Science Symposium

"Where Creativity Meets Innovation"

ABSTRACT BOOK - 2025

Organized by
NBT Science Symposium Committee
(A Service Project of Agraj Seva Kendra)

Sincerely Thank

https://intellectionnj.com

for their generous support

Intellection's mission is to provide low-income children with the resources to succeed in STEM careers and give back to the community. Intellection works with local communities to provide under-represented and under-privileged students with the tools, resources, and opportunities to succeed in STEM careers

Our Sincere Appreciation to All the Financial Supporters

NBT SCIENCE SYMPOSIUM 2025

**NBT
Science Symposium
Executive Committee Team**
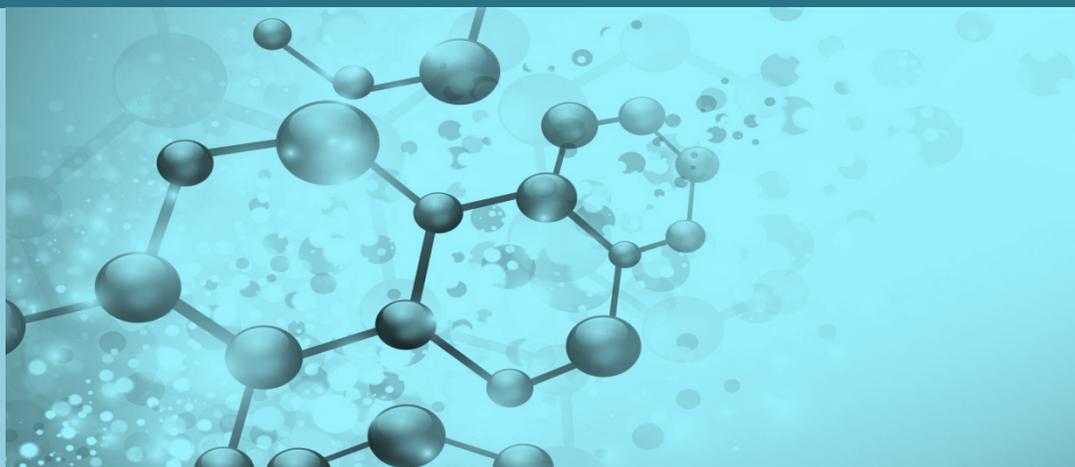
Gangadhara Rao Vakkalagadda
Chairperson

Surendar Reddy Revuri
Co-Chairperson

Kishore Mitikiri
Content Coordinator

Govinda Rajan
CEO-Agraj Seva Kendra

Message from Chairperson

Dear Friends,

Welcome to the 9th Annual NBT Science Symposium! It is a privilege to gather once again to celebrate the ingenuity and curiosity of our young scientists. This event underscores our collective commitment to fostering a passion for discovery and innovation.

Over the past year, space tourism has experienced remarkable advancements, bringing the dream of space travel closer to reality for many.

In September 2024, the Polaris Dawn mission achieved a historic feat by completing the first commercial spacewalk. Astronauts reached an altitude of 1,400 kilometers, the highest since the Apollo program, and conducted a 30-minute extravehicular activity (EVA) to test new spacesuit designs and study space radiation effects .

Axiom Space secured significant investments to expand its operations, aiming to send more passengers to orbit and develop the world's first commercial space station. This initiative is expected to reduce the cost of space travel, making it more accessible to the public .

Zephalto, a French space tourism company, announced plans to launch its pressurized capsule, Céleste, in late 2024. The six-hour journey will carry passengers to the stratosphere, offering panoramic views of Earth and a unique space experience .

Space Perspective introduced its hydrogen-powered balloon, Spaceship Neptune, offering a six-hour journey to the edge of space. The flight includes luxurious amenities and aims to provide a gentle introduction to space travel .

In December 2024, Emily Calandrelli became the 100th woman to visit space during a Blue Origin flight. Her participation highlights the growing inclusivity and appeal of space tourism .

As we reflect on these achievements, let us be inspired by the possibilities that lie ahead. Your participation today signifies a commitment to inquiry and innovation.

I extend my heartfelt thanks to Mr. Surendar Revuri and Mr. Kishore Mitikiri for their unwavering dedication in organizing this event. Gratitude is also due to Agraj Seva Kendra, led by Mr. Govinda Rajan, for their support, and to the North Brunswick Board of Education and North Brunswick Township for their continued partnership.

Together, we are shaping a future rich with discovery and progress. Best wishes to all participants—may your endeavors inspire and lead to new horizons in science.

Good Luck and all the best!
Gangadhara Rao Vakkalagadda
Chairperson, NBT Science Symposium Committee

Messages

Govinda Rajan

Janet Ciarrocca

Dear Brothers & Sisters,

Welcome to the Ninth Annual NBT Science Symposium. Students in grades 3 to 12 will be presenting the projects they worked on for the past several months. This event makes an impact on STEM interest for students. Participation in this event increases STEM knowledge and Engagement. These emerging scientists have a STEM identity and are viewed as STEM ambassadors.

I congratulate the participants and their parents. I am grateful to the Board of Education for their help and support in conducting this event. I thank the faculty for encouraging the students to participate. I thank the sponsors, judges and volunteers for their contribution.

Last but not the least, I congratulate the NBT Science Symposium Committee and the chairperson Gangadhara Vakkalagadda for their efforts for the past nine years in making this event a grand success.

