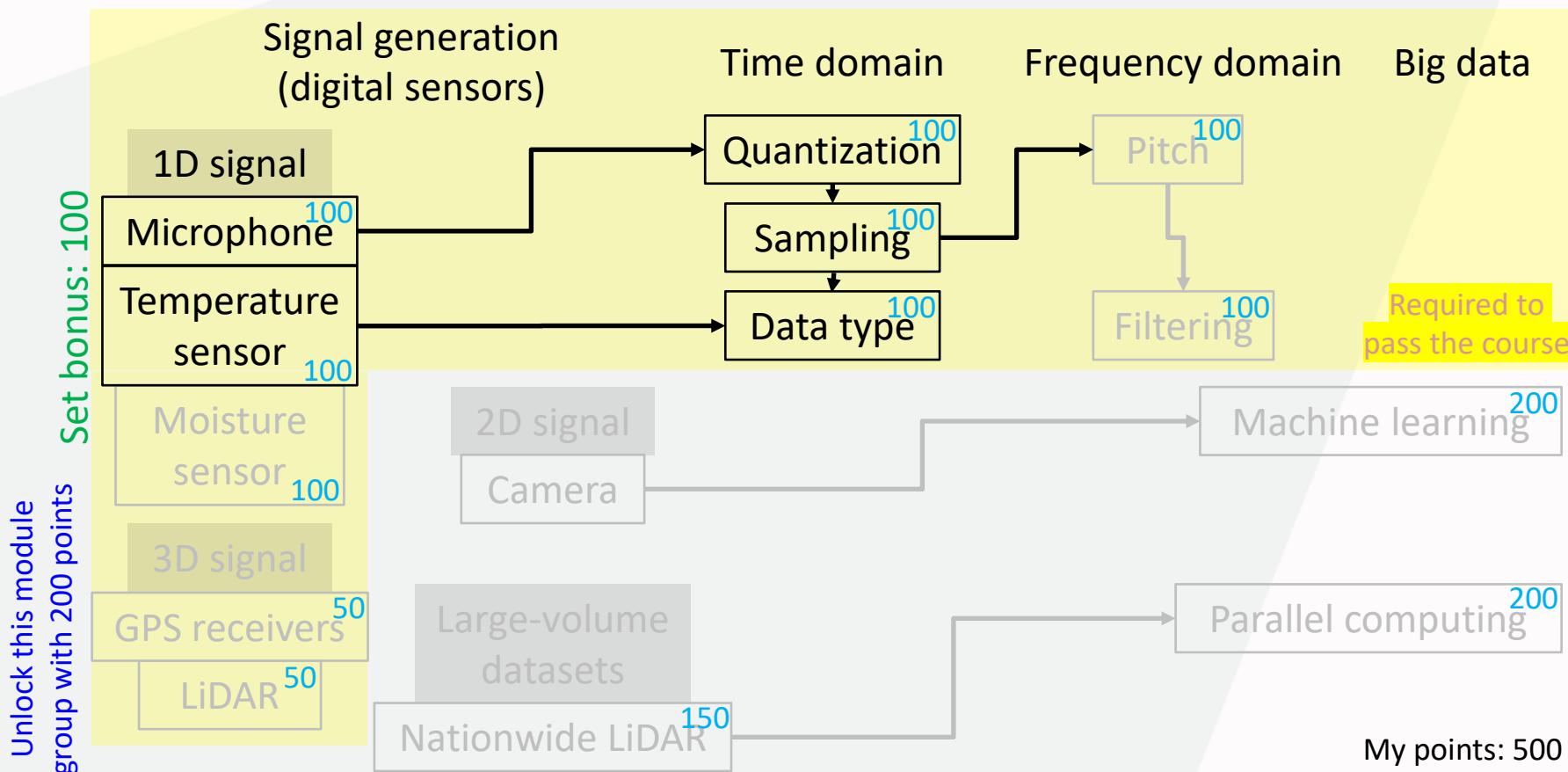
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- Point system – Positive feedback to encourage progress
  - Competition
    - Real-time ranking: most points earned

