

Worksheet: Frequency and Amplitude

Introduction to Mobile Robotics > Frequency and Amplitude Exploration

This worksheet is provided for reference only. Be sure that you follow the steps in the online directions, and answer the questions at the appropriate times. Fill out all your answers on a separate sheet of paper.

Exploration 1: Amplitude – Gather Data

Introduction

Exploration 1

2

3

4

Exploration 2

Conclusion

Observations:

1. Sound value for each tone in the sequence (Record in data table on last page)
2. Based on what you heard, what changed about the sound between each successive tone? What stayed the same?

Exploration 1: Amplitude – Analyze the data (1)

Introduction

Exploration 1

2

3

4

Exploration 2

Conclusion

3. Plot the data from the four different tones in order, using either a bar graph or a line graph, underneath the data table on the last page of this worksheet.
4. The four tones you heard in this exploration all had the same sound frequency (and wavelength), but had successively increasing sound amplitudes. Based on the pattern of your results...
 - i. Would you say that the sound sensor's reading is affected by the amplitude of a sound wave?
 - ii. If yes, then is there a clear pattern to the way in which the sound sensor values change based on the sound wave's amplitude? Explain.
5. Summarize briefly what you found out about the sound sensor and the amplitude of sound waves.

Exploration 2: Frequency – Gather Data

Introduction

Exploration 1

Exploration 2

2

3

Conclusion

Observations:

6. Sound value for each tone in the sequence (Record in data table on last page)
7. Based on what you heard, what changed about the sound between each successive tone? What stayed the same?

Exploration 2: Frequency – Analyze the data (2)

Introduction

Exploration 1

Exploration 2

2

3

Conclusion

8. Plot the data from the four different tones in order, using either a bar graph or a line graph, underneath the data table on the last page of this worksheet.
9. The four tones you heard in this exploration all had the same sound amplitude, but had successively increasing sound frequencies. Based on the pattern of your results...
 - i. Would you say that the sound sensor's reading is affected by the frequency of a sound wave?
 - ii. If yes, then is there a clear pattern to the way in which the sound sensor values change based on the sound wave's frequency? Explain.
10. Summarize briefly what you found out about the sound sensor and the frequency of sound waves.

Conclusions: Sound and Sound Sensor

Introduction

Exploration 1

Exploration 2

Conclusion

Answer the following:

11. Which quality or qualities of a sound wave affect the value that the sound sensor displays?
12. Write a short recommendation for or against the use of the sound sensor in each of the following situations. Be sure to explain the reason(s) for your decision.
 - i. Automatic noise-detecting light switch for cafeteria staff (see Clap On, Clap Off Activity)
 - ii. Tuning device for string instruments in the school orchestra
 - iii. Voice recognition device (something that can tell the difference between people voices) for a home security system
 - iv. Siren detector on traffic lights that listens for the siren of an approaching ambulance, fire truck or police car, and automatically turns the light green for them
 - v. Tea kettle watcher that listens for whistle of a boiling tea kettle and turns off the stove
 - vi. Baby monitor that alerts parents when a baby is crying in a crib at night
13. Suggest one or two more experiments that could be done to further explore the behavior of the sound sensor.
14. What is the term commonly used to describe a sound wave's amplitude? What is the term commonly used to describe frequency?

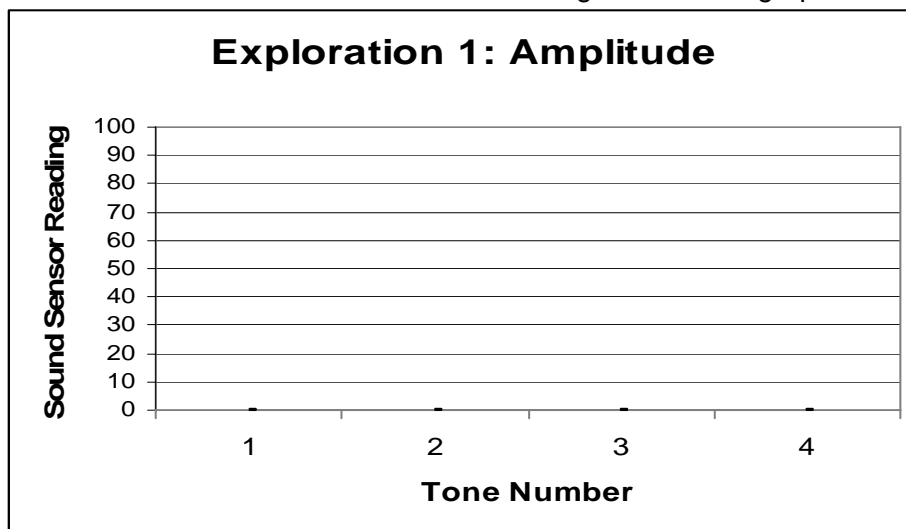
Tables and Graphs: Frequency and Amplitude

Introduction to Mobile Robotics > Frequency and Amplitude Exploration

Exploration 1: Amplitude

	1 st Tone	2 nd Tone	3 rd Tone	4 th Tone
Sound Sensor Value				

3. Plot the data from the four different tones in order using either a bar graph or a line graph.



Exploration 2: Frequency

	1 st Tone	2 nd Tone	3 rd Tone	4 th Tone
Sound Sensor Value				

8. Plot the data from the four different tones in order using either a bar graph or a line graph.

