

PC/CP 320 Exploration Project

Terry Sturtevant

Wilfrid Laurier University

October 24, 2019

Outline

Outline

There are 2 projects this term.

Outline

There are 2 projects this term.

- *Integration* project

Outline

There are 2 projects this term.

- *Integration* project

Brings together several things you've done in lab

Outline

There are 2 projects this term.

- *Integration* project
 - Brings together several things you've done in lab
- *Exploration* project

Outline

There are 2 projects this term.

- *Integration* project
Brings together several things you've done in lab
- *Exploration* project
Allows you to investigate something that has been mentioned, but you haven't used in the lab

Outline

Outline

Why two projects?

Outline

Why two projects?

- The integration project only involves previously-seen material.

Outline

Why two projects?

- The integration project only involves previously-seen material.
The challenge is adapting the code to incorporate all of them.

Outline

Why two projects?

- The integration project only involves previously-seen material. The challenge is adapting the code to incorporate all of them.
- The exploration project introduces something you've never used.

Outline

Why two projects?

- The integration project only involves previously-seen material. The challenge is adapting the code to incorporate all of them.
- The exploration project introduces something you've never used. The challenge is learning how to use it.

Outline

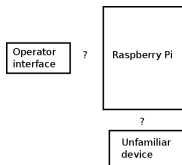
Why two projects?

- The integration project only involves previously-seen material. The challenge is adapting the code to incorporate all of them.
- The exploration project introduces something you've never used. The challenge is learning how to use it.

Trying to combine both would make it too easy to get overwhelmed.

Exploration project

Exploration project



- There are 4 weeks, (8 lab periods), exclusively for the projects.

- There are 4 weeks, (8 lab periods), exclusively for the projects.
Two weeks are exclusively for the integration project.

- There are 4 weeks, (8 lab periods), exclusively for the projects.
Two weeks are exclusively for the integration project.
Two weeks are mostly for the exploration project.

Schedule

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.

There are lots of resources online.

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.
There are lots of resources online.
- Lab 4A; Demonstrate basic functionality of the device.

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.
There are lots of resources online.
- Lab 4A; Demonstrate basic functionality of the device.
Show it doing *something*.

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.
There are lots of resources online.
- Lab 4A; Demonstrate basic functionality of the device.
Show it doing *something*.
- Lab 4B; *Demonstrate the completed exploration project.*

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.
There are lots of resources online.
- Lab 4A; Demonstrate basic functionality of the device.
Show it doing *something*.
- Lab 4B; *Demonstrate the completed exploration project.*
Show it doing *something that wasn't in any of the resources you found*.

Schedule

There are 2 weeks, (i.e. 4 lab periods), mostly for the exploration project.

- Lab 3A; Choose device to explore and learn about it.
There are lots of resources online.
 - Lab 4A; Demonstrate basic functionality of the device.
Show it doing *something*.
 - Lab 4B; *Demonstrate the completed exploration project.*
Show it doing *something that wasn't in any of the resources you found.*
- Be sure to highlight what you came up with on your own.**

Project Substitution Option

Project Substitution Option

- You have the option of *combining* the projects as follows:

Project Substitution Option

- You have the option of *combining* the projects as follows:
An *unfamiliar* input device can replace one input device for the integration project.

Project Substitution Option

- You have the option of *combining* the projects as follows:
 - An *unfamiliar* input device can replace one input device for the integration project.
 - An *unfamiliar* output device can replace one output device for the integration project.

Project Substitution Option

- You have the option of *combining* the projects as follows:
 - An *unfamiliar* input device can replace one input device for the integration project.
 - An *unfamiliar* output device can replace one output device for the integration project.
- If you make this your 4th device, you can determine feasibility during the first 3 lab periods.**

Project Substitution Option

- You have the option of *combining* the projects as follows:
 - An *unfamiliar* input device can replace one input device for the integration project.
 - An *unfamiliar* output device can replace one output device for the integration project.
- If you make this your 4th device, you can determine feasibility during the first 3 lab periods.**

This means that you are basically doing the projects in parallel.

Ramifications

Ramifications

- For the exploration project, you make a reduced test program for the unfamiliar device.

Ramifications

- For the exploration project, you make a reduced test program for the unfamiliar device.
(In fact, it may be similar to what you use for early testing of the device.)

Ramifications

- For the exploration project, you make a reduced test program for the unfamiliar device.
(In fact, it may be similar to what you use for early testing of the device.)
It may use functionality you created for the integration project.

Ramifications

- For the exploration project, you make a reduced test program for the unfamiliar device.
(In fact, it may be similar to what you use for early testing of the device.)
It may use functionality you created for the integration project.
- *If you can show it working on time as the 4th device, the integration demonstration can be delayed.*

Exploration Goal Options

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi
- **Previous Examples** - for devices with *several* examples with Raspberry pi

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi
- **Previous Examples** - for devices with *several* examples with Raspberry pi
Exhibit *different* operation with Raspberry Pi than examples

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi
- **Previous Examples** - for devices with *several* examples with Raspberry pi
Exhibit *different* operation with Raspberry Pi than examples
OR

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi
- **Previous Examples** - for devices with *several* examples with Raspberry pi
Exhibit *different* operation with Raspberry Pi than examples
OR
Change code format from examples

