The Power Of Bugs

Slides: Computing & the Planet

Preparation

- Email students the recommended reading on The Power Of Bugs (at least 3-4 days before the session)
    - *Hi [your team name],*

      I am sharing with you the article that we will be reading parts of at the beginning of our next session. It is recommended (not mandatory) to glance through it before class but make sure you save the article and bring it to our session on [date]. No worries if things don't really make sense, we will talk more about it in the next session. Hope you find it interesting, see you soon!

      The Power Of Bugs

      Best,
      [Your name]
- Organize discussion strategies to use to facilitate conversation

Goals and Outcomes: PACE-internal

- Introduce the topic of how bacteria can fuel low-power sensors and what a microbial fuel cells is
- Facilitate a productive discussion that allows students to think critically about technology & agriculture

Goals and Outcomes: Student-facing

- I will learn about research done by faculty in the CSE department which shows how bacteria can fuel low-power sensors

- I will engage in a discussion that assesses how this possibility can be beneficial and what it means for agriculture & the environment

Script

First acknowledge that it is awesome for the students if they had a chance to look at the text, and no worries if not.

Ice Breaker (5-10 minutes)

We have talked about how intersection CS is, how about with agriculture?

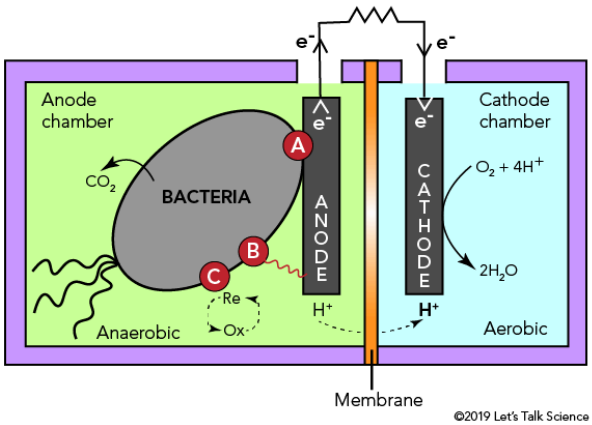
Ask students if they can think of any applications in agriculture using computer science.

See if you can make up any scenarios where cs might help in an agriculture setting?

Definitions (5 minutes)

Let's first define some things which might be helpful in understanding what we are going to discuss today:

- *microbial fuel cells (MFCs)*
  - *here is what one looks like:*
    - helpful to assure the students that it looks complicated but don't worry I don't really understand it either



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    - What we need to understand about them: they can help reduce environmental contaminants such as wastewater, reduce atmospheric carbon dioxide by using it to rebuild fuels, and may potentially provide a renewable energy source
- soil hydration sensors
    - they measure the water content in the soil
- *aerobic organism* or aerobe
    - an organism that can survive and grow in an oxygenated environment.
- *anaerobic organism* (anaerobe)
    - any organism that does not require oxygen for growth.
    - Some anaerobes react negatively or even die if oxygen is present
- *closed loop control system*
    - a mechanical or electronic device that automatically regulates a system to maintain a desired state or set point without human interaction.

Read text (10 minutes)

Provide student 10 minutes to read the article: The Power Of Bugs

- Consider doing paired reading
- Consider doing entire cohort reading
- if students feel comfortable, LPM could also do popcorn style reading: a classroom practice in which students go around the room taking turns reading a text out loud

Discussion (10-15 minutes)

Facilitate a discussion (refer to discussion strategies) around the following question(s):
pick ones you see fit, feel free to add others:

- Why would measuring moisture levels in soil help the environment?
- Based on the article, can you think of some possible next steps for Dr.Pannuto and his team?
- What do you think the data from the passive monitoring systems could provide to farms and wetlands, and why do you think that would be helpful?
- Silly question? → Would you charge your cell phone using dirt?

Post-session

- Check in with the student(s) who you noticed might need more support during session (e.g. Looked overwhelmed/lost etc)
- Fill out the [LINK]
    - What activities did you do

- How did they go
    - Could ask what their favorite part of the session was
- Any concerns