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    - Homework hints
    - One-to-one real-time tutoring

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  - Hidden challenges
    - Research ideas

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    - Homework hints
    - One-to-one real-time tutoring
  - Hidden challenges and achievements
    - Research ideas and silly jokes

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Hidden/explicit achievements



## Speedrunner!

+10 points

*Get a specific task done within a limited time.*

“Either don’t run or... run like **crazy!**”



## Mindreader!

+10 points

*Get a specific task done without using any hints.*

“Hints are not necessary...’cause I’m good at  
reading your mind!”

A modern game may have hundreds of small  
achievements for more frequent positive feedback.

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Assignments – Hide hints by default

**Data Science for Agriculture  
AGR 333  
Lab 4 – Data Collection and IOT**

Goal: Understand data collection sources, limitations, and the connection to the internet of thing.

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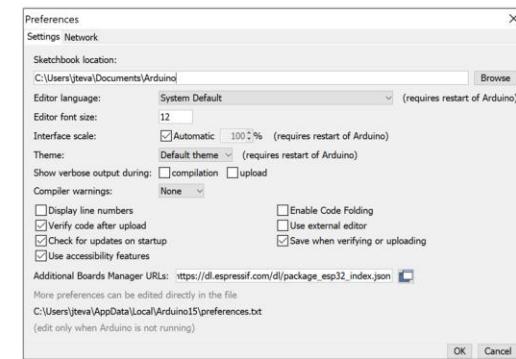
**Part 1: Software Setup**

**Installing Arduino IDE**

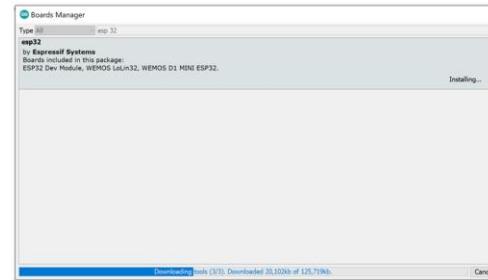
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- 2.→ Download and install the latest version for your operating system.
- 3.→ Open Arduino to ensure it installed correctly.

**Installing ESP Board in Arduino IDE [1]**

- 4.→ In your Arduino IDE, go to **File> Preferences**
- 5.→ Enter [https://dl.espressif.com/dl/package\\_esp32\\_index.json](https://dl.espressif.com/dl/package_esp32_index.json) into the “Additional Board Manager URLs” field as shown in the figure below. Then, click the “OK” button.



- 6.→ Open the Boards Manager. Go to **Tools > Board > Boards Manager...**
- 7.→ Search for ESP32 and install the package by **Espressif Systems**.



- 8.→ If the installation worked, you should now see ESP 32 boards available in **File>Board**

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Assignments – Hide hints by default

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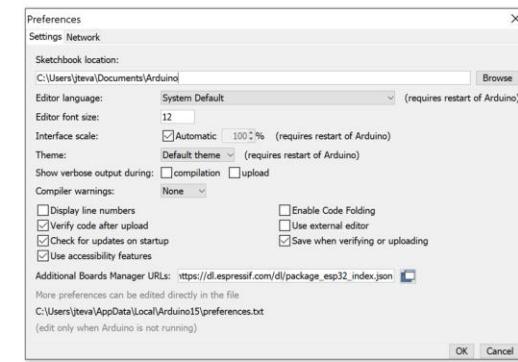
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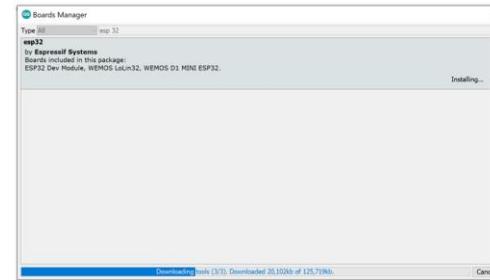
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The ability to follow instructions +  
The ability to find solutions and solve problems

