**CPEN 291   
Mini-Project Report**

**A. Group info**

Lab section: \_\_L2B\_\_\_\_\_ (*L2A or L2B)* Group #: \_\_G7\_\_\_\_\_\_ (*Example: A-G1*)   
Group’s Lab Bench #s: \_\_7\_ and \_8\_\_ (*Example: 1 and 2*)   
Student names:

|  |  |
| --- | --- |
| Jerry Xu | Francis Godinho |
| Jared Paul | Ken Johnson |
|  |  |
|  |  |

All the underlined text in this template are for your info. You should remove any text that is underlined before submission to Canvas.

Please keep the format of the report as is (e.g. do not omit any section, or change the font size or margins).

In Sections B and C of the report:

* Explain the design and implementation procedures, and thoroughly provide documentation for the circuitry and software. During the project, you must have selected any method over another for some steps, describe the alternative (e.g. the second best) you considered. Include block diagrams or drawing to identify the main components and their interactions.
* You may include code segments in this part of the report only whenever needed for the explanations of the software design and approach. Your code must include comment statements, so do not repeat what is already included in the comment statements. As usual you will need to submit the complete code file separately, and also to include the complete code as an appendix to this report. The code must be readable in the first place and include sufficient comments (per code segment and per line, when needed) for documentation.

**B. Technical documentation for the main functionality**

Fully document your design and implementation for the main functionality here. In particular explain:

* What the six dance moves are, and how they are different
* How you have implemented each of the six robot moves
* What info the LCD displays and how it has been mounted/attached for optimal viewing

**C. Technical documentation for the additional functionality**

Fully document your design and implementation for the additional functionality here. Explain:

* What the additional functionalities are
* Include the list of the additional components you used
* The hardware implementation
* The software implementation

**D. Test and evaluations**

Explain your evaluation and testing procedures for hardware and software. Please demonstrate systematic testing, debugging and continuous integration. Include the problems you have encountered and how you resolve them, as well as best practices you have incorporated.

**E. Conclusions and Reflections**

Reflect and conclude on the lessons, tricks or interesting concepts you have learned during the project.

Also reflect on other aspects such as team work, project management, time management, ...

**F. References and bibliography**

Provide any relevant references.

Also include the list and description of the files submitted for this lab (including code and Fritzing breadboard schematics)

Include the following appendixes. There is no page limit for the appendixes.

**Appendix A – Robot pictures**

Include a few pictures of your robot here. The pictures should clearly show the robot as a whole, as well as all electronics, wiring and parts. Include photos taken from the top, and from the sides. Show the location/installation of circuits and components as clearly as possible.

**Appendix B - Code**

Include the complete CircuitPython code with comment statements. This code must be the same code as the files you demo and submit. Clearly identify the portion of the code for the main functionality and the Additional functionality.

The code must be readable, with indentation, syntax highlighting (that is, copy with colour coding), and on white background. The code must be in text (that is, absolutely no snapshots of the code).

**Appendix C - Fritzing**

Include the snapshot of your fritzing breadboard-view schematic. Include as many as you have, but clearly describe which is which. This is in addition to the fritzing file that you submit to the Canvas.

**Appendix D - GitHub**

Every group member must have reasonably and equally contributed to the project github repository. If that is not the case for any member and there is a valid reason as to why, please include an explanation here.

**Appendix E – Complete Component list**

Include the list of all the components used for the project.

If you have used any component you have purchased on own, include full info, a link to datasheet, and cost.

**Appendix F – Answer the following questions:**

Q1 – Teamwork: Explain in details the methods your group has used to communicate effectively among team members.

Q2 – Design Process for the additional functionalities: Describe clearly the process you used for the following design aspects of your own additional functialities.. Please spend time to carefully answer each of them.

1. **Use of process**: Describe your approach to adapt and apply a general design process for any additional feature. What was your approach?
2. **Constraint identification**: Explain the constraints that you must consider in the design of the additional functionalities.
3. **Solution generation**: Explain at least two possible alternative additional features that your group rejected due to technical reasons and explain why.
4. **Solution Assessment**: Explain how you tested and assessed the viability and then correctness of your group’s additional features.