Sincerely,

Govinda Rajan
CEO, Agraj Seva Kendra

Dear Friends,

On behalf of the North Brunswick Township Board of Education, it is with great pleasure that I welcome you to the 2025 NBT Science Symposium. NBTSchools supports and encourages exploration in scientific study, and more specifically in the areas of STEM: Science, Technology, Engineering and Math. We fully support wonderful community events such as the NBT Science Symposium. Such events allow our students the opportunity to explore their wonderings and expand their curiosity through scientific study. A huge thank you to the NBT Science Symposium Committee for continuing to encourage our students to explore various areas of science and for their consistent support of this annual event. Congratulations to all of our NBT students for expanding their horizons through their science explorations!

Sincerely,

Janet Ciarrocca
Superintendent of Schools
North Brunswick Township Public Schools

NBT Schools Community,

It is my pleasure to welcome you to the 2025 NBT Schools Science Symposium, an event dedicated to exploring the frontiers of scientific discovery and innovation. This year's symposium, held at NBTHS, brings together inspiring future scientists in our schools to share their inquiry into the different fields of Science.

We welcome this event as an opportunity for these students to come together and share their curiosity, inquiry, and collaborative skills as they work together in teams to put together the projects they are sharing today. It is through encouraging students to share their scientific knowledge that we hope to prepare a future generation of students and workers who will be ready to tackle the challenges our world will continue to face in the future. I welcome all families who are attending the science symposium and hope that you have a wonderful experience today learning from our future scientists!

Sincerely,

Michael Kneller
Principal, North Brunswick Township High School

Michael Kneller

NBT SCIENCE SYMPOSIUM 2025

Program Schedule

Time	Activity
9 AM to 10 AM	Participants to pick up the registration packages and setup displays
10 AM	Judging Sessions begin **Room 1 Judges** ● Kelly Sookdeo ● Vijay Reddy ● Rajeev Shrivastava **Room 2 Judges** ● Barbara Wendell ● Subir Dutta ● Madhusudan Reddy **Room 3 Judges** ● Frank Sweeney ● Manohar Sriramoji ● Abhay Navale
12.15 PM Program Moderator: Blisse Vakkalagadda	● Welcome address ● Address by Mrs. Janet Ciarrocca, Superintendent of Schools ● Address by Intellection NJ Representative ● NJ STEM Pathway Presentation ● Vote of Thanks ● Awards Distribution

Judging Time	Room 1 Team #	Room 1 Team Name	Room 2 Team #	Room 2 Team Name	Room 3 Team #	Room 3 Team Name
10.00 AM	ES-1	Super Scientists	ES-12	TTS Group	MS-1	HP Science Team
10.10 AM	ES-2	Reaction in Action	ES-13	Wind Blowers	MS-2	Abhay's Team
10.20 AM	ES-3	Right Angles	ES-14	ForceFlow Engineers	MS-3	Science Nerds
10.30 AM	ES-4	Electro Bros	ES-15	Electra	MS-4	The Conductivity Crew
10.40 AM	ES-5	Super Magnet Geniuses (SMG)	IMS-1	The Musketeers	HS-1	AI Medics
10.50 AM	ES-6	Super Scientists	IMS-2	Shielding Squad	HS-2	Innovative Thinkers
11.00 AM	ES-7	Aqua Knights	IMS-3	Energy Genius	HS-3	Brainy Badgers
11.10 AM	ES-8	Galactic Girls	IMS-4	AI Takeovers	HS-4	The Prognosipals
11.20 AM	ES-9	The Bomb Girls	IMS-5	Juicy Volts	HS-5	Biomedical Besties
11.30 AM	ES-10	Solar Sparks	IMS-6	The Myth Busters	HS-6	Energizers
11.40 AM	ES-11	Curious Jaguars	IMS-7	The Chill Pill Girls		

Elementary School Projects (Grades 3-4)

Team: Super Scientists (ES1)
Title: How weight affects the journey of an airplane.
Participants: Maya Katira and Samaya Patel Bhakta

Objectives/Goals: Our objective is to see how weight affects the flight of an airplane's flight distance. By adding different amounts of weights to a plane, we want to see how far they can travel depending on the weight attached to them, and where on the airplane. The aim of the experiment is to see how adding weight to an airplane affects its distance to travel; lighter airlines travel shorter or heavier airplanes travel further or vice versa, also does the placement of the weight on the airplane affects the flying distance.
Materials/ Methods: We made several identical paper airplanes the same way, using the same paper. We then added different amounts or distribution of weights (paper clips) to each paper airplane, using 1-3 paper clips and 0 paper clips as our control case. We will fly each plane five different times, starting at the same location and thrown the same way and measuring the distance traveled. We will also perform the experiment indoors to eliminate wind. The weight will be distributed \ attached along the spine of the airplane {spine}.
Results: We took a look at the results of the average distances flown. The results will show the optimal location and amount of weight will fly the furthest in comparison to our airplane with no weight.
Discussion/ Conclusion: In conclusion adding a small amount of weight in the right location can help our plane fly further, but not if it's too much weight and in the wrong location.   This experiment helped us understand how airplanes use weight for efficient flight.

Team: Reaction in Action (ES2)
Title: Lungs in Action- How we Breathe
Participants: Aarika Tandon and Nikoletta Fiotakis

Objectives/Goals: The goal of our project is to show how our lungs help us breathe in & out.
Materials: We made a model with balloons and a bottle.
Conclusion/Discussion: The Balloon lung model demonstrates how the human respiratory system works. When we pull the bottom balloon (representing the diaphragm) the lung balloons fill with air. When we push It back, the air goes out. This shows how our lungs and diaphragm work together to help us breathe.

Team: Right Angles (ES3)
Title: Sedimentation Using Potash Alum
Participants: Aiza Attar and Aleeha Masood.

