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Central New Mexico
Community College

MY IT INSTRUCTOR

Welcome

Integrating the Raspberry Pi

into your CIS Programs

Agenda

01. **Why the Raspberry Pi?**

Why the Raspberry Pi may be a good fit for your Students

02. **Potential Uses...**

Quick tour of potential projects, assignments, use cases for the Raspberry Pi

03. **Configurations**

Review of some common Raspberry Pi configurations and cost

04. **Conclusion/Questions**

Let's wrap it up and peek at all the cool resources listed on

http://www.myitinstructor.com/nctc.html

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Key Takeaway…

What one assignment or project could I change to include a Raspberry Pi in order to enhance my student's engagement in the assignment or project?

Why Integrate the Raspberry Pi into your CIS/CS Program...

- Low Cost

- Flexibility / Expandability / GPIOs

- Power / Size

- Community

- Tactile Learning Opportunities

Resources

HTTP://WWW.MYITINSTRUCTOR.COM/NCTC.HTML

- This is a Resource Heavy Presentation…
- I have listed all the links used to create this presentation plus many more on my website.
- Please visit the website to dig into the ideas shared in this presentation.

EXAMPLES
AND
USE CASES

Raspberry Pi in System Administration

Linux (Over 50 distros available)

Remote Administration
- VNC
- SSH
- KVM

Servers (Anything you can build on Linux)

Network Configuration and Infrastructure

Network Monitoring

OS Image Flashing

Virtualization
- KVM
- ESXi
- Thinlinx
- Minos
- BerryTerminal

Kali Linux

System Updates & Package Management

WiFi/BlueTooth/Ethernet

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Raspberry Pi in Networking

- Network+ Course – I have my students build the network infrastructure on Raspberry PIs.

- DNS/DHCP/WAP/Firewall/Proxy/File(SMB/NFS)/Print/VPN/VOIP /Network Monitoring/Network Scanner/Ad Blocking/TOR/Captive Portal/Dynamic DNS / NAS.

- Used online ticketing system (Spiceworks) to assign work related to the network build to simulate the real world

- Optional: Pi(Rate) Box, OwnCloud, and Quake/DOOM/Minecraft.

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Raspberry Pi in Cloud Computing

- AWS IoT
- Azure (Windows IoT)
- GCP IoT
- MongoDB
- IFTTT
- Twitter
- Dweet.io

- OwnCloud
- Google AIY Voice/Vision
- Media Server
- Cloud4RPi
- Hologram.io
- Zapier

- Mythic Beasts
  - Raspberry Pi Servers in the cloud
- Docker
- Home Assistant
- Amazon Alexa
- UpSwift.io

Raspberry Pi in Cyber Security

- Cisco IoT Fundamentals Security
  - Explore Device, Network, and Application vulnerabilities on IoT (Raspberry Pi) Devices
  - Conduct Vulnerability and Risk Assessments
  - Security Game utilizing Raspberry Pi

- Kali Linux on Raspberry Pi

- Network Scanning with Raspberry Pi

- Pineapple Pi – Portable Hacking Station

Raspberry Pi in Programming

Languages

Flexibility - IDEs

Physical Computing

Python, Java, Node-RED, SQL, PERL, Erlang, Scratch, Sonic-Pi, Wolfram, C, C++, C#, Rust, PHP, HTML5, JQuery, Node-js, PHP, LaTeX, Arduino, JavaScript, Fortran, Cobol, Go, R, Swift, Ruby, Scala, Kotlin

IDLE, MU, Thonny, BlueJ, Geany, Greenfoot, Mathmatica, Wolfram Scratch, Blockly, Visual Studio Code, Node-RED, Node-js, Arduino, Adafruit WebIDE, AlgoIDE, Ninja, Lazarus, Codeblock, Jupyter Notebook, MATLAB

The General-Purpose Input Output (GPIO) Pins provide for expansion, added capabilities and physical computing opportunities that are not available with a laptop or PC

Raspberry Pi in AI/Machine Learning

AI/Machine Learning

- Google AIY
- Coral AIY
- Tensor Flow
- OpenCV
- Pi-Top/.NET/Microsoft Teams

Robotics

- Pi-Wars
- Dexter Industries
- Pi-Top Robotics Kit
- Various Robotic Kits
- HomeBuilt Robots

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Raspberry Pi in IoT

Basic Electronics - Helps students to understand how computers work and that the connections are critical to a properly functioning system.

Python Programming - Students learn to write simple scripts to automate menial tasks.

Reinforce Sys Admin Skills - Flash SD cards, network configuration, Linux, project planning and management, remote control VNC/SSH, encryption keys, teamwork, presentation skills, and connecting divergent systems.

