Northeastern University
College of Engineering

Weekly STEM Newsletter - Week 37 (November 29th - December 3rd, 2021)

Computer Engineering

Introduction

Computer engineering combines electronic engineering with computer sciences to design and develop computer systems, software and hardware along with various technological devices. Students majoring in computer engineering examine the role of engineering in computer systems with topics including cloud computing, application algorithms, electronic circuits, embedded systems as well as many other various topics. As the field encompasses various topics students tend to choose a subject to focus on as a concentration ranging from telecommunications, cybersecurity, robotics and more. Students in computer engineering not only highlight how computer systems work but also how they integrate into the world.

Common coursework within the field of computer engineering would include foundational math and science courses, with core classes consisting of programming, data structures and algorithms, embedded design, circuits and signals and design of operating systems, to name a few. Computer engineering is the right fit for you if you have an interest in computing systems, hardware, software and various devices, and mathematics.

Upon completion of a computer engineering degree there are a variety of career paths! Positions range from computer scientist, software or hardware developer, or engineering technician, etc. Places that employ these positions are computer and technology companies like Amazon, Apple, Google, Microsoft, IBM and government organizations. Alternatively, there is an option for graduate school if a student wants to focus on a subsection of computer engineering, they can pursue a masters in biomedical engineering, computer systems analysis or environmental engineering.

Northeastern Connections

Faculty Connection

Dana Brooks is a research professor in the Electrical and Computer Engineering department and an affiliated faculty within the Bioengineering department at Northeastern University. His research focuses on Biomedical signal and image processing; medical imaging; statistical signal processing. Areas of interest pertaining to research for Professor Brooks are biomachine integration, critical infrastructure sustainability and security and integrated modeling,inference and computing. Biomachine integration is the integration of advanced materials, devices and machines with living systems, like humans, to produce synthetic biomachine technologies. An example of biomachine integration would be robotic devices used to perform medical procedures like rehabilitation, surgery and diagnostics. Critical infrastructure is the development of design strategies, standards and regulatory framework that are essential for the function of society and its infrastructure. These sectors range from water/wastewater, energy, transportation and communication systems. Lastly, integrated modeling, inference and computing addresses gaps in application in bioengineering for health and disease, monitoring environmental health and climate change and designing and engineering advanced material systems. Certain applications will be used to advance modeling, machine learning and computation, with its goal being to unify approaches that span the various applications. With his research Professor Brooks will be able to give insight and recommendations for the development of diagnostic biomedical devices.

Student Connection

NUTRONS FIRST Robotics, Team 125 is a robotics club that was founded at Northeastern University in 1997. They obtained the name NU-TRON's from their original sponsors, Northeastern University and Tetron Systems. In 2005 they only had 5 student members and 1 mentor, today there are 42 students and 24 mentors, aided by 10 sponsors. AS the 2018 competition season concluded the team was relocated out of Northeastern University and by October of 2018 into Revere Public Schools. Revere Public Schools offered NU-TRON a new lab space, an area for the machine shop and access to the cafeteria and empty classrooms to host meetings after school.

For many years NU-TRON was one of the only teams of its kind in the area. Student participants come from 4 high schools, 1 middle school, 5 universities and 7 professional companies. Because students are coming from the various schools, Team 125 is one of the most diverse

teams in New England! There are 13 languages spoken on the team and 74% of the team members are minorities.

Do Now

https://www.tynker.com/hour-of-code/

A website with an array of coding games, puzzles and projects.

Activity

River Flow Rate

- **Teach Engineering**

Materials Needed:

You can use any materials you want but here are some suggestions:

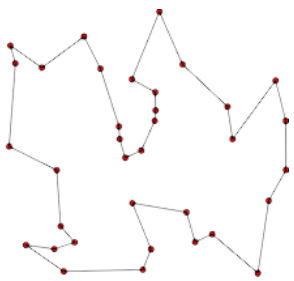
- River Flow Rate Handout
- Computer with Internet access

Steps:

1. Open the River Flow Rate handouts.
2. Introduce and explain the activity to students.
3. Have students write down their best estimates about the flow rate of a local river (fast, slow, narrow, deep, etc). For greatest benefit, choose a nearby river that students are familiar with, or choose a river and search for a video of said river
4. Have each student group assemble at a computer with Internet access. If computers are limited, do this portion of the activity as a class. Bring up the Daily Streamflow Conditions page at the USGS Current Water Data for the Nation website at https://waterdata.usgs.gov/nwis/rt.
5. Have students complete the worksheets.
6. Compare and analyze estimates versus real-world flow rate data.

Share Your Results

We'd love to know how the activity and/or the "do now" turned out! What worked and what didn't work? Please share with us something you learned and/or send us pictures! Email us at stem@northeastern.edu.



Related links/Extensions

- Professor Dana Brooks - research information
- Computer Science Games for Middle Schoolers
- Teaching Coding