Objectives/Goals: In this project, we explore how dirty water can be cleaned using a special powder called potash alum. Potash alum helps tiny dirt particles in the water stick together and become heavier. These particles then settle at the bottom of the container — a process called sedimentation.
Materials/Methods: The following materials were used:
- A glass jar or transparent container
- Dirty or muddy water
- Potash alum (a small piece or powdered form)
- Spoon
- A clean glass to compare water clarity

Discussion/ Conclusion: We learned that potash alum is a useful and simple way to clean muddy water. This method can be used in places where clean water is not easily available. It helps remove dirt from the water, but the water still needs to be boiled before drinking to kill germs.
Summary: This experiment shows us that potash alum helps clean dirty water by making the dirt

settle at the bottom through a process called sedimentation

Team: Electro Bros (ES4)
Title: Understanding Basic Electric Circuits: A Hands-On Approach to Electricity
Participants: Anthony Thomas and Jordan Anim

Summary: Electricity is a form of energy that powers many devices we use every day. Simply put, electricity is the flow of tiny charged particles called electrons through materials like wires. In this presentation, we explore the fundamentals of basic electric circuits by demonstrating how simple circuits work. A basic electric circuit consists of four key components: a battery, wires, a switch, and a light bulb. The battery provides the electrical energy, the wires act as the pathway for the flow of electricity, the switch controls whether the circuit is open or closed, and the light bulb lights up when electricity flows through it. When a circuit is complete (closed), electricity flows from the battery, through the wires, and to the light bulb, causing it to light up. If the switch is open, the circuit is broken, and the electricity cannot flow. We will demonstrate how to build such a circuit and explain the role each component plays in creating a complete flow of energy. Understanding how to control and manipulate electricity using these basic components provides the foundation for more advanced studies in electrical engineering and technology. Through this hands-on approach, participants will gain a clear understanding of how electricity works in simple circuits, the importance of each component, and how to safely control the flow of electricity.

Team: Super Magnetic Geniuses (ES5)
Title: Ferrofluid Dance: Magnetic Patterns and Surface Tension
Participants: Selia Herrera, Mila Dorjo and Gianna Baskett

Objective: This study explored how ferrofluids interact with magnetic fields and how changes in surface tension affect the appearance of magnetic spikes.
Materials: Ferrofluid, strong magnet, three petri dishes, water, dish soap, pink salt, pipette, gloves.
Methods: Pour water into a petri dish. Add 10 drops of ferrofluid. Hold a magnet under the dish and observe the ferrofluid spikes. Repeat with added dish soap (to reduce surface tension) and with added salt (to increase surface tension).
Results: Without additives, ferrofluid formed clear spikes along magnetic field lines. With soap, spikes were shorter and blurry. With salt, spikes were sharper and more defined.
Conclusion/ Discussion: Ferrofluid forms spikes in a magnetic field due to the combined effects of magnetic forces, surface tension, and gravity, a phenomenon called Rosensweig instability. The tiny magnetic particles align with the magnetic field lines, and the magnet pulls the domains inside the particles to point in the same direction, forming spikes. Surface tension resists spike formation but can be overcome by magnetic forces. The water's surface tension is high due to hydrogen bonds between molecules. Soap disrupts these bonds, reducing surface tension and making ferrofluid spikes shorter and less defined. Soap molecules have hydrophilic heads and hydrophobic tails that interfere with water's cohesive forces. In contrast, salt increases surface tension by adding ions that attract water molecules closer together, making the spikes sharper. Gravity also affects the ferrofluid by pulling it downward, helping shape the spikes.
Summary: Overall, this project provided a clear visual representation of how factors like soap and salinity affect ferrofluid magnetic behavior.

Team: Super Scientists (ES6)
Title: Fluorescence and Ultraviolet Light
Participants: Evelyn Sontag, Alaia Valerio Rodriguez, and Emmali Baez

Objectives/Goals: In our project we tried to get the brightest glow from ultraviolet (UV) light using different chemicals and to learn about fluorescence.

Materials / Methods: For this experiment we chose tonic water because it glows when UV light hits it. We added tonic water to four containers. The first container just had tonic water. The second container, we added a pink highlighter. The third container we added pink highlighter ink and laundry detergent. In the fourth container we added pink highlighter ink and petroleum jelly. We put them in a box and shone a UV flashlight on them.

Results: Both the container with petroleum jelly and laundry detergent shone around the same.

Conclusions/Discussion:From our reading and research, UV light waves are super-fast, short and they have lots of energy. Fluorescence is when UV light is absorbed by chemicals, but it shoots out a blast of light that is less energetic. We saw this in one container when UV light went from violet to blue. We thought that the container with petroleum jelly would shine brightest, because it would absorb the ultraviolet light better, but the mixture with the petroleum jelly, and the one with laundry detergent both shone brightly. The difference is that the mixture with the petroleum jelly was opaque and not a lot of UV light passed through, but the mixture with the laundry detergent was more transparent.

Summary: With this experiment we used UV light to make water fluoresce.

Team: Aqua Knights (ES7)
Title: Moana's Journey of Water
Participants: Reena Rao, Maanya Velakoti, Sanvi Kapil Patel and Ishaan Wazi

Objective: Team Aqua Knights would demonstrate the water cycle model through Disney inspired Moana journey of water theme – a real working model demonstrating several stages of water cycle.

In addition, the team would also be reviewing different ways of water conservation techniques and protecting this vital resource and ensuring sustainability for future generations.
Example: The 5 Rs, Refuse, Reduce, Reuse, Recycle, Respect

Methods/Materials: Moana model, large clear bowl with water or ice cubes, Thermocol, Mud, grass, rocks, real leaves, cotton to demonstrate clouds, materials to depict snow, food heat lamp, gravel, soil, sand mimicking natural filtration layers. Explanatory placards to help demonstrate and understand the science of how the cycle works.