**Appendix G - Other**

Include any other relevant info that does not fit in any other section in the report.

**B. Technical documentation for the main functionality**

The six dance moves are:

1.

2.

3.

4.

5.

6.

How they are different:

// to be finished

How we implemented each of the six dance moves:

// to be finished

What info the LCD displays and how it has been mounted/attached for optimal viewing:

// to be finished

**C. Technical documentation for the additional functionality**

What the additional functionalities are:

1. Music - buzzer

2. The ultrasonic sensor

3. Keypad

4. LED light show

Include the list of the additional components you used:

Buzzer, Ultrasonic Sensor, Keypad, LEDs

The hardware implementation:

We started the project by putting everything on the breadboards and assembling the robot. Then we wrote code to support the functionality of the robot. After extensively testing it, we started to move everything to the solder board to reduce the space used by the hardware components.

The software implementation:

// to be finished

**D. Test and evaluations**

Explain your evaluation and testing procedures for hardware and software. Please demonstrate systematic testing, debugging and continuous integration. Include the problems you have encountered and how you resolve them, as well as best practices you have incorporated.

**E. Conclusions and Reflections**

Reflect and conclude on the lessons, tricks or interesting concepts you have learned during the project.

Also reflect on other aspects such as team work, project management, time management, ...

We have spent a lot of time on the buzzer and LCD to figure out how to produce the result we wanted and how to synchronize and integrate the parts.

Moreover, this project not only tested our technical knowledge, but also the methods to improve efficiency to meet the deadline. We found that project management was a critical aspect. Since we divided up the tasks early in the project, it benefited us later because everyone had a clear understanding of what each person needed to do.

// add more

**F. References and bibliography**

Provide any relevant references.

Also include the list and description of the files submitted for this lab (including code and Fritzing breadboard schematics)

Bad Guy song notes: <https://leoouyang.com/itp/physcomp/tone-output-bad-guy-24-hours>

Super Mario song notes: <https://www.princetronics.com/supermariothemesong/>

LCD: ?

Shifter: ?

**Appendix A – Robot pictures**

Include a few pictures of your robot here. The pictures should clearly show the robot as a whole, as well as all electronics, wiring and parts. Include photos taken from the top, and from the sides. Show the location/installation of circuits and components as clearly as possible.

// TO BE FINISHED

**Appendix B - Code**

Include the complete CircuitPython code with comment statements. This code must be the same code as the files you demo and submit. Clearly identify the portion of the code for the main functionality and the Additional functionality.

The code must be readable, with indentation, syntax highlighting (that is, copy with colour coding), and on white background. The code must be in text (that is, absolutely no snapshots of the code).

// TO BE FINISHED

**Appendix D - GitHub**

Every group member must have reasonably and equally contributed to the project github repository. If that is not the case for any member and there is a valid reason as to why, please include an explanation here.

// TO BE FINISHED

**Appendix E – Complete Component list**

Include the list of all the components used for the project.

If you have used any component you have purchased on own, include full info, a link to datasheet, and cost.

1. 3D-printed Robot
2. Itsy Bitsy
3. Servo Motors
4. Solder Boards
5. TFT LCD
6. Piezo Buzzer
7. Ultrasonic Sensor
8. Keypad
9. Shifters
10. LEDs
11. Wires
12. Resistors
13. Capacitors

**Appendix F – Answer the following questions:**

Q1 – Teamwork: Explain in details the methods your group has used to communicate effectively among team members.

We used Trello to divide up and assign the tasks. We also have a Facebook group chat to post updates and communicate.

// ADD MORE

Q2 – Design Process for the additional functionalities: Describe clearly the process you used for the following design aspects of your own additional functialities. Please spend time to carefully answer each of them.

1. **Use of process**: Describe your approach to adapt and apply a general design process for any additional feature. What was your approach?
2. **Constraint identification**: Explain the constraints that you must consider in the design of the additional functionalities.
3. **Solution generation**: Explain at least two possible alternative additional features that your group rejected due to technical reasons and explain why.
4. **Solution Assessment**: Explain how you tested and assessed the viability and then correctness of your group’s additional features.

// TO BE FINSIHED