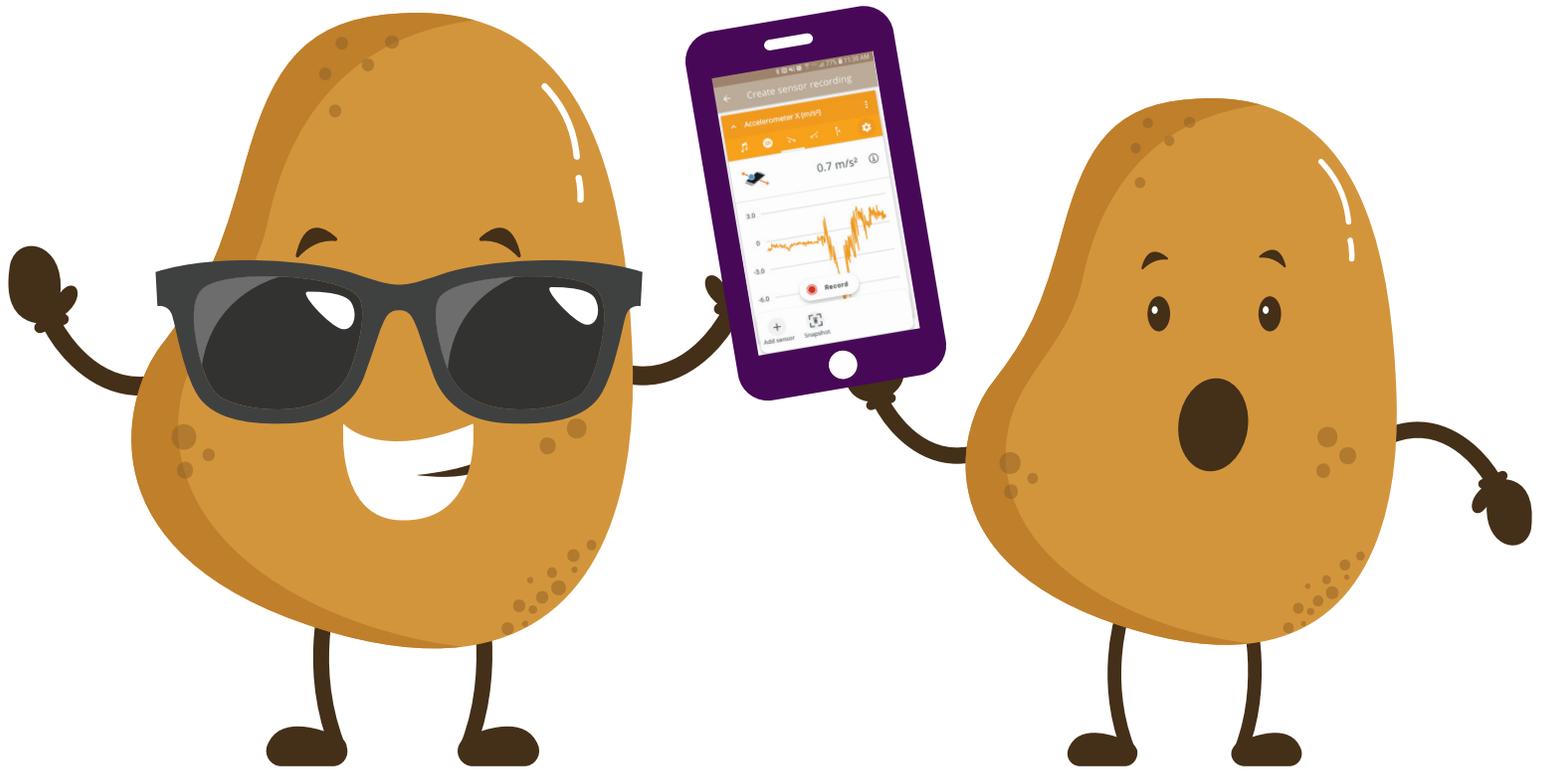




Who says all the fun has to happen at The Tech Interactive? Explore data science and rethink a classic game using your smartphone and the Arduino Science Journal app!