Results: This experiment visually shows evaporation, condensation, and precipitation in action! In addition, the project would outline that there are several initiatives to conserve water that can minimize water waste, maximize use and maintain water resources for the future.

Conclusions/Discussion: Our water cycle model successfully demonstrates the natural process of water movement through evaporation, condensation, and precipitation. By observing these stages in action, we gain a deeper understanding of how Earth continuously recycles water, ensuring its availability for ecosystems and human use. We have a working model demonstrating water cycle and water conservation model through a fun Disney inspired Moana model.

Team: Galactic Girls (ES8)
Title: Moon Mysteries & Phases of the Moon
Participants: Srinidhi Bhat and Shivani Subramanian.

Objectives/Goals: This project explores the fascinating mysteries on the Moon and helps us to understand the result from the Moon's orbit around Earth and its interaction with sunlight.
Materials: Flashlight (Sunlight source), Foam ball or small round ball (Moon), Globe or a partner's face (Earth), Oreo cookies (for edible Moon phase model), Black paper, glue, crayons or chalk, Moon phase observation log sheet.
Methods: Research using science books and videos. Observe the Moon over several nights and record its shape, mystery Smiley Face Moon. Build a Moon Phase model using a flashlight, a ball (Moon), and a globe or face (Earth). Create a Moon phase chart with drawings or Oreo cookies.
Results: Our study shows that the Moon doesn't change its shape — it just looks different from Earth because of how sunlight hits it. These changing appearances are called Moon phases containing 8 parts as New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Last Quarter, and Waning Crescent. Using models helped us clearly see how the Moon moves around Earth and how shadows and light cause the phases.
Conclusions/Discussion: Our models proved effective in showing how light, shadow, and movement create visible changes in the Moon's shape. A "smiley face" Moon is a visual phenomenon where a thin crescent Moon appears to form a smiling mouth, with two bright celestial objects, typically planets like Venus and Jupiter-positioned above it, resembling eyes.

Summary: This project helped us to understand the scientific explanation behind the phases of the Moon using real-world observations and models. Through this study, we gained insight into space systems and how astronomy helps us explain natural phenomena.

Team: The Bomb Girls (ES9)
Title: Science in Your Bath
Participants: Liliana Morris and Sania Ali

Objectives/Goals: Investigate how different ingredients and temperatures of water affect the fizziness of homemade bath bombs.
Methods/Materials: To test the chemical reaction we created two different mixes of ingredients.
Mixture 1 included baking soda, citric acid, and coconut oil.
Mixture 2 included baking soda, citric acid, cornstarch, epsom salt, water, and olive oil. We also used different temperatures of water for them to dissolve in.
Results: Hot, warm and cold water were used to test the results. For both mixtures, it dissolved the fastest in the hot water and fizzed quickly to the top but mixture 1 had the most bubbles. In the warm water it continued to fizz and dissolve at an even pace. In cold water, it dissolved slowly creating small amounts of fizz but didn't rise to the top. The results between both mixtures showed that ingredients in mixture 1 created more bubbles.
Conclusions/Discussion: In conclusion, the bath bombs reacted the fastest and created the most bubbles in the hot water because of the key ingredients in both mixtures which were baking soda and citric acid. When baking soda and citric acid are mixed together with water, they create a chemical reaction also known as carbon dioxide. When carbon dioxide dissolves in water, it creates what we call "bubbles".
Mixture 2 did not create as many bubbles as mixture 1 because it had cornstarch, which acted as a dry filler and slowed down the chemical reaction.
Mixture 1 was the most successful by creating a better chemical reaction and more "bubbles" for your bath.

Summary: The project helped understand that using cornstarch delayed the fizziness reaction and the best chemical reaction worked with the use of baking soda and citric acid.

Team: Solar Sparks (ES10)

Title: Solar Smart Living – Clean Energy at Home

Participants: Diksha Bharath, Tanvi Eshwar, and Riya Pridhiviraj

Objectives/Goals: Solar energy is a powerful and sustainable way to generate electricity. Our project demonstrates how sunlight can be harnessed to power homes efficiently while protecting the environment.

Materials: We built a small house model using cardboard. To demonstrate solar power, we used a small solar panel, wires, a switch, an LED light, and adhesive materials like tape and glue.

Methods: We carefully placed a solar panel on one side of the house we built. By wiring the panel to an LED light and inserting a switch, we ensured control over the electricity flow. The completed setup resembled a small garden scene, reinforcing the idea that solar energy can seamlessly integrate into homes. When placed in sunlight, the panel generated electricity, illuminating the LED light—proving the efficiency of solar energy.

Results: The LED light successfully turned on when the solar panel was exposed to sunlight, demonstrating how solar energy can provide consistent power. However, when the light source was removed, the system ceased to function, highlighting the importance of direct sunlight for effective energy generation.

Conclusion: Through this project, we gained a deeper understanding of how solar panels convert sunlight into electricity. As a clean, renewable energy source, solar power helps reduce dependence on fossil fuels, making it an excellent choice for sustainable living. By incorporating solar energy into homes, we can lower electricity costs while protecting the environment.

Summary: Our project demonstrated how solar energy can power homes using simple materials. We learned that it is an efficient, safe, and environmentally friendly solution, making it a valuable alternative for clean energy in everyday life.

Team: Curious Jaguars (ES11)

Title: The Science Behind Everyday Magic: Unveiling the Wonders Around Us

Participants: Anvitha Gandhaveeti and Umar Ahmed

Objective: This science project explores fascinating everyday phenomena that seem magical but have scientific explanations, including optical illusions, static electricity, chemical reactions, and capillary action.

