

## ABSTRACT

RoboQueen (Robotic Mannequin) is an ongoing research project in the Computer Engineering Technology Department. Its goal is to create a semi-autonomous internet-connected remote-controlled robotic mannequin to conduct research in several areas such as social robotics, interactive storefront fashion display model and to teach computer hardware, software, networking and mathematics concepts in various courses. In the current phase of the research project, some of the RoboQueen hardware circuits and components will be improved and updated with the help of 3D printed electronic and embedded circuits and sensors. 3D printing technology has advanced to the point where it is now possible to make composite circuits by mixing conducting and non-conducting materials to make custom devices and circuits. These custom 3D printed devices and circuits will be used to add more functionality and features to the RoboQueen project.

## INTRODUCTION

In the first phase of this research project the sub-system being implemented with the help of 3D printing is the LM3915 circuit. LM3915 is an audio visual LED display integrated circuit that has been used in RoboQueen for driving the LEDs used in the eyes and the lips of RoboQueen. This circuit board will be integrated into 3D printed lips. In addition, 3D printing is being integrated into the servo motor head and arm movements.

## HARDWARE

3D printed servo motor joints like the one shown below are being designed to replace the servo motor attachments currently being used in RoboQueen for the arms and head movement. Integrating the 3D printed servo motors into RoboQueen will give the robot a more accurate and more human like movement.