Introduction

How do you make Hot Potato high tech? Add a phone, hands-on prototyping, and some data analysis, of course! In this twist on the classic party game, the “hot potato” is a DIY container for your smartphone to keep it as still (and safe!) as possible. After designing your “hot potato,” load your phone with the Arduino Science Journal app and record the motion detected by the phone’s accelerometers while it’s passed around. Work as a team to analyze the graphs and reduce the amount of motion detected. Whether playing in pairs or a larger group, this activity is a fun and active way to explore designing your own experiments!



This activity uses the [Arduino Science Journal app](#), which lets you use your phone’s sensors to create experiments and record data on the world around you. If you haven’t used it before, download the app and play with it first.

Subject:

Data Science

Ages:

7+

Time:

15-20 minutes

Key concepts:

Data literacy,
forming hypotheses,
experimentation,
defining and testing
variables

Materials

- Smartphone with the Arduino Science Journal app
- DIY “Hot Potato” supplies (see below)
- Music player and your choice of music
- Protective phone case (recommended)
- Friend(s) to play with!



DIY “Hot Potato”

You will need at least one item from each category, but don't limit yourself to the items on this list. Use whatever you have on hand — be creative!

Remember: You will need to be able to open the hot potato easily to see the app!

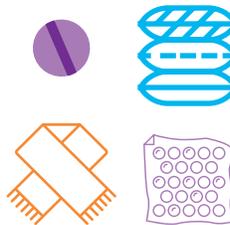
Containers

- Strawberry baskets
- Cardboard food boxes
- Cloth lunch bags
- Plastic storage containers



Cushioning

- Foam
- Small pillows
- Soft balls
- Scrap fabric
- Cotton balls
- Bubble wrap
- Scarves



Fasteners

- Rubber bands
- Yarn or string
- Chenille stems (pipe cleaners)



Warning: This activity may involve tossing the smartphone to other people, so please exercise caution and check in with an adult before you begin. We highly recommend using a durable phone case to protect the phone from potential damage. If you would like extra protection, play over soft surfaces like carpet or place pillows on the floor.

Instructions

Create and Test the “Hot Potato”

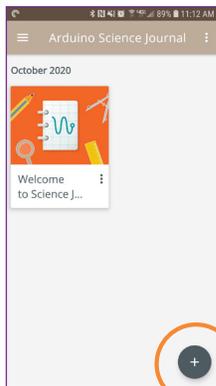
1. Before you can experiment, you will need to create your DIY hot potato. The goal of your hot potato is to keep your phone still and prevent smaller movements from being recorded throughout the game. It will also add protection to your phone throughout the activity.
2. Find materials that work for you but consider the categories we've suggested:
 - **Container** to put the phone in
 - **Cushioning** inside the container to prevent it from moving around
 - **Fasteners** to keep the container closed when it is tossed around
 - Keep in mind that you will need to make it easy to open the container after each experiment to turn off the sensor and analyze the results.
3. Build your hot potato and test it out by shaking it gently or moving it around.
 - Do you hear the phone moving inside? Is the hot potato preventing extra movement of the phone?



Conduct the Experiment

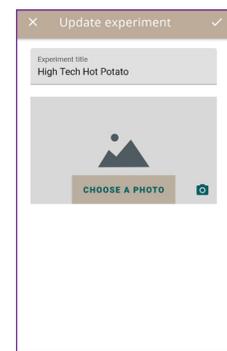
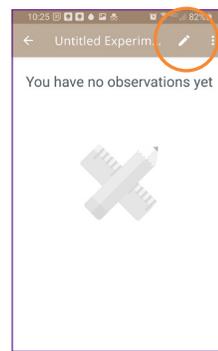
1. Just like its namesake, in “High Tech Hot Potato” players toss the hot potato around a circle while music plays. When the music stops, they open the hot potato and analyze the data.
2. However, High Tech Hot Potato is a little different from the classic version of the game.
 - It’s collaborative. High Tech Hot Potato focuses on working together as scientists, rather than competing. Although the players are still trying to not be the last one holding the hot potato, no one is “out.”
 - It can be played with 2 or more players.
3. Before playing, designate one person to be the **DJ** for the first experiment. The rest of the **Players** will be in charge of starting and stopping the experiment recording on the Science Journal app.
4. Follow this basic game play for the experiment:

- 1 **Open the Arduino Science Journal app and start a new experiment.**



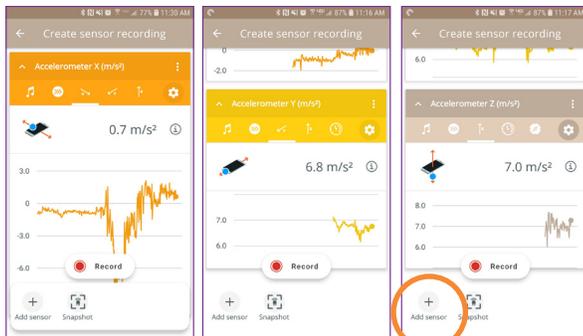
Tap the + icon to start a new experiment.

- 2 **Rename it High Tech Hot Potato. (This will help you organize your data and experiments.)**



- 3 **Add Accelerometers X, Y and Z (m/s²) to the experiment.**

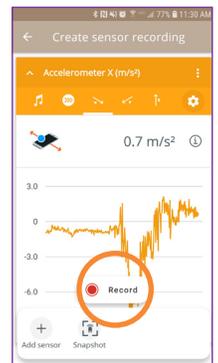
Tap the + icon to add a sensor.



- 4 **Players stand across from each other or in a circle and press the red record button to start an experiment.**

Tap the Record button to record.

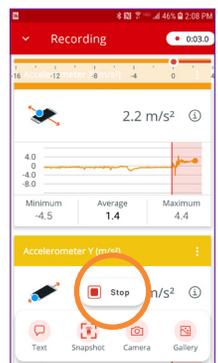
- Place the smartphone inside the DIY hot potato!



- 5 **DJ starts the music once the phone is secure.**

- Players toss the hot potato around the group.
- The DJ can either join the game or make observations to share later.

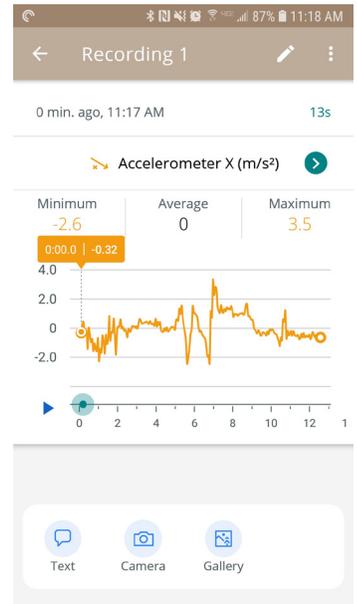
- 6 **When the music stops, open the hot potato and end the recording by pressing the red stop button.**





Analyze, Hypothesize and Play Again!

- After each round of the game, **analyze the results** of the graphs:
 - Which accelerometers (X, Y, or Z) detected increased motion?
 - When were there peaks in the graphs? What could have caused those peaks?
 - How can the group adjust the experiment/game strategy to lower the range in numbers?
- As a group, make a hypothesis**, or educated guess, about the results you will get if you change the way the experiment is conducted (how the game is played). For example, you might change:
 - How you move the hot potato. (What can you do other than toss?)
 - The distance between players.
 - How high or low you toss the hot potato.
 - How quickly you move the hot potato.
- Test the hypothesis** by conducting another experiment with your new strategy. (Choose a different person to be the DJ.)
- Analyze the results and keep experimenting.** As you play, consider which strategy, or strategies, worked the best and why.
 - Did you have more or less motion on any of the accelerometers?
 - How is your data different each time you play? Why do you think it has changed?
 - Are there any peaks on the graphs from your new tests that are higher than your first? What could have caused this result?



Observation Notes

Arduino Science Journal has a feature that allows you to take notes on your experiments. Try recording notes on your results after each test to see which test had the best results. Consider comparing your notes with other testers and see if there are any differences.

Keep Experimenting



More Players: How do the results change when you add more players to the game? What adjustments do you have to make to how you communicate and work together?



More Phones: Consider what would happen if two (or more) smartphones were introduced to the game. Do you think the phones would record different data during the same test? Try it and find out! Don't forget you will have to make another DIY hot potato for the second phone.

Share Your Results! Keep us posted about your design challenges on social media with **#TheTechatHome**.



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