Materials: Ballon, Wool, Water Stream, Hermann Grid Illusion, Red cabbage (or pH indicator paper), Water, Vinegar (acid), Baking soda (base), Lemon juice (acid), A few clear cups, White flowers, Food colors

Methods:

Static Electricity Trick: Rubbing a balloon against wool creates negative charges, causing neutral objects like water to bend toward it.

Optical Illusions (Hermann Grid): The brain processes contrast in a way that makes us see faint dark dots at intersections, demonstrating how perception is shaped by neural processing.

Chemical Color Change: Red cabbage juice acts as a pH indicator, turning red in acidic solutions (vinegar) and blue/green in basic solutions (baking soda).

Capillary Action (Rainbow Flower): Colored water travels through plant stems via capillary action, changing the flower's color by transporting liquid upwards.

Conclusions / Discussion: Science often appears magical, but behind every astonishing phenomenon is a logical explanation rooted in scientific principles. This demonstration explored the hidden scientific principles behind seemingly magical phenomena in daily life, from optical illusions and static electricity to chemical color change and capillary action, and how these simple principles help humans daily Static electricity aids in photocopiers and anti-static technology, optical illusions inspire Architecture design and advertising, pH indicators help test water quality, and capillary action is used in filtration systems.

Summary: Science doesn't take away the mystery—it enhances it. Understanding these

natural wonders fuels curiosity and exploration, making the world an even more fascinating place.

Team: TTS Group (ES12)
Title: The Solar System
Participants: Tiya Reddy Angu, Thaanvi Maheswaran and Sahasra Toom

Objectives/Goals: To represent the solar system with a model and explain facts about each planet and the sun.
Methods/Materials: The materials used for this project are: Cardboard,Wire, Lightweight foam balls, Colors, Paper, Glue, Scissors
Conclusions/ Summary: This model attempts to represent the orrery of the Solar System and show the positions of different planets. And it also tells facts about each of the planets and the sun.

Team: Wind Blowers (ES13)
Title: Wind Energy
Participants: Vihan Shrivastava, Abhiram Donavalli, Yuvan Donavalli and Pranvi Jujjavarapu

Objectives/Goals: Our goal is to build a miniature city powered by wind energy, where a windmill generates electricity to light up LEDs (Light Emitting Diodes) in the houses.
Methods/Materials: The materials we used include wood, wooden model houses, fans (acting as windmills), small generators, connectors, LEDs, copper wires, and a breadboard.
First, we connected one LED to a breadboard and attached it to a small fan-powered generator. When we added a second LED, both lit up, which showed that one fan could power two LEDs. However, when we tried to light more LEDs (three or four), it didn't work—the fan didn't produce enough power. We are currently working on improving this by either increasing the fan's power or redesigning the circuit. For example, we could try to get a different fan with more wind power.
We plan to use a series circuit to power multiple houses. During the process, we learned how to use a breadboard properly and how to power LEDs using fans and batteries. We also gained experience building simple circuits on our own.
Conclusion/Discussion: In conclusion, we are planning to expand our project by adding more houses and LEDs. We also want to explore different types of circuits and find ways to generate more power using wind. This project helped us learn a lot about electricity, circuits, and renewable energy.
Results: In the end, the project was successful. The lights in the model houses lit up, and the windmill spun fast enough to generate enough electricity for the LEDs. The setup worked as planned
Summary: We achieved our goals, and our project worked well. The LEDs in the miniature houses lit up successfully, and we were proud of the final result. We also researched how LEDs work and learned a lot through hands-on experimentation

Team: ForceFlow Engineers (ES14)
Title: Efficient Electricity
Participants: Ayaan Alam, Rian Patel and Reyan Saha

Objectives/Goals: We are trying to compare wind, kinetic, and hydro energies from most efficient to least efficient. We are doing this to save money, electricity, and our environment.
Methods/Materials: For this experiment we are going to have three toy cars and we are going to compare three types of energy. We are going to use three toy cars, a stopwatch, a measuring tape, a track, and a data recorder. We will attach a sail to the car and measure the three types of energies by using a fan to blow wind against it, shoot a rubber band at it, and squirt water at it with a water gun.
Results: We think kinetic is going to go the farthest because a human pushing it can go farther depending on a hard day push. We think wind is going to be second for this because a fan can push the car up but will wear off with distance. We think hydro is going to be the least efficient

because it's going to wear off but wind is still more powerful.

Conclusions: In conclusion we think the most efficient energy is kinetic, then wind, and last hydro.

Team: Electra (ES15)
Title: Dolly - The Robo Pup
Participants: Arpitha Nair, Diya Elizebeth Mathew, Navea Nagarajan and Sidithi Vinod.

Objectives/Goals: This study aims to showcase the principles and methods used to automate a pet toy.

Methods/Materials: Arduino - A microcontroller board that acts as the central control unit of the pet toy. It reads data from sensors and makes decisions to control the motors based on programmed logic.

IR sensors - Infrared proximity sensors that detect nearby objects by emitting infrared light and sensing its reflection. In this project, three sensors are placed at the front, left (30°), middle and right (30°) to detect the position of a hand and guide the bot's direction

Motor driver (L298) - An interface between the Arduino and the DC motors. It allows the Arduino to control the direction and speed of the motors without directly supplying high current, which the Arduino cannot handle.

DC Motor – These motors are responsible for driving the wheels of the bot. By changing the polarity of the voltage supplied to the motors via the motor driver, the bot can move forward, turn left, or turn right.

Along with above major components, we have a 9V Battery, Bread board, LED, Wires and a soft toy.

Conclusion/Discussion: We successfully automated our pet toy so that it can follow us as and when we need. This project helped us in understanding the basic principles and methods behind robotics.

