Abstract: Science and Engineering Fair of Houston

1305

Proppeling Droplets

Category: Physics and Astronomy

Nathaniel Tan, Michael Zhang, James Li

Spring Branch ISD/Spring Branch Academic Institute

Our project is a test in the field of quantum physics. In our experiment, we asked ourselves, how does the frequency of a vibrating plate affect the path that a granular, non-spherical object on top of the plate? We are testing pilot-wave theory as we observe the path of an object on a vibrating plate. We hypothesized that the path would have a semi-random path from our research in the field of walking droplets using sources such as NJIT and Purdue University. We used various materials such as little beans and metal to place on our vibrating plate. What we did was create a small surface that would cause the object placed upon it to move around as the surface oscillates. Then we measured the movement of the path and the height of the bounces. We did not see many specific patterns or results which would not have happened if pilot-wave forces did exist in our structured environment. However, we did see consistent averages of the height of the highest bounce in our conclusion data. We hope to modify this experiment in the future by resolving most of our technical issues as well as observing non-Newtonian fluids or solid-liquid contact.

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Abstract: Science and Engineering Fair of Houston

1306

Bounce Battle: Heat vs. Ice

Anna Roeper

Alief ISD/Houston Academy

Category:

Physics and Astronomy

This project was done to determine whether temperature affects the bounce height of a softball. Softball players know that many things can affect the bounce and velocity of a softball, such as the speed the ball was thrown or hit, the firmness of the ground it is bounced on, and what kind of spin/movement the ball is traveling with. However, this project was done to definitely determine whether temperature alone affects the bounce of a softball. To determine whether temperature affects the bounce, all of the other conditions were to be the same. Same drop height, same release method, same location/floor, and using identical (new/unused) softballs. Six softballs were used: 2 at room temperature, 2 below freezing, and 2 over 100°F. The cold ones were kept in a sealed bag in the freezer and the hot ones were kept wrapped in a heated blanket until the moment they were ready to be tested. A temperature gun was used to check each softball's temperature prior to being dropped. Each ball was tested 5 times at a 5 ft drop and then the entire experiment was redone at an 8 ft drop. The data supports that temperature does affect the bounce height of a softball. The hotter the softball is, the higher the bounce. This is good for softball players to know and take into consideration when they are fielding a softball in various temperatures.

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Abstract: Science and Engineering Fair of Houston

1307

All Gas No Brakes

Carlos Guevara

Houston ISD/BCM Biotech Academy at Rusk - MS

Category:

Physics and Astronomy

My project is about how changing the type of air affects the distance and speed of a balloon powered car affect the distance and speed? My purpose for choosing my project was to understand how the gasses worked and if we are able to use them as an alternate fuel source. When analyzing the data I noticed that exhaled air (Breath) excelled in every trial while Helium didn't do so well in every trial. The trouble I had was acquiring the Alka Seltzer gas. What I had to do was make the chemical reaction with the water and Alka Seltzer tablets, then quickly put on the balloon on the flask to get the gas to test. The results showed that Exhaled air (Breath) had the best total distance and fastest overall speed.

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Abstract: Science and Engineering Fair of Houston

1308

Predictive Quantum Code for Molecular Orbital Configuration

Ammar Ashary

Private/THE HONOR ROLL SCHOOL - MS

Category:

Physics and Astronomy

Molecular orbitals are essential to understand the mechanisms by which chemical reactions occur. Predicting a factor with such great weight could heavily affect research and reduction of time, and necessary trials. ML models are trainable based of datasets that can be found online, some of which show the atoms and the given molecular orbitals after. This project aims to train a model to take atoms and use the wave function and previous datasets to predict the molecular orbitals at the end. Despite the usage of data sets, another basis upon which the model has been trained is the LCAO(linear combination of atomic orbitals) to ensure accuracy.