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Data Science for Agriculture	
AGR 333	
Lab 4 – Data Collection and IOT	
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## Part 1: Software Setup

### Installing Arduino IDE

Hints

### Installing ESP Board in Arduino IDE [1]

Hints

Hints

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# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Assignments – Hide hints by default

The screenshot shows a LaTeX document with the following structure:

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AGR 333  
Lab 4 – Data Collection and IOT**

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**Part 1: Software Setup**

**Installing Arduino IDE**

**Hints: Google “Download Arduino IDE”**

The ability to follow instructions +  
The ability to find solutions and solve problems

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Assignments – Hide hints by default

*My remaining points: 500*

Data Science for Agriculture  
AGR 333  
Lab 4 – Data Collection and IOT

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### Part 1: Software Setup

#### Installing Arduino IDE

*Unlock with 3 points*Hints

#### Installing ESP Board in Arduino IDE [1]

*Unlock with 2 points*Hints

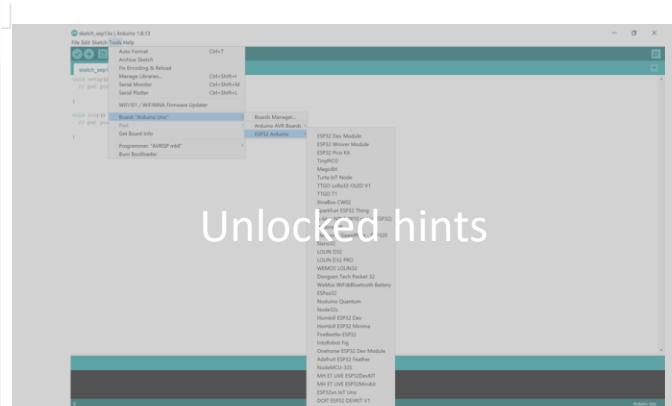
*Illusional scarcity: by allowed # of hints or the point system*

*Unlock with 10 points*Hints

The ability to follow instructions +  
The ability to find solutions and solve problems

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Assignments – Automated performance evaluation



Unlocked hints

**Filesystem Uploader Plugin [2]**

9.→ Navigate to your Arduino directory and create a new folder named “tools”.

10.→ Unzip the ESP32FS folder to the newly created tools folder. If you see

**Correct.**

Incorrect. Retrieve ESP32FS subfolder and move to Arduino<tools

11.→ Restart Arduino.  
12.→ Make sure plugin was installed by checking Tools and looking for **ESP32 Sketch Data Upload**

**Installing Libraries**

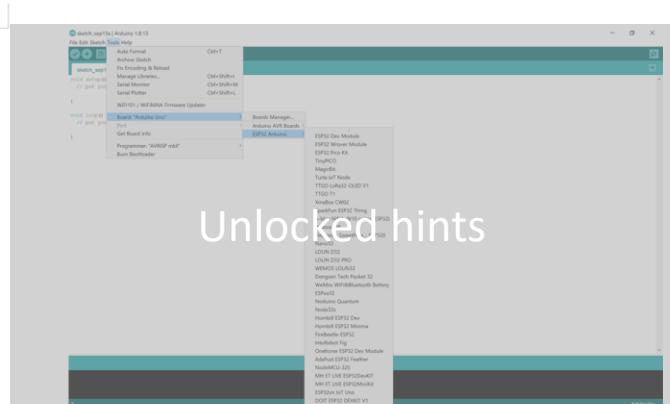
Checkpoint-1: Pass this check point to get 5 points.

(Partially)  
Automated  
check point

Unlock with 1 points Hints

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Assignments – Automated performance evaluation



**Filesystem Uploader Plugin [2]**

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10.→ Unzip the ESP32FS folder to the newly created tools folder. If you see

Correct.