Intermediate Middle School Projects (Grades 5-6)

Team: The Musketeers (IMS1)
Title: Artificial Intelligence (AI): The future is now !!
Participants: Aryan Vuggini, Ananya Medaand Pranav Krishna Prasad

Objective: Our project explores how Artificial Intelligence (AI) can learn to recognize things like images, sounds, and poses. We used simple online tools to train an AI model, showing how machines can learn from examples—just like people do. We also demonstrate how AI is used in real life, such as in self-driving cars, smart home devices, and fitness apps.

Materials/ Methods:Google Teachable Machine (https://teachablemachine.withgoogle.com/),
Laptop with webcam and microphone, printed traffic signs, recorded voice commands, and space to perform workout poses.
Experiments/ Use cases: Collected images, sounds, and poses for training the AI.
Google Teachable machine is a website that lets you create your own AI models. It has 3 different segments to gather data, train models and save the model.
Used Google Teachable Machine to train 3 separate models:

- Image model for recognizing traffic signs. For the image model, we collected pictures of traffic signs and trained the AI using different angles and lighting.
- Sound model for voice commands used in smart homes. We recorded voice saying commands or sounds in different tones and volumes to help the AI recognize natural speech.
- Pose model for fitness workout poses. We performed different exercises several times and retrained the model when it made mistakes. We falso adjusted the lighting and background to improve accuracy.

Discussion/Conclusion: AI can learn from examples and recognize patterns, just like humans. However, the models had limitations: they didn't work well in poor lighting, with unclear audio, or with unexpected inputs. The AI can only recognize what it has been trained on.

Summary: This project helped me understand how AI is used in daily life. We learned that training a computer can be fun, and AI is already helping us drive, exercise, and live smarter!

Team: Shielding Squad (IMS2)
Title: Blocking Signals with a Faraday Cage
Participants: Naman Venugopal and Devyansh Sharma

Objectives/ Goals: The goal of our project is to find out which material can block radio signals the best when used to make a Faraday cage.

Methods/Materials: We are testing three materials: aluminum foil, steel wire, and copper wire. We wrapped each material around a cardboard box to make a cage, leaving small spaces between the wraps. Then, we placed a small radio inside each cage and checked if we could still hear the radio station.

Results: We think the cage made with aluminum foil will block the radio signals the best. We believe copper wire will also block some signals, and steel wire will block the least..

Conclusions/Discussion: Our project is designed to show how different materials can block radio signals when used to make a Faraday cage. We expect aluminum foil to work the best because it can cover the box fully and is a good conductor.

Team: Energy Genius (IMS3)
Title: Sustainable Energy
Participants: Aiden Ben Dolla and Amy Akal
Objectives/Goals: The study objectives are to gather data to compare relationships between natural light and temperature. Does the same relationship occur with artificial light intensity and temperature

Learning objectives: Plan the project towards gathering desired data using stem science kit in May 2025. Use data collected to link theory of natural light, temperature and artificial light. Understand nature, laws of natural sunlight energy and how it impacts on our lives. Enhance stem kit data collections tools, and data analysis

Methods/Materials: Stem electronic kit which is linked to UNDP experiments to sustainable development goal #7: Access to ensure affordable, reliable and sustainable modern energy for all. Kit contains: Core computing module based on the ESP32. Dual processor, memory, Wi-Fi and Bluetooth are enabled. OLED screen as an output USB interface for power and serial output if required. Light sensor for collecting natural light intensity and UVIndex data. 8 ten pin connectors for mechanical construction, power and 12C transmission Artificial light bulb.

Results: Energy from sunlight is stronger than energy from artificial light bulbs and being under a shade or roof minimizes the sunlight rays. Further studies and research articles have concluded that the intensity of sunlight is significantly higher than that of most artificial light sources. The intensity of sunlight allows for energy absorption for the development of plants through photosynthesis. The temperature of the day depends on the intensity of the sun rays. In shaded areas or under roofs the temperature is decreased due to light rays being blocked or interrupted.

Summary: The energy emitted from natural sunlight has a relationship with temperature as determined by the intensity of the sun rays which affect human and plants life in various ways which is not the same as artificial light.

Team: AI Takeovers (IMS4)
Title: Battery-Powered Programmable Robotic Car
Participants: Ishan Shrivastava and Varun Mandava

Objective/Goals: Our objective is to design and build a programmable robotic car that can move forward, backward, and turn left or right. The car

will be powered by batteries and controlled by a microcontroller that follows pre-programmed commands.

Method: In this project, we used the following components:

- Raspberry Pi Pico 2W – to run the Python code and control the car
- L298N Motor Driver – to control and power the motors
- Wheels – to allow the car to move in different directions
- Base (box) – to hold all components securely
- Battery Pack – to power the Raspberry Pi Pico
- 12V Battery – to supply power to the motor driver
- Stepper Motors – to spin the wheels and drive the car
- IR Receiver and IR Remote – to send and receive commands wirelessly

Results: Once the battery is connected, the Raspberry Pi Pico 2W powers on and starts executing the pre-programmed instructions. These commands, written in Python, are sent to the L298N motor driver. The motor driver controls the motors, enabling the car to move forward, backward, or make turns based on the stored program or IR commands. The car responds quickly and moves in the direction it is programmed to go.

Conclusions: Our project was a success, and we built a fully working model of a battery-powered robotic car. We learned that the Raspberry Pi Pico 2W is a great tool for programming and robotics. In the future, this type of robotic car can be used for transporting small goods or upgraded to drive on its own. We plan to add features like an ultrasonic sensor, which will help the car detect and avoid obstacles, making it more intelligent and useful for real-world tasks.

Summary: We successfully created a programmable robotic car that moves using pre-coded instructions and can be controlled with an IR remote. This project taught us valuable lessons in electronics, coding, and robotics. With added features, it could be used for smart delivery systems, self-driving experiments, or future technology demonstrations.

