Integrate Global Sustainability Virtual Exchanges Into Teaching Computer Science Concepts

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ABSTRACT

The increasing globalization of technology has changed the face of computer science. In addition to core technology skills, modern computer scientist must possess cross-cultural communication skills, team management skills, the ability to perform on geographically distributed teams, and an understanding of the big picture in addition to technical ability.

Lord Fairfax Community College (LFCC) used a virtual exchange as a teaching tool for introductory computer science concepts. Nineteen students participated in the Global Solutions Sustainability Challenge, a project supported by the Stevens Initiative, which is sponsored by the U.S. Department of State and administered by the Aspen Institute. The project aims to find a sustainable solution to an issue within the hospitality and tourism industry, while providing students an opportunity to learn about a different culture.

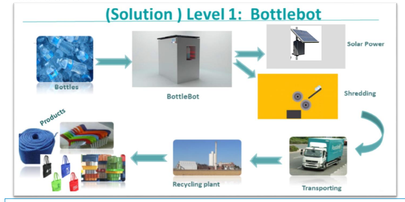
Over 10 weeks students learned about the seven big concepts of computer science, marketing, business plans, team work, public speaking, research, leadership, graphic design, application development, and much more.

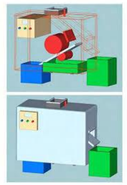
SEVEN BIG IDEAS OF COMPUTER SCIENCE

Creativity

Computing is a creative human activity that engenders innovation and promotes exploration

Abstraction





Reduce information & detail to focus on concepts relevant to understanding & solving problems

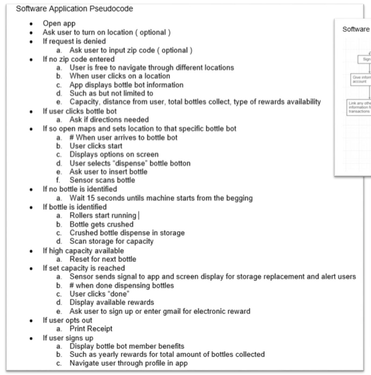
Data and Information

Data and information facilitate the creation of knowledge

The Internet

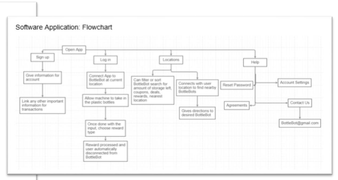
Digital devices, systems, and the networks that interconnect them enable and foster computational approaches to solving problems

Algorithms & Programming



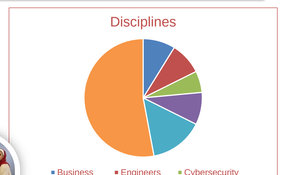
Software Application Pseudocode

- Open app
- Ask user to turn on location (optional)
- If request is denied
  - a. Ask user to input zip code (optional)
- If no zip code entered
  - a. User is free to navigate through different locations
  - b. When user clicks on a location
  - c. App displays bottle bot information
  - d. Such as but not limited to
  - e. Capacity, distance from user, total bottles collect, type of rewards availability
- If user clicks bottle bot
  - a. Ask if directions needed
- If so open maps and sets location to that specific bottle bot
  - a. # When user arrives to bottle bot
  - b. User clicks start
  - c. Displays options on screen
  - d. User selects "dispense" bottle botton
  - e. Ask user to insert bottle
  - f. Sensor scans bottle
- If no bottle is identified
  - a. Wait 15 seconds until machine starts from the begging
- If bottle is identified
  - a. Rollers start running
  - b. Bottle gets crushed
  - c. Crushed bottle dispense in storage
  - d. Scan storage for capacity
- If high capacity available
  - a. Reset for next bottle
- If set capacity is reached
  - a. Sensor sends signal to app and screen display for storage replacement and alert users
  - b. # when done dispensing bottles
  - c. User clicks "done"
  - d. Display available rewards
  - e. Ask user to sign up or enter gmail for electronic reward
- If user opts out
  - a. Print Receipt
- If user signs up
  - a. Display bottle bot member benefits
  - b. Such as yearly rewards for total amount of bottles collected
  - c. Navigate user through profile in app



Algorithms are tools for developing and expressing solutions to computational problems. Programming is a creative process that produces computational artifacts

Global Impact



Computing enables innovation in other fields including science, social science, humanities, arts, medicine, engineering and business

FINDINGS, BENEFITS, FUTURE WORK

- ❖ Often four-year institutions have scholarships for students to have a global experience. Unfortunately, Community College usually do not have such a fund and when they do, students often are unable to take advantage of it because of family, work, and financial obligations of non-traditional adult learners.
- ❖ This project serves as a model to other community college to provide computer science majors an authentic and global experience to translate technical concepts into business concepts. It also provides an to think beyond the technology.
- ❖ Adding virtual exchanges also successfully teaches more undergraduate students how to think outside the box and about the local surroundings.
- ❖ Students will graduate with an experience on their resume that will help them to secure jobs and transfer to four-year institutions.
- ❖ Future work involves tracking the participants of the Virtual Exchange project to see how they use the skills learned in their upper class studies and within their professional careers.

RESOURCES

BottleBot Sales Pitch YouTube Video:
https://youtu.be/f_NUUeVRlL8

The Stevens Initiative - International Virtual Exchange:
https://youtu.be/ehyOWMgV7e4

Stevens Initiative: https://www.stevensinitiative.org/
Global Solutions: https://www.irex.org/project/global-solutions

PRESENTER INFORMATION

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