Incorrect. Retrieve ESP32FS subfolder and move to Arduino<tools

11.→ Restart Arduino.  
12.→ Make sure plugin was installed by checking Tools and looking for **ESP32 Sketch Data Upload**

I confirm things are correct. [ ]

Or

Run this [script](#) and copy the output below ([more instructions](#)):

Installing Libraries

Unlock with 1 points Hints

(Partially) Automated check point

Copy the output here

Submit

# Tailoring game design techniques for AGR 333 - Data Science for Agriculture

- Rough guidelines
  - The “flow” state
  - Huge amount of content for all levels with progress control and rewards
- Actionable items
  - Expanding content
  - Skill tree
  - Point system

# Institute-level support

- Procedures to streamline proposing, testing, promoting better practices
  - Student performance before and after taking different versions of the same the course
- Individual rewards for confirmed better, mimicable practices
- Expert support
  - Professors, game designers, visual artists, programmers, ...



# Thank you!

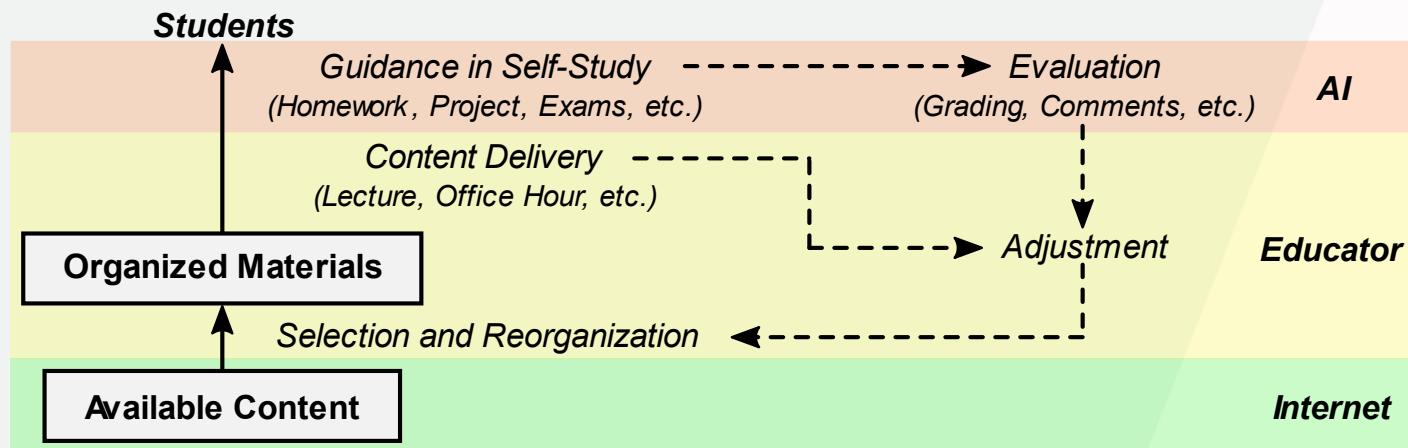


# Tailored game design techniques in this talk

- Motivation:
  - Tell stories/Be personal
  - Take advantage of interesting topics
  - Rewards
- Training approach:
  - Repeated exposures to key ideas
  - Incremental in small steps
  - Visual hints

# Tailoring game design techniques: Opportunities and challenges

- Reusability
  - Create high-quality content once
- Evaluation automation
  - Ideally with feedback
  - Easier for coding assignments



# Selected game design techniques

- Flow (as a rough guideline)
  - Progress control
  - Challenges
- Intuitive visual hints
  - Make the learning experience effortless
  - Reduce effort/cost in fetching study materials

“Let’s be do  
whatever we can to  
make games fun!”

Not “gamifying”...