Team: **Juicy Volts (IMS5)**
Title: Investigating the Electrical Conductivity of Potatoes and Lemons
Participants: Anika Arun and Iniya Ramachandran

Objectives: This project aims to investigate how certain fruits and vegetables can act as power sources in simple electrochemical cells. By comparing different food items, we aim to determine which can effectively conduct electricity and understand the chemical reasons behind their performance.

Materials: Fresh potatoes, Fresh lemons, Zinc nails (galvanized), Copper wires or coins, Alligator clips, Multimeter, LED light or digital clock, Nonconductive vegetables (carrots, cucumbers, eggplants)

Methods: Zinc and copper electrodes were inserted into each fruit or vegetable. These foods acted as the electrolyte between the electrodes. The multimeter measured voltage and current. An LED light was connected to check if the generated electricity could power a small device.

Results: Lemons and potatoes generated measurable voltage. Lemons produced slightly higher voltage due to citric acid, which increases ion availability. Potatoes, rich in potassium and phosphoric acid, also worked well. In contrast, vegetables like carrots, cucumbers, and eggplants showed poor or no conductivity, failing to light the LED.

Conclusion: Fruits and vegetables with high acid or electrolyte content can serve as simple power sources in electrochemical cells. Lemons and potatoes effectively conducted electricity, while other vegetables did not because they lacked the necessary ion concentration or pH level.

Team: **The Myth Busters (IMS6)**
Title: FROM FLOOR TO FORK- IS THE 5 SEC RULE SAFE?
Participants: Damianos Likakis and Arnav Raj

Objectives/Goals: People drop food all around the world and some might say "Wait! the five sec rule, I can still eat this!" We are trying to determine whether the 5 sec rule is trustworthy for kids and adults to follow without getting sick or harmed. We can do this by collecting germs on our fruit, an apple, petri dish, and a cotton swab. This experiment will help people to have safer food options and eat germ free foods.
Materials: Petri dish, Sterile gloves, Nutrient agar, Sterile goggles, Pencil
Paper, Timer, Some fruit - Apple, Microscope
Sterile cotton swab, Stain
Methods: First we take a fruit, an apple and drop it on the floor for about 3 sec, 5 sec, 7 sec, 10 sec and 15 sec. Next use sterile gloves to pick up the fruit and gently rub it against the cotton swab and then we will lightly place on the petri dish. Now put the petri dish in a warm environment with a temperature between 40F – 138F for 4-20 min. Once we take it out we will set up the slide under the microscope and make an observation of which petri dishes have more or less bacteria in them.
Results: Results from the experiments will be presented at the fair.

Team:**The Chill Pill Girls (IMS7)**
Title: Insulin IV vs Oral Route
Participants: Isra Naeem, Hawwa Tahir, Rouba Eldeeb, Ayla Syed, and Sara Mortigo

Objectives: To learn why there are so many different forms of medicines and if oral medication can take the place of medical shots. We did an experiment to look at the difference between insulin taken orally and as a shot.
Methods: We made jello which represented the insulin medication. We treated the jello shape in two different ways by creating two separate environments. In our first environment we mixed water and red food color in a container. This was used to see how the insulin reacted when given as a shot. In our second environment, we mixed water and meat tenderizer. The meat tenderizer was used to represent the protease in the stomach. This environment was used to study the medicine given orally to the person. Once both of the environments were ready, we then treated both of the environments with the insulin by placing cut out pieces of jello in each of the containers and observed how the jello reacted in the two different settings.
Results: The Jello kept its original shape when placed in the container with the blood; whereas, the jello lost its original shape when it was placed in the container with the meat tenderizer.
Conclusion: Based on the results we learned that insulin medication is more effective when given directly to the blood in the form of a shot. On the contrary, the insulin loses some of its properties when it passes through the digestive system when taken orally; therefore, not as effective as the shot.

"The most beautiful experience we can have is the mysterious. It is the fundamental emotion that stands at the cradle of true art and true science."

"There are two ways to live: you can live as if nothing is a miracle; you can live as if everything is a miracle."

"Why does this magnificent applied science, which saves work and makes life easier, bring us so little happiness? The simple answer runs: Because we have not yet learned to make sensible use of it."

- Albert Einstein

Middle School Projects
(Grades 7-8)

Team: HP Science (MS1)
Title: Artificial Pancreas
Participants: Harsh Naik and Priyansh Patley

Objective: People with diabetes who take insulin must constantly monitor their blood glucose and calculate insulin doses based on food, activity, and how they feel. This can even require doses in the middle of the night. They use tools like glucose meters or continuous glucose monitors. Advances in technology have led to "hybrid loop" systems—automated devices that adjust insulin levels like a real pancreas, often called an artificial pancreas

Materials: The project requires materials, including a 5V peristaltic pump, resistor, multimeter, alligator clips, containers, aluminum foil, and an Arduino-compatible microcontroller (like Arduino Uno), which acts as the circuit's "brain." Additional items include water, food coloring, dish towels, and basic electronics like a breadboard and jumper wires. The Arduino is programmed to control signals and manage the circuit's components.

Methods: This project models how an artificial pancreas works using a circuit and two liquids (tap and distilled water) to represent insulin and blood. The goal is to show how such systems help manage blood sugar levels safely and effectively, raising awareness about the artificial pancreas as an easier alternative for diabetes care. The pancreas naturally regulates blood sugar by releasing insulin, using glucose—our main energy source—from foods like sugar and carbohydrates. Blood glucose levels typically rise after eating.

