Lesson Plan: Exploring Embedded Engineering as a Career

Grade Level: 6th-12th grade

Duration: 3 class periods (45 minutes each)

Objectives:

- Students will understand the fundamentals of embedded engineering as a career.
- Students will explore the role of an embedded engineer in various industries.
- Students will investigate the skills and education required for success within the field of embedded engineering.

Materials:

- Computer with internet access
- Projector and screen
- CodeX or other microcontroller

Day 1: Introduction to Embedded Engineering (45 minutes)

Activity 1: What is Embedded Engineering?

1. Begin the lesson by discussing the importance of technology in our daily lives.
    a. **Student Response:** What devices do you use that contain embedded systems (e.g., smartphones, home appliances, automobiles). Freewrite for 3-5 minutes and brainstorm a list to share with the class.
    b. Discuss in a small group or whole class.
2. Define embedded engineering: It is the field of designing and building embedded systems, which are specialized computer systems integrated into other products or systems to control their functions.
3. Show the Firia Labs Videos for Lesson 4:
    a. Interview with Donnie Pitts, Senior Product Designer
    b. A Day in the Life of an Embedded Engineer
4. Show examples of embedded systems and their applications using visuals or short videos:
    a. Embedded Systems in 5 Minutes!
    b. What is an Embedded System?

Activity 2: Discussion on Embedded Engineering Career

1. Discuss the role of embedded engineers in various industries (e.g., automotive, medical devices, consumer electronics).
2. Highlight the demand for embedded engineers in today's job market.

3. Explain that embedded engineers work on hardware and software to make devices smart and efficient:
    a. Embedded Systems Engineering VS Embedded Software Engineering
    b. Embedded Software Project Ideas
    c. Simple Tutorials for Embedded Systems
    d. Simple Tutorials for Embedded Systems YouTube Channel
4. Mention that the field offers a wide range of career opportunities, including embedded software development, hardware design, and system integration.

Activity 3/Homework:
Students will research and prepare a short presentation on a specific embedded system they find interesting. They should include details on its application, how it works, and the role of embedded engineering in its development.

Day 2: Skills and Education Requirements (45 minutes)

Activity 1: Skills for Embedded Engineering
1. Review the homework presentations, allowing students to share their findings.
2. Discuss the skills needed for a career in embedded engineering, including problem-solving, programming, electronics, and teamwork.
3. Explain the importance of programming languages like C, C++, and Python in embedded systems development.

Activity 2: Education Pathways
1. Describe the various educational pathways to become an embedded engineer, such as bachelor's degrees in electrical engineering, computer engineering, or computer science.
2. Mention the importance of internships, co-op programs, and practical experience during education.
3. Highlight the value of continuing education and certifications in staying competitive in the field.

Activity 3/Homework:
Assign students to research colleges or universities that offer relevant degree programs and to create a list of potential schools they may want to apply to in the future.

Day 3: Hands-On Activity (45 minutes)

Activity: Building a Simple Embedded System
1. Provide a basic microcontroller board (e.g., CodeX or Arduino) for each student or group.
2. Explain the components and capabilities of the microcontroller, such as input/output pins, sensors, and actuators.
    a. Introducing the CodeX

3. Guide students through a simple project, like blinking an LED or reading sensor data.
4. Encourage students to write a simple code to control the microcontroller. Explore this:
    a. CodeX Wearable NeoPixel Glasses Part 1: Making the Glasses
    b. CodeX Wearable NeoPixel Glasses Part 2: Programming the Pixels

Discussion:

1. After the hands-on activity, facilitate a discussion on the experience and challenges faced by students.
2. Relate the activity to the real-world tasks and problem-solving skills required in embedded engineering careers.

Conclusion:

Summarize the key points discussed throughout the lesson, emphasizing that embedded engineering offers exciting career opportunities in various industries and that a strong foundation in STEM subjects is essential. Encourage students to pursue their interests in technology and consider a future in embedded engineering.

Assessment:

Have students write a short reflection on what they learned during the lesson and how it has influenced their perception of embedded engineering as a potential career path.