Creating a Video Game for the Blind

Difficulty

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Required</td>
<td>Average (6-10 days)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>None</td>
</tr>
<tr>
<td>Material Availability</td>
<td>Readily available</td>
</tr>
<tr>
<td>Cost</td>
<td>Very Low (under $20)</td>
</tr>
<tr>
<td>Safety</td>
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</tbody>
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Abstract

Do you enjoy playing video games? Do you like the challenge of reaching a difficult game level and scoring lots of points? Video games include many graphic elements that are great to watch, but did you know that not only sighted people enjoy video games? Blind and visually impaired players can also play video games by relying on sound cues — the pings, pops, bangs, and bursts of music that make a game fun or exciting. When building a game that will be accessible to differently abled people, what kinds of tools and techniques can you use that will be perceptible to everyone? In this video and computer games science project, your goal is to build a video game that is engaging and entertaining for both sighted and blind or visually impaired players.

Objective

To build a video game that can be enjoyed by blind or visually impaired as well as sighted players.

Credits

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Cite This Page

MLA Style


APA Style

Introduction

We rely on our senses to gather information about the world around us and act accordingly. For example, if we heard a sudden crash, we would be startled. Or, if we smelled the delicious aroma of cookies coming from the kitchen, most of us would wander over to snag one. But how would we get along if one of our senses, such as sight, were impaired? Would that stop us from doing things that we enjoy? Not necessarily. Just ask several blind and visually impaired video gamers who don't allow their disability to prevent them from having fun with video games. How do blind and visually impaired gamers play video games? Well, they rely heavily on sound cues coming from the game to help them navigate through it. For example, the footsteps of an approaching attacker sound different than the footsteps of an attacker running away. Many video games include sound as a way to enrich the gaming experience for sighted players. But some video games include sound as a way to enable the blind or visually impaired to play the game, too. These kinds of games are known as accessible games. Everyone likes playing games with their friends and family, and that includes video games. Blind or visually impaired people want to be able to play games that both they and their sighted friends and family can also enjoy, creating a demand for games that are accessible for visually impaired players as well as visually exciting for sighted players. Some gaming companies and academic institutions are starting to meet this demand.

In this video and computer game science project, you will become a game designer, using the Engineering Design Process to devise a video game that a blind or visually impaired person can play. You will build a driving game in which the player starts at school or music practice and has to get home in time for dinner without hitting any obstacles. What kinds of problems will you have to understand to make such a game? How will you use sound as a major element in your game? Finally, how will you make your game fun to play? Besides enjoying yourself, you'll be doing your part to solve a social issue, too.

Terms and Concepts

- Visual impairment
- Sound cues
- Accessible games
- Blind gaming
- Flow charts

Questions

- What companies produce video games that are accessible to the blind?
- What are some examples of video games accessible to the blind? Can everyone find them interesting to play?
- What are some of the key features of video games designed to be played by people who are blind or visually impaired?

Bibliography

Creating a Video Game for the Blind

This page will help you get started with GameMaker and has links to lots of tutorials for beginners:


Materials and Equipment

- Computer with Internet connection
- GameMaker Lite; you can download the PC version at no charge from YoYo GameMaker for PC (http://www.yoyogames.com/gamemaker/windows) and the Mac version for free from YoYo GameMaker for Mac (http://www.yoyogames.com/gamemaker/mac). Please note that at the time this project was written, GameMaker worked better on PCs than on Macs.
- Optional: Audacity or other sound and audio recording software; You can download Audacity free of charge from audacity.sourceforge.net/download/ (http://audacity.sourceforge.net/download/)

Experimental Procedure

**Note:** This engineering project is best described by the **engineering design process**, as opposed to the **scientific method**. You might want to ask your teacher whether it’s acceptable to follow the engineering design process for your project before you begin. You can learn more about the engineering design process in the Science Buddies Engineering Design Process Guide (http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml).