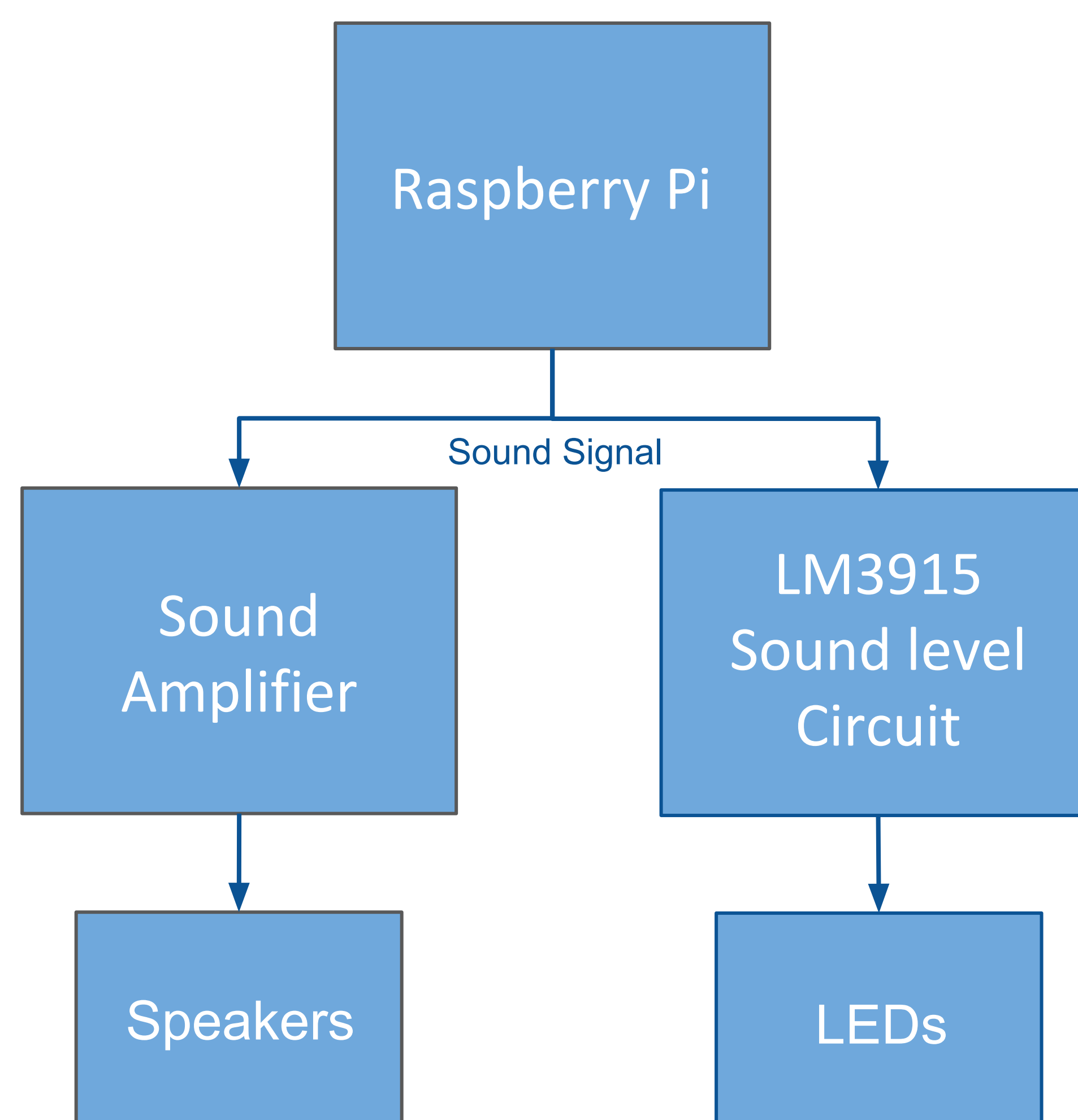


## PARTS LIST

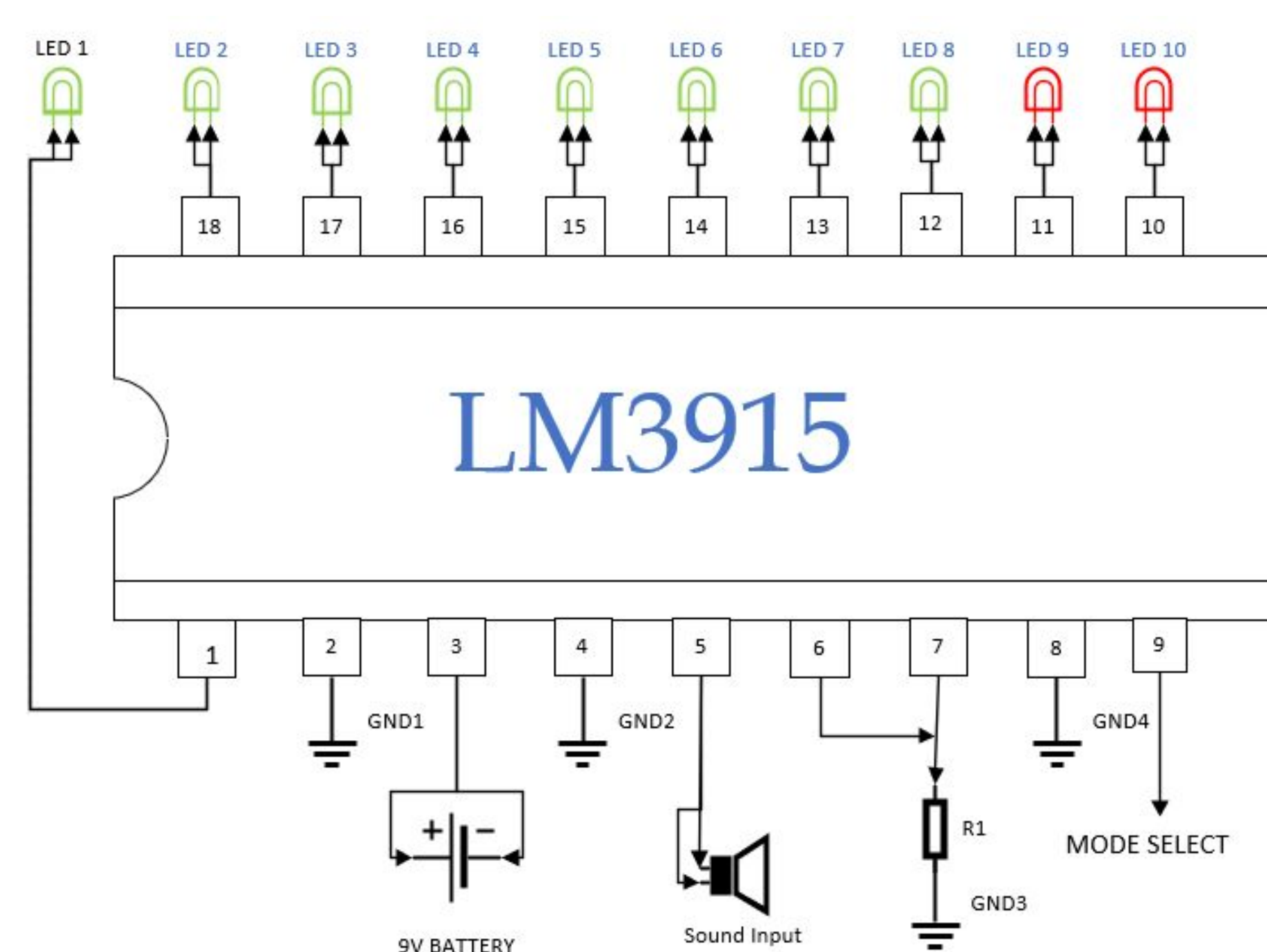
- Arduino UNO
- Raspberry Pi 3
- Servo Motors
- Speakers
- Microphone
- LEDs
- Power Supply
- Cardboard
- Extruded Aluminum Kit



