

Resource Exchange: The Basics of Computer Hardware for Middle School Students

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Dr. Stephany Coffman-Wolph is an Assistant Professor at Ohio Northern University in the Department of Electrical, Computer Engineering, and Computer Science (ECCS). Previously, she worked at The University of Texas at Austin and West Virginia University Institute of Technology (WVU Tech). She is actively involved in community outreach with a goal of increasing the number of women in STEM and creating effective methods for introducing young children to CS concepts and topics. Dr. Coffman-Wolph's research interests include: Artificial Intelligence, Fuzzy Logic, Software Engineering, STEM Education, and Diversity and Inclusion within STEM.

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Ahmed Ammar received the B.Sc. degree in electrical engineering from Sirte University, Libya, in 2005, and the M.S. and Ph.D. degrees in electrical engineering from West Virginia University, USA, in 2012 and 2019, respectively. In 2019, he joined Ohio Nor

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The Codetroller is a unique educational experience for all students from 5th grade through 12th grade. It consists of 6 tactile buttons and a Raspberry Pi Pico (a palm-size computer that allows students to learn about programming and basic electronics) and a 3D printed protective case. This is a cost-effective programming educational tool for students and teachers alike. The Codetroller replaces the traditional keyboard and mouse set up to allow your students to play preexisting games or explore learning to program in Scratch. This project provides an opportunity for students to learn soldering (but a pre solder option is available). Use the Codetroller to program a better educational opportunity for your students now!

OHIO NORTHERN UNIVERSITY

By Henry Debord, Dr. Ammar, Dr. Coffman- Wolph

THE CODETROLLER



How to Set Up

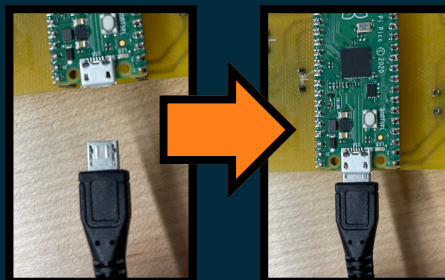
Step 1

Assemble the Controller



Step 2

Plug the Cord Into the Controller



Step 3

Plug the Cord Into the Computer



ALL FOR LESS THAN \$20!

Great For Grades 5th-12th

What Can It Do?

- **CONTROL STUDENT PROGRAMMED GAMES**
- **CONTROL DIGITAL TO PHYSICAL DEVICES**
- **PRACTICE SOLDERING**

What Will They Learn?

- **RASPBERRY PI ADJACENT DESIGN SKILLS**
- **PROGRAMMING SKILLS**
- **KINETIC BUILDING SKILLS**
- **SOLDERING SKILLS**

THIS PROJECT COULD ASSIST K-12 TEACHERS TO MEET CSTA K-12 COMPUTER SCIENCE STANDARDS.

(COMPUTER SCIENCE TEACHERS ASSOCIATION (2017). CSTA K-12 COMPUTER SCIENCE STANDARDS, REVISED 2017. RETRIEVED FROM [HTTPS://CSTEACHERS.ORG/K12STANDARDS/](https://csteachers.org/k12standards/)) AND NEXT GENERATION SCIENCE STANDARDS IN ENGINEERING DESIGN (CITATION: NGSS LEAD STATES. 2013. NEXT GENERATION SCIENCE STANDARDS: FOR STATES, BY STATES. WASHINGTON, DC: THE NATIONAL ACADEMIES PRESS).

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What Do You Need For It?

- **3D PRINTER OR THE SHELLS**
- **PCB**
- **6 BUTTONS**
- **PIN HEADERS**
- **RASPBERRY PI PICO**
- **MICRO USB TO USB CORD**
- **SOLDERING IRON**
- **SOLDER**