Planning Your Game in GameMaker

1. In this video and computer games science project, you will create a game that entertains both sighted and blind or visually impaired players. The goal for players is to drive their car through a busy city and make it home in time for dinner without hitting any obstacles along the way.
2. First, download the GameMaker Lite program from YoYo GameMaker for Mac (http://www.yoyogames.com/gamemaker/mac) or YoYo GameMaker for PC (http://www.yoyogames.com/gamemaker/windows). Make sure that your computer’s operating system fits the requirements for running GameMaker listed on the download page.
3. Before you start programming your game, work through the first two beginner (Level 1) tutorials listed in the GameMaker User Guide (http://www.sciencebuddies.org/science-fair-projects/project_ideas/Games_GameMaker_Guide.shtml). These tutorials, each only about 30 minutes long, will walk you through the steps of making a video game with GameMaker. Even if you’ve never programmed before, you will be ready to tackle this driving game project after working through the tutorials.
4. Once you have completed the two beginner tutorials, have practiced with GameMaker, and feel comfortable with the programming environment, it is time to start the project. As noted at the beginning of this procedure, this project follows the Engineering Design Process (http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml). Remember, if you run into trouble making your game, or feel as if you want more practice before tackling this project, the GameMaker User Guide (http://www.sciencebuddies.org/science-fair-
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projects/project_ideas/Games_GameMaker_Guide.shtml also contains links to many other beginner tutorials as well as GameMaker help documents, a wiki, and a forum you can turn to with specific questions.

5. **Define the problem.** In this case, you will create a fun video game that both sighted and blind or visually impaired players can enjoy. Refer to the Science Buddies [Define the Problem](http://www.sciencebuddies.org/engineering-design-process/engineering-design-problem-statement.shtml) page to help you set the boundaries for the project.

6. **Do background research.** Read the references in the bibliography to develop an understanding of blind gaming. You should also study the YoYo Games tutorial [What Is a Good Game?](http://sandbox.yoyogames.com/make/tutorials) to start thinking about the goals of building a successful video game.

7. **Develop the project requirements.** The project requirements are the characteristics that your video game must have to be a successful and educational video game. Refer to the Science Buddies [Specify Requirements](http://www.sciencebuddies.org/engineering-design-process/engineering-design-requirements.shtml) page for tips on how to formulate your game's design requirements. Here are some ideas to consider when formulating the requirements:
   a. For sighted players, what kind of sprites (that is, images or animation) do you want to use? Do you want to use cars, motorcycles, trucks, or bicycles? Where will you get the sprites?
   b. How do you want the game to feel, in terms of sound cues, pacing (how fast the game moves), and other elements that will engage everyone who plays?
   c. How will you make the roadway? Will it be a maze or a scrolling pathway (a path that moves across the screen)? If you use a scrolling pathway, how fast will it move and what obstacles will pop up?
   d. Using sound is a requirement. Will you use your own sounds in the game or will you reuse sounds from the GameMaker tutorials? If you plan to make your own sounds, you can use audio editing and recording software like Audacity. Download [Audacity](http://audacity.sourceforge.net/) for free from the Internet.
   e. How long will the game last?
   f. How will the game be won or scored?

**Building Your Game in GameMaker**

1. **Create and analyze solutions.** Keeping your project requirements in mind, think about different ways that you could build your game. Take a look at the Science Buddies document [Create Alternative Solutions](http://www.sciencebuddies.org/engineering-design-process/alternative-solutions.shtml) to guide your efforts. Once you have developed a few solutions, analyze the solutions by making rough sketches and flow charts for each one. Refer to the Science Buddies [Choose the Best Solution](http://www.sciencebuddies.org/engineering-design-process/best-solution.shtml) page to help you pick a working solution.