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Abstract: Science and Engineering Fair of Houston

1309

Chladni Plates Wonders in Sound

Noah Morris

Clear Creek ISD /Brookside Intermediate School

Category:

Physics and Astronomy

Abstract This project was completed to evaluate what frequency of sound waves affects the movement of small objects and the creation of constructional waves. This is beneficial research, because military groups have been recently using the frequency of 300 MHz with such precision that they can shoot drones out of the sky. The focus in this experiment was to find the frequency moves small objects moving the most. In this project, the objectives performed were building a Chladni plate, testing out different frequencies on different shaped surfaces by changing out each shape after every 50Hz, the different shapes were, square, triangle, circle, diamond, rectangle, and star. In the project at the end, the results were that 120Hz was the most active among all but one shape. Which was square. One of the strangest results was that the diamond shape stayed with the least number of constructional waves, and that pentagon had the most constructional waves throughout. All the data proved the hypothesis was wrong; the number of sides to a shape does not affect the number of constructional waves; the amount is almost random. This project contributes to the project category by showing how different frequencies act on different shaped surfaces.

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Abstract: Science and Engineering Fair of Houston

1310

What materials can block a Wi-Fi signal?

Maryam Noman

Private/Houston Quran Academy - Spring - MS

Category:

Physics and Astronomy

This experiment was designed to test the impact of different materials on Wi-Fi strength when they are placed in front of a Wi-Fi router. There were four things that were used to block Wi-Fi. The list includes a person, aluminum, stainless steel and cardboard. An app on a wireless device was used to measure the strength of the Wi-Fi signal. Aluminum blocked the Wi-Fi radio waves the most. The person was after aluminum and after that was steel which was followed by cardboard. The average values across trials for different materials were used to make the comparison. The hypothesis that Aluminum will block the Wi-Fi radio waves the most, was accepted. Contrary to initial expectations, the human body attenuated Wi-Fi radio waves to a greater extent than stainless steel. Furthermore, in Trial 2, the attenuation caused by the human body exceeded that of aluminum, an outcome that was also unanticipated.

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Abstract: Science and Engineering Fair of Houston

1311

Sound travel

Patricio Molina Velazquez

Houston ISD/BCM Biotech Academy at Rusk - MS

Category:

Physics and Astronomy

I did a class room model with drywall and used three different wall surfaces top test which one was the most efficient in helping the sound propagate better , I used two phones to produce the sound and measure it , there were 6 tests done and they were 2 for every wall surface , at the end of the experiment I discovered that the flat wall surface was the most efficient of all in propagating the sound meaning that the walls dont need any change on their surface but if you need the room to be more quiet the most efficient wall surface is the 3D wall surface because its slits dont let the sound vibrations to bounce off of the walls.

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Abstract: Science and Engineering Fair of Houston

1312

Collision & Collinearity Dynamics

Category:

Physics and Astronomy

Oliver Weng, Mazen Kanama

Conroe ISD /McCullough Junior High

This project explores collinearity and collisions by studying what happens when two toy cars collide head-on. Since collisions occur in everyday life, as seen in sports, playground activities, and most importantly, car crashes, understanding how they work is crucial. The purpose of this experiment was to observe how the mass and speed of an object before collision affect how both objects move forward. This project also helps explain Newton's Laws of Motion and the law of conservation of momentum. In the experiment, a straight toy track was set up on a flat surface. Different toy cars with different masses were used. One car was placed at rest, while the other car was launched towards it. The speed of each vehicle at the time of collision was recorded. After the crash, we recorded each vehicle's displacement. This process was repeated several times with cars with different masses and starting speeds to collect enough data. The collected data was organized into a spreadsheet to compare the before and after states for each collision. The results were analyzed to test whether momentum was conserved. Overall, this project shows that the motion of objects after a crash depends on both their mass and speed. This experiment helps explain real-world collisions and shows why understanding momentum is vital for designing and setting safer road speeds to improve road safety.

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Abstract: Science and Engineering Fair of Houston

1313

Windmills

Ayaan Dhanani

Private/THE HONOR ROLL SCHOOL - MS

Category:

Physics and Astronomy

In this project, I tested which material works best and how many blades produce the most energy. I tested this by making different sets of windmill blades using paper plates and different materials, then comparing the energy each setup created. I found that 6 plastic blades worked best and produced the most energy. This matters because it shows that plastic blades can be more effective than wood or popsicle sticks for making a windmill generate energy.

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Abstract: Science and Engineering Fair of Houston

1314

How a Skater Controls Their Rotation Rate

Category:

Physics and Astronomy

Alexis Richardson

Conroe ISD /McCullough Junior High

If a skater moves their arms of an extended position to a tucked in position then their rate of rotation will increase. The project I am doing is important because it helps explain the physics of spinning on ice and can help skaters improve their spins by understanding and working at it. During the experiment the trials with the tucked in position had more rotations and in a smaller amount of time. The trials with the outstretched position had a fewer amount of rotations in a slower amount of time. The graphs showed that although the outstretched position was much slower, its rotation amount was constant. During the tucked in position the number of rotation changed a lot. This shows that a tucked in position is faster than an outstretched position.

