Ira A. Fulton Schools of Engineering
Arizona State University

Smart Manufacturing

Microcontroller Applications: Programming and Electrical Basics to Integration

Overview

Gain the skills to seamlessly integrate microcontrollers into practical solutions, from circuit simulation to innovative assistive technology design.

Whether you're a novice enthusiast or a seasoned professional, this credential is tailored to empower you with the indispensable skills needed to navigate the ever-expanding integration of microcontrollers into daily life.

Key Skills Covered

- Identifying and utilizing basic electrical components
- Programming microcontrollers
- Utilizing sensors and actuators
- Understanding sensor feedback
- Designing solutions for real-world assistive technology needs

- Live instruction by ASU Associate Professor Daniel Frank
- Earn an ASU Engineering Badge to showcase your new skills
- See each micro-badge for student pricing
- In person, ASU Poly

Take one micro-badge or complete all four to earn the badge! More details about each micro-badge below.

Introduction to Microcontrollers and Electronics Sept. 24–27, 2024 | 5:00–8:30 p.m. Scroll down for more info	Explore the foundational principles of electricity, circuits, and microcontrollers, designed to empower learners to explore the basics of versatility across microcontroller applications. This course equips you with fundamental skills in electrical circuits, multimeters, and microcontrollers, essential for roles in mechanical engineering, computer programming, and beyond.
Microcontroller Programming Basics Nov. 12–15, 2024 | 5:00–8:30 p.m. Scroll down for more info	Through hands-on activities and labs, students will demonstrate their mastery of coding elements and debugging methodologies, preparing them for practical applications in microcontroller programming.
Microcontroller Sensors and Actuators Scroll down for more info	Learn about various motor types, mounting methods, and their integration into mechanical systems. Discover the functionality of H-bridge circuits for DC motor control, explore the applications of servos and other actuators, differentiate between analog and digital signals, and integrate sensor feedback into a system utilizing microcontrollers.
Assistive Technology Microcontroller Applications Scroll down for more info	Immerse yourself in the engineering design process, navigate the realm of assistive technology, and practice the creation of impactful prototypes using microcontrollers to enhance the lives of individuals with disabilities.

What you'll earn!

Participants will earn a digital micro-badge from the Ira A. Fulton Schools of Engineering for each micro-badge completed and the full badge when completing all four micro-badges. Participants will also qualify for Continuing Education Units (CEU).

Start your Microcontroller Applicaitons journey today!

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Introduction to Microcontrollers and Electronics

Overview

Explore the foundational principles of electricity, circuits, and microcontrollers, designed to empower learners to explore the basics of versatility across microcontroller applications.

~~$449~~ $75 for current ASU students!

20 SWAP Hub scholarships are available to make this program free! Click here to complete your application.

SWAP Hub Scholarship

No prior experience is required!

Course Description

The Introduction to Microcontrollers and Electronics - Level 1 micro-badge is designed to provide beginners with a solid foundation in electrical concepts and microcontroller applications. Learn to recognize and assemble various circuit components, use solderless breadboards for prototyping, and operate multimeters for troubleshooting.

Whether you're pursuing engineering, programming, technical roles, or you're just interested in microcontrollers, this course provides essential skills that can enhance your problem-solving abilities and technical proficiency. Be prepared for advanced studies or a future career in technology and engineering. Join us to kickstart your journey into the world of electronics!

Session Topics:

- Introduction to Electrical Concepts
- Electrical Components and Circuits
- Breadboard Basics
- Multimeter Basics
- Microcontroller Basics

Key Skills Covered:

- Understanding electronics circuits
- Identifying components of electric circuits
- Utilizing multimeters for measurements and troubleshooting
- Integrating microcontrollers into circuits

Instructional sessions will be held in person at ASU Poly

- Tuesday, Sept. 24, 2024, 5–8:30 p.m.
- Thursday, Sept. 26, 2024, 5–8:30 p.m.
- Friday, Sept. 27, 2024, 5–8:30 p.m

Spots are limited!