2. **Build and test a sample video game.** Once you have created a set of requirements and a possible solution, it is time to open GameMaker and start working on building a sample video game. Build a sprite and an object and have it drive around a simple maze or scrolling pathway. Remember to review your requirements so that you keep yourself focused on the task. Review the Science Buddies [Prototyping](http://www.sciencebuddies.org/engineering-design-process/engineering-design-prototypes.shtml) document. In particular, remember that your goal is to create a video game that is appealing and fun for both sighted and visually impaired or blind players.

3. **Program your video game.** Keep testing the game as you work. When you have fulfilled a requirement or task, run the game and test it out.

4. Break the game programming up into smaller tasks so that the project is not overwhelming.
   a. Test the game along the way so that you can fix small issues as they come up. This will prevent your having a long set of events at the end that don't work.
   b. Once you have finished your game, check to see that all of the project requirements are fulfilled.

5. **Test and redesign.** Review the Science Buddies [Test and Redesign](http://www.sciencebuddies.org/engineering-design-process/testing-redesign.shtml) document to help organize your work. Test your game out on your family, your friends, and yourself. Make sure either to have people in your test pool who are blind or visually impaired, or to simulate...
that situation as closely as possible by having some of your test subjects play the game blindfolded. Take notes on what your players enjoyed and didn't enjoy about the game. Use the feedback to improve your game.

The Final Product: Presenting Your Game

1. When presenting your game at your science fair, try to bring in a computer. If you are not able to do so, take screenshots of your work, print them out, and mount them to a poster board. If you need help taking screenshots, ask a teacher or someone else familiar with the computer for help.

2. You should include the following items in your presentation:
   a. A list of your project requirements that guided your building of the video game.
   b. The rough sketches or flow chart that describes how the game works.
   c. An explanation of what you learned from your research and from creating the video game.

3. If you would like to publish your game for a wider audience to view, the Tips and Resources for Making Video and Computer Games page lists several places to do that.

Variations

- Add additional rooms to your game. For example, have your player go into a grocery store prior to reaching home.
- Learn GameMaker Language (GML) and then use GML to improve your game. You can use GML to write a program or a script that can warn your players of upcoming obstructions.

Ask an Expert

The Ask an Expert Forum is intended to be a place where students can go to find answers to science questions that they have been unable to find using other resources. If you have specific questions about your science fair project or science fair, our team of volunteer scientists can help. Our Experts won't do the work for you, but they will make suggestions, offer guidance, and help you troubleshoot.


Related Links

- Science Fair Project Guide (http://www.sciencebuddies.org/science-fair-projects/project_guide_index.shtml)
- Other Ideas Like This (http://www.sciencebuddies.org/science-fair-projects/search.shtml?v=solt&pl=Games_p029)

If you like this project, you might enjoy exploring these related careers:
Computers are essential tools in the modern world, handling everything from traffic control, car welding, movie animation, shipping, aircraft design, and social networking to book publishing, business management, music mixing, health care, agriculture, and online shopping. Computer programmers are the people who write the instructions that tell computers what to do. Read more

Are you interested in developing cool video game software for computers? Would you like to learn how to make software run faster and more reliably on different kinds of computers and operating systems? Do you like to apply your computer science skills to solve problems? If so, then you might be interested in the career of a computer software engineer. Read more

If you've ever watched a cartoon, played a video game, or seen an animated movie, you've seen the work of multimedia artists and animators. People in these careers use computers to create the series of pictures that form the animated images or special effects seen in movies, television programs, and computer games. Read more

News Feed on This Topic

Blindfolds On: Designing Video Games for the Visually Impaired
(Science Buddies Blog, December 6, 2012)

Success Story: A Video Game for the Blind (Science Buddies Blog, May 24, 2012)

ASU program aims to improve access to STEM classes for blind, visually impaired students (EurekAlert!, August 23, 2012)

Note: A computerized matching algorithm suggests the above articles. It's not as smart as you are, and it may occasionally give humorous, ridiculous, or even annoying results! Learn more about the News Feed.
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You can find this page online at: http://www.sciencebuddies.org/science-fair-projects/project_ideas/Games_p029.shtml

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