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi
- **Previous Examples** - for devices with *several* examples with Raspberry pi
Exhibit *different* operation with Raspberry Pi than examples
OR
Change code format from examples
e.g. create library if examples bit-bash

Exploration Goal Options

- **Preliminary** - for devices with *few or no* examples with Raspberry pi
Exhibit sample operation with Raspberry Pi
- **Previous Examples** - for devices with *several* examples with Raspberry pi
Exhibit *different* operation with Raspberry Pi than examples
OR
Change code format from examples
e.g. create library if examples bit-bash
e.g. add functionality absent from examples

Project Components

Project Components

- **Software** - simple example for others to use

Project Components

- **Software** - simple example for others to use
- **Documentation** - includes list of sources you used

Project Components

- **Software** - simple example for others to use
 - **Documentation** - includes list of sources you used
- You are part of an ongoing community of creators and developers

Project Components

- **Software** - simple example for others to use
 - **Documentation** - includes list of sources you used
- You are part of an ongoing community of creators and developers
- Your* work will be part of what *future members* of the community use

Project Components

- **Software** - simple example for others to use
- **Documentation** - includes list of sources you used
You are part of an ongoing community of creators and developers
Your work will be part of what future members of the community use
- **Video or screencast** - specifically exhibiting what you developed

Multivalued Input Options

Multivalued Input Options

- **Analog sensor** -such as resistive or capacitive soil moisture sensor, heart rate monitor
(combination project possibilities)

Multivalued Input Options

- **Analog sensor** -such as resistive or capacitive soil moisture sensor, heart rate monitor
(combination project possibilities)
analog output must feed into ADC to interface with the Pi

Multivalued Input Options

- **Analog sensor** -such as resistive or capacitive soil moisture sensor, heart rate monitor

(combination project possibilities)

analog output must feed into ADC to interface with the Pi

some will need voltage dividers or need analog voltage amplification or attenuation

Multivalued Input Options

- **Analog sensor** -such as resistive or capacitive soil moisture sensor, heart rate monitor

(combination project possibilities)

analog output must feed into ADC to interface with the Pi
some will need voltage dividers or need analog voltage amplification or attenuation

Devices like this require *calibration* to be useful to future users.

Multivalued Input Options (continued)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)
- **DHT11 temperature/humidity sensor** (*combination project possibility*)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)
- **DHT11 temperature/humidity sensor** (*combination project possibility*)
- **Keypad** - (*combination project possibility*)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)
- **DHT11 temperature/humidity sensor** (*combination project possibility*)
- **Keypad** - (*combination project possibility*)
- **Capacitive Hex Keypad** - (*combination project possibility*)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)
- **DHT11 temperature/humidity sensor** (*combination project possibility*)
- **Keypad** - (*combination project possibility*)
- **Capacitive Hex Keypad** - (*combination project possibility*)
- **RFID reader** - (*combination project possibility*)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)
- **DHT11 temperature/humidity sensor** (*combination project possibility*)
- **Keypad** - (*combination project possibility*)
- **Capacitive Hex Keypad** - (*combination project possibility*)
- **RFID reader** - (*combination project possibility*)
- **TM1638 Keypad/display** - (*combination project possibility*)

Multivalued Input Options (continued)

- **DS18B20 1-wire temperature sensor** (*combination project possibility*)
- **DHT11 temperature/humidity sensor** (*combination project possibility*)
- **Keypad** - (*combination project possibility*)
- **Capacitive Hex Keypad** - (*combination project possibility*)
- **RFID reader** - (*combination project possibility*)
- **TM1638 Keypad/display** - (*combination project possibility*)

Some of these have existing libraries; others may have simpler bit-bashing examples.

User Output Options (complex)

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display
- **128x32 OLED display** - (*combination project possibility*)

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display
- **128x32 OLED display** - (*combination project possibility*)
uses I^2C

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display
- **128x32 OLED display** - (*combination project possibility*)
uses I^2C
- **TM1637 display** - (*combination project possibility*)

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display
- **128x32 OLED display** - (*combination project possibility*)
uses I^2C
- **TM1637 display** - (*combination project possibility*)
- **TM1638 Keypad/display** - (*combination project possibility*)

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display
- **128x32 OLED display** - (*combination project possibility*)
uses I^2C
- **TM1637 display** - (*combination project possibility*)
- **TM1638 Keypad/display** - (*combination project possibility*)
- **LED string options** - (*combination project possibility*)

User Output Options (complex)

- **MAX7219 displays** - (*combination project possibility*)
including 8x8 dot matrix, 8 digit 7 segment display
- **128x32 OLED display** - (*combination project possibility*)
uses I^2C
- **TM1637 display** - (*combination project possibility*)
- **TM1638 Keypad/display** - (*combination project possibility*)
- **LED string options** - (*combination project possibility*)

Some of these have existing libraries; others may have simpler bit-bashing examples.

Operator Interface Options

Operator Interface Options

- If the device is for input, then the operator interface should be to display the output.

Operator Interface Options

- If the device is for input, then the operator interface should be to display the output.
- If the device is for output, then the operator interface should be to control the input.

Operator Interface Options

- If the device is for input, then the operator interface should be to display the output.
- If the device is for output, then the operator interface should be to control the input.

The simpler the interaction, the easier it is for others to understand and adapt.