More like “sugar coating”

- Provide positive feedback on the side
  - Out of the “learning” process
- Decrease the operations that may hurt the motivation
  - Reduce cost in information fetching

- Example pay-as-you-go program framework
  - For a specific program, we could pre-define a few skills we want to teach. They would serve as module (tree node) groups.
  - Then, we could add relevant online courses into each module group to teach the corresponding skill.
    - Courses can be purchased and studied individually (hence, "pay as you go").
  - The key is that, for each course, we could list alternative versions/flavors of the same course, e.g., with different years, instructors, and/or teaching materials, so that students have the opportunity to customize the program by selecting their preferred versions.
    - We could have one or two free-trial lectures in each course to facilitate the decision.
  - We could also design a course evaluation system for participating students to comment on/rate courses that they finished.

- Benefits of this framework
  - Motivating professors to contribute to online education
    - We could distribute part of the profit from a course to its instructor as an incentive, ideally as a percentage of the profit rather than a fixed base amount.
      - If a star professor becomes rich from their online courses, that will be a great example for us to brag about to persuade other professors to participate.
    - Granting students the option of choosing from different flavors of the same course would promote healthy competition among instructors.
      - Instructors who participate early (e.g., when their courses are essentially the only options) or who can provide higher-quality teaching (e.g., to win the market against multiple competing versions of the same course) will earn the most money.

- A student-oriented course evaluation system
  - The same student performance evaluations (e.g., exams) could be used in the different versions of the same course.
    - Courses with the best student performance => Potential sources for better practices in online education
  - Easy feedback from market/students (Ref: Amazon.com)
    - Most profitable courses, or highly-rated courses with positive comments => Potential versions to promote
- Motivating students to progress in courses
  - We could allow students to buy new courses with points they earn from completed courses.
    - This would increase the "illusional scarcity" of points to better motivate students to progress in purchased courses.
    - We could use other virtual currencies we come up with for this purpose, so that students are still willing to spend points for less valuable resources like hints.
  - The average amount of virtual currency a student can get needs to be carefully planned for the trade-off between student motivation and program profit.

- More flexible payment
  - (Traditional) One-time payment plan
    - Wholesale price for all required courses to get a degree/finish a program should be cheaper than other options, even with the virtual currency considered.
  - (Pay-as-you-go) Buy and take courses one by one
    - A program could enforce an "expiration date" of a course certificate if the student wants to use that for a degree/to complete that program.

# 22 pages of outline

This image shows a grid of 22 pages of handwritten notes, likely from a class or meeting, arranged in a 4x6 grid. The notes cover various topics related to online education, game design, and student engagement. The handwriting is dense and varied, with some pages featuring large, bold headings and others filled with smaller, detailed bullet points.

**Page 1:** Starting the Future of Online Education: A Game Design Perspective. Discusses the evolution of online education, its challenges, and the potential of game design to address them. Key concepts include "Gamification," "Microlearning," and "Adaptive Learning."

**Page 2:** Game-based learning: A review of research and practice. Focuses on the benefits of game-based learning for education, such as increased motivation and improved retention. It also discusses the challenges of implementing game-based learning in real-world settings.

**Page 3:** Gamification in education: A critical review. Examines the concept of gamification and its application in educational contexts. It highlights both positive and negative aspects of gamification, such as its potential to increase student engagement and its risks of creating a competitive, rather than collaborative, environment.

**Page 4:** Gamification in education: A critical review. Continues the discussion on gamification, focusing on its impact on student motivation and learning outcomes. It also explores the psychological mechanisms behind gamification's effectiveness.

**Page 5:** Gamification in education: A critical review. Further explores the use of game mechanics in education, including the use of points, badges, and leaderboards. It also discusses the potential for gamification to improve student engagement and performance.

**Page 6:** Gamification in education: A critical review. Explores the use of game mechanics in education, focusing on their potential to improve student engagement and performance. It also discusses the potential for gamification to improve student engagement and performance.

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