Creativity - When students are exposed to and asked to create their own Raspberry Pi projects, they are forced to think beyond the instructions. This process builds better IT Technician.
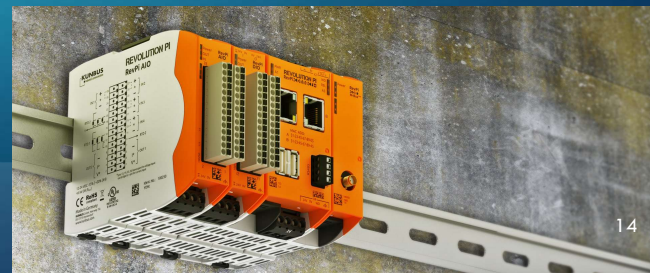
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Industrial Uses of Raspberry Pi

MyPi - Industrial IoT Integrator Board

Revolution PI - OpenSource IPC based on Raspberry Pi

netPI – Industrial Raspberry Pi As Open Edge Connectivity

Ecosystem

Raspberry Pi Compute Module

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Just a Reminder…
Why use Raspberry PIs in your CIS programs

- Low Cost
- Flexibility / Expandability / GPIOs
- Power / Size
- Community
- Tactile Learning Opportunities
- And they are just plain fun to work/play with…

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Did you see something Interesting today?

Can you think of at least one assignment or project could I change to include a Raspberry Pi in order to enhance my student's engagement in an assignment, topic or concept?

Opportunities…

- WASTC Instructor Training - https://www.wastc.org/
  - Virtual Faculty Development Weeks (4.5-day Workshops) – https://www.wastc.org/2021-fdw
    - June 7 – 11, 2021 – Networking with the Raspberry Pi
    - June 14 – 18, 2021 – Teaching CIS with the Raspberry Pi
  - Cisco IoT Connecting Things (Jul 10th - Aug 7th, 2021) Now includes bonus hands-on labs hours.
  - Cisco IoT Security (Nov 6th - Dec 11th, 2021) Now includes bonus hands-on Lab Hours
  - Cisco IoT Big Data and Analytics (March 20th - April 17th, 2022)
- Post Covid-19 - Onsite/Remote Workshops for Instructors or Labs for Students
- Conference Speaker/Workshop Facilitator

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About Me: Kerry A. Bruce

CompTIA ITF+, A+, Network+, Security+, Server+, Cloud+, AWS Cloud Practitioner, CCENT

2019-2020 CNM-BIT Distinguished Faculty

20+ Years in IT Industry - Small Biz, State Gov, Citibank, Sandia National Labs, MSP/VAR Owner

8+ Years - CIS Instructor - Central New Mexico Community College & Jefferson College

4+ Years - Cisco Instructor Trainer (IoT Fundamentals Courses) - WASTC

Raspberry Pi Certified Educator (Have used the Raspberry Pi in the classroom since 2014)

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Raspberry Pi Basic Configuration

Basic Setup - $100 - $200 (up to $300 w/add-ons)

Raspberry Pi Kits from Vilros/Sparkfun/Raspberry Pi

Add used/spare Keyboard/Mouse/Monitor

Get extra SD cards for backups & different OSes.

Misc. HATs, physical computing components, etc.

Optional: Add Pi-Top[4] DIY Edition ($99.95)

Raspberry Pi 400 Configuration

Raspberry Pi 400 Kit - $100 - $200 (up to $300 w/add-ons)

Raspberry Pi 400 Kits from Raspberry Pi

Add used/spare Monitor

Add a GPIO Expansion board for ease of use

Get extra SD cards for backups & different OSes.

Misc. HATs, physical computing components, etc.

PI-Top[4] Configuration

Pi-Top[4] Setup - $250 - $600

Pi-Top[4] Complete Kit

Add used/spare Keyboard/Mouse/Monitor

Get extra SD cards for backups & different OSes.

Misc. HATs, physical computing components, etc.

Optional: Add Pi-Top Keyboard, Screen, Sensors, Robotics Kit

Raspberry Pi Desktop OS Config

Raspberry Pi Desktop OS w/PiZero- $100 - $200

Using Old desktop PCs/laptops install Raspberry Pi Desktop OS

Buy Raspberry PiZeroW Kit ($30)

Using a USB cable, you can interact with GPIOs on PiZero

Get extra SD cards for backups & different OSes.

Misc. HATs, physical computing components, etc.

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Compute Module 4 for Industrial IoT

Raspberry Pi Desktop OS w/PiZero- $100 - $200

Designed for Industrial or embedded applications.

Cost effective and powerful

32 versions of Compute Modules starting at $25 -$90

IO Board $35

Compute Module 4 Antenna Kit $6