Register today

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Microcontroller Programming Basics

Overview

Learn the fundamentals of microcontroller programming, including logic structures, functions, and debugging, to build a solid foundation for future studies and careers in engineering and technology.

Course Description

The Microcontroller Programming Basics - Level 1 micro-badge covers the structure, components, and syntax of microcontroller programs. You'll learn to create and understand basic logic structures, functions, and flowcharts, essential for efficient coding. Through interactive labs and activities, you'll develop practical skills in debugging, using tools like breakpoints and the serial monitor to fix code issues systematically.

This course is a great starting point for anyone interested in fields like engineering, programming, and technical roles, providing you with valuable problem-solving skills and a solid grounding in microcontroller programming. By the end, you'll be equipped with the knowledge to tackle more advanced topics and enhance your technical proficiency, setting you up for success in your academic and professional pursuits. Join us and start your journey into the world of microcontroller programming!

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SWAP Hub Scholarship

No prior experience is required!

Session Topics:

- Microcontroller Programming Basics
- Process Representation
- Logic and Loops
- Introduction to Functions
- Debugging Basics

Key Skills Covered:

- Understanding microcontroller programming basics
- Utilizing flowcharts for process representation
- Implementing logic structures and loops
- Introduction to functions and debugging techniques

Instructional sessions will be held in person at ASU Poly

- Tuesday, Nov 12, 2024, 5–8:30 p.m.
- Thursday, Nov 14, 2024, 5–8:30 p.m.
- Friday, Nov 15, 2024, 5–8:30 p.m

Spots are limited!

Register today

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Microcontroller Sensors and Actuators

Overview

Explore microcontroller sensors and actuators, covering motor types, H-bridge circuits, and distinction between digital and analog signals for precise actuator control through sensor feedback.

Student price coming soon!

Course Description

The Microcontroller Sensors and Actuators - Level 2 micro-badge builds on foundational knowledge to empower students to create their own microcontroller systems. Learn to recognize and mount various motors, select suitable prototypes, and control motor speed and direction with H-bridges. Explore servos, actuators, and the nuances between analog and digital signals. Through engaging labs and activities, gain hands-on experience integrating sensors to control actuators.

Ideal for aspiring mechanical engineers, computer programmers, and technicians, this course offers the essential skills to excel in modern engineering roles. Join us on-campus to advance your technical expertise!

Session Topics:

- Motor Basics
- Motor Selection
- Introduction to H-Bridges
- Other Actuators
- Analog and Digital Signals

Key Skills Covered:

- Understanding different types of motors and their integration
- Utilizing H-bridges for motor control
- Exploring additional common actuators such as linear actuators and servo motors
- Differentiating between analog and digital signals and utilizing sensors accordingly

This program has not been scheduled.

Email us at **exec-fseonline@asu.edu** to be notified when the course is scheduled!

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Assistive Technology Microcontroller Applications

Overview

Engage with the engineering design process, delve into assistive technology, and develop prototypes using microcontrollers to improve accessibility for individuals with disabilities.

Student price coming soon!

Course Description

The Assistive Technology Microcontroller Applications - Level 2 micro-badge encourages creative problem-solving through iterative design, prototyping, and material selection. Learn to build prototypes using microcontrollers, understanding the nuances of material selection and iterative design. Explore how engineering can transform lives while refining your technical abilities.

This course empowers you to innovate and create impactful technology solutions. Join us on-campus for an engaging and transformative learning experience.

Session Topics:

- Engineering Design
- Introduction to Assistive Technology
- Research Strategies
- Mock-Ups and Prototypes
- Material Selection

Key Skills Covered:

- Understanding the engineering design process and its application in solving real-world problems
- Introduction to assistive technology and its significance in improving accessibility
- Research strategies for gathering essential information for engineering projects
- Creating effective prototypes using microcontrollers and common prototyping materials

This program has not been scheduled.

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