## BLOCK DIAGRAM



## ELECTRICAL CIRCUIT



## ACKNOWLEDGEMENTS

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- CUNY Research Scholars Program 2018

## PROGRAM CODE

In the next stage of this project I will work with the software involved in RoboQueen. Currently it has three different software components.

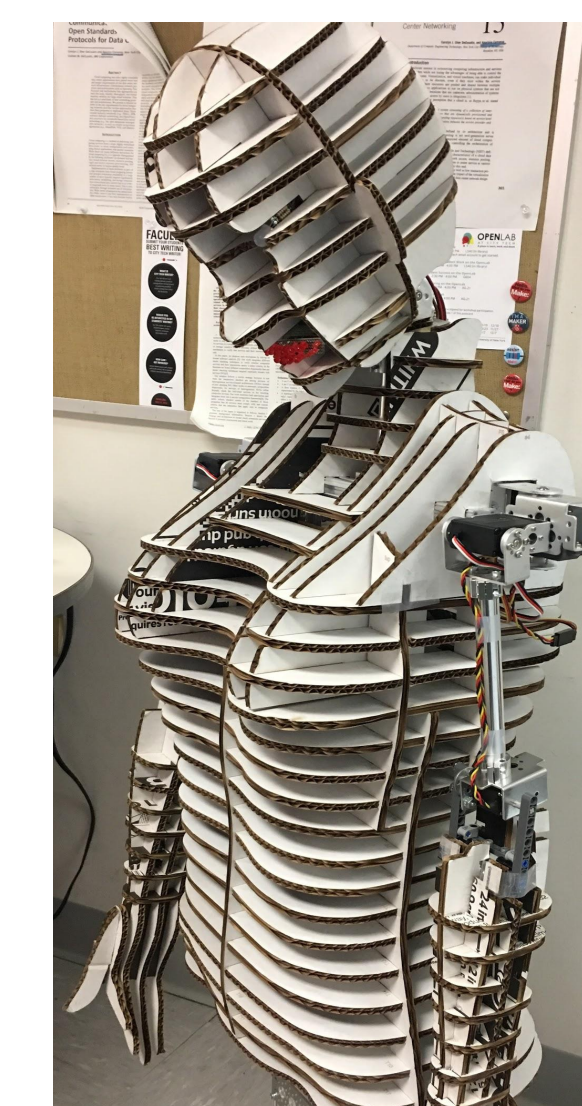
1. A C++ program running on Arduino to control the servo motors.
2. Raspberry Pi Linux Shell Script to control text to speech output.
3. Python code to activate speech based on sensor inputs.

When 3D printing servo motor joints are implemented, the arduino code will need to be modified in order to create a desired range of movement.

## FUTURE WORK

Areas of further research where 3D printing can be implemented:

- 3D physical modeling such as 3D printed robot frame.
- 3D printed body slices rather than cardboard slices which are currently used to make the body.



## REFERENCES

- “How Does a LM3915 IC: Visualized Audio Level Display Using LM3915.” *ElProCus - Electronic Projects for Engineering Students*, 22 Apr. 2016, [www.elprocus.com/visualized-audio-level-display-using-lm3915/](http://www.elprocus.com/visualized-audio-level-display-using-lm3915/).
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