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Abstract: Science and Engineering Fair of Houston

1315

How Much Time does it take to Soak an Oboe Reed to get the Maximum Sound Quality?

Abby Zwart

Clear Creek ISD /Westbrook Intermediate School

Category:

Physics and Astronomy

I designed a device that could blow air into an oboe reed at the same note of E6 I soaked the reeds for difference amounts of time for each level of my independent variable, and I had 5 trials for each amount of time the reed was soaked. The device I made will help the results be more constant and therefore, more accurate. This will help oboists in the future know how long they need to soak their reeds to make it peak sound quality. Overall, soaking an oboe reed for 4 minutes produced the most harmonious peaks (an average of 6-7 peaks) and a smaller number of non-harmonious peaks, so that is the ideal soaking time to produce the highest quality sound. Soaking an oboe reed for 2 or 3 minutes produced a slightly less quality sound (an average of 5-6 peaks), but it was better than 30 seconds or 5 or 10 minutes.

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Abstract: Science and Engineering Fair of Houston

1316

Perpetual Motion

Hailey Henderson

Charter/School of Science and Technology, Houston - MS

Category:

Physics and Astronomy

The purpose of this experiment was to prove how perpetual motion was impossible by using the laws of thermodynamics. This project shows not to trust them, and also informs others on if it is possible or not. What I did was create a wheel from scratch using materials such as cardboard, hot glue, and marbles to show this theory. I spun the wheel and concluded that perpetual motion was definitely impossible. This was very important because it was the main point of my project, and it proved my hypothesis which was that it wouldn't work as true. I not only concluded that perpetual motion was false, but I also learned about the laws of entropy as well. This project could have also been easily proved as false by using my research on how people have used fake machines in the past, but the wheel was very important on the real demonstration of the project.

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Abstract: Science and Engineering Fair of Houston

1317

The Effects Of Voltage On The Performance Of A Motor

Yasmine Ashraf

Private/Houston Quran Academy - Spring - MS

Category:

Physics and Astronomy

This research investigates how voltage, load, and temperature affects the performance of a 1 Ampere motor. The independent variables included varying different numbers of 1.5 V AA batteries, the addition of LED lights to the circuit, and the use of batteries frozen for two hours. Motor performance was measured by rounds per minute (RPM) made by an attached figurine. The study hypothesised that increased voltage would raise motor speed. While adding LED lights or reducing battery temperature would decrease it. To test this, RPM was recorded using varying number of batteries under three conditions: a motor only circuit, then circuit with integrated LEDs, and a circuit using frozen batteries. The results confirmed the hypothesis. Data showed that voltage is directly proportional to the motor speed whereas increased load and decreased temperature are inversely proportional to performance. These findings highlight the impact of voltage and environmental factors on motor efficiency.

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Abstract: Science and Engineering Fair of Houston

1318

Drone Attachments: Which Will Work Best in Space?

Category:

Physics and Astronomy

Yug Tandon, Ethan Suh

Conroe ISD /Knox Junior High

This project tests how well different robotic arm attachments pick up objects. The hypothesis states that if researchers test which robotic arm attachment is most practical for cleaning up objects in space, then developers of space-junk-collecting drones will know which attachment is most effective, because the trial data will show which attachment is the most efficient. There are an estimated 130 to 170 million pieces of space junk orbiting Earth, which must be removed for satellites and spacecraft to function properly. This experiment tests the most effective drone attachment between a robotic arm, a mesh net (sieve), and a double scoop grab made of two plastic cups attached to the arm. The project uses a modified robotic arm model from The Q. The robotic arm hovers over the water and uses each attachment to pick up cans and fish floats and place them in a container. Each attachment is tested in three 40-second trials. The average number of items collected determines how well they pick things up. In the end, the mesh sieve collected the most items, averaging about five objects. The double scoop grab collected about three objects, while the robotic arm collected about one. The hypothesis was disproven because the double scoop grab was not the most effective. This information can help researchers determine which type of drone attachment they should use on the trash collecting drones.

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