Discussion/Conclusion: The goal of the project is to raise awareness about the artificial pancreas as a better and easier alternative to manually injecting insulin, informing people that this new treatment option exists.

Team: Abhay's Team (MS2)
Title: Our solar system
Participants: Abhay Srikanth and Peter Hernandez Jr.

Objectives/ Goals: Exploring the solar system and outer space and learning some scientific facts.

Methods/Materials: The solar system is a gravitationally bound system con-sisting of the sun and all the objects that orbit it, includ-ing planets, moons, asteroids, and comets. All the planets in the solar system are mercury, venus, earth, mars, jupiter, saturn, uranus, and neptune. Pluto the dwarf planet was once a planet that was part of the solar system. There's plenty of gravity in outer space. Otherwise, the Moon would not orbit the Earth and Earth wouldn't circle the Sun. Jupiter is the heaviest planet. Lagrange points are positions in space where the gravitational forces of a two-body system like the Sun and Earth produce enhanced regions of attraction and repulsion. Saturn is a special pri-mairly due to its mag-nifficent ring system, which is more exten-sive and complex than any other planet in the solar system. In the Earth-Sun system, L1 is between Earth and sun about 1.5 million km (900,000 miles) from Earth-about four times farther from Earth than the Moon. In any two body system, there are five Lagrange points numbered L1 to L5. At these points, the gravitational pull exerted by the two bodies equals the centripetal force needed for an object to maintain a constant distance relative to them.

Results: NASA and other agencies around the globe study the sun's core parking their satellites in Lagrange points. It helps us get more information about the solar system.

Conclusions/Discussion: Based on internet research we learned that there are eight planets and one dwarf planet that used to be a planet that was part of the solar system. Every planet also has stars for themselves except for venus, uranus, saturn, and jupiter. Mercury also has the north pole and south pole star. Venus does not have any stars. Mars has stars in the night sky. But the official star of earth is the sun. Uranus, Saturn,

Venus, and Jupiter do not have stars. Like fellow gas giant Jupiter, Saturn,is a massive ball made mostly of hydrogen and helium. To study the earth's star called the sun we have to use the Lagrange point to help us study the sun.

Summary: The project attempts to describe the gravitational pull and how the lagrange.

Team: **Science Nerds (MS3)**
Title: Investigating Factors Affecting Wireless Power Transfer Efficiency
Participants: Visesha Pasumarthi and Karunya Gujja

Objectives/Goals: This project aims to determine the factors influencing the efficiency of wireless power transfer.
Methods/Materials: For this experiment, we used enameled copper wire (22-26 AWG), two coil forms (3-inch diameter, non-metallic), a wire stripper, a 555 timer, a breadboard, jumper wires, 9V batteries, a diode, a capacitor, and small LED diode lights.

Initially, we set up our transmitter and receiver coils to test their functionality. After confirming the setup, we commenced our experiment. We first tested the hypothesis related to the distance between the coils. We started with the coils in direct contact and gradually moved them apart by one centimeter at a time. We recorded the voltage and brightness of the LED each time we adjusted the distance, then graphed the results. For the second hypothesis, we created three different sized transmitter coils and tested each with the same receiver coil. We documented power transfer efficiency and analyzed the relationship between coil size and efficiency.
Results: As the coils were positioned further apart, the LED dimmed, and when we used a thicker transmitter coil, the LED brightness increased.
Conclusions/Discussion: In conclusion, both hypotheses were validated. The first, about distance, was confirmed as the LED brightness increased when the coils were closer together.

The second hypothesis, regarding the thickness of the transmitter coil, was supported since the LED brightness increased with the thicker coil.

Summary: The study aims to identify the key factors that influence the efficiency of wireless power transfer systems and how these components affect overall performance.

Team: **The Conductivity Crew (MS4)**
Title: How Many Electrolytes Do Sports Drinks Actually Contain?
Participants: Rishab Patel, Nishchal Polanki, and Samarth Panchal

Objective/Goals: Many sports drinks today are advertised as having large amounts of electrolytes that boost the healthiness and effects of the drink, but is that really true? We've gathered multiple drinks to test out how the drinks conduct compared to water.
Materials: Distilled Water, Gatorade, Powerade, BodyArmor, Liquid I.V., 5 glasses, Marker, Masking tape, Scissors, Straw, Multimeter, Alligator Clips, 24-gauge bare copper wire, 9-Volt Battery with clip, 1 kΩ resistor
Method: - Take 5 cm of the straw and two 12 cm pieces of the copper wire.
- Wrap the wires around the straw, leaving 5cm unwrapped. This will be the conductance sensor.
- Connect the multimeter probes, the black probe into the 'COM' port and the red probe into the 'VΩmA' port.
- Attach the alligator clips to their corresponding color's probe and the snap connector to the 9V battery.
- Link the other end of the red clip to the battery's red wire, and the green alligator clip to the battery's black wire.
- Attach the conductance sensor to the alligator clips.
- The electrolytes' conductivity can now close this open system. Pour the 5 fluids into according labeled drinks.
- Turn on the multimeter and set it to 200m. Place the sensor into each glass multiple times, recording the average value in microamps.

Divide this value by one million microamps for an amp and the voltage to get the conductance.

Conclusions: BodyArmor had the most amount of conductance on average, with Liquid I.V. in 2nd, Powerade in 3rd, Gatorade in 4th, and water in 5th. Although most companies kept up to record with their claims, Gatorade only had 2/3 the amount of electrolytes as Powerade and way less than the other drinks.

High School Projects
(Grades 9-12)

Team: **AI Medics (HS1)**
Title: Code Against Cancer
Participants: Annika Agshiker, Anagha Meda, and Niya Patel

Objective/Goals: Remission occurs in almost one in three cases of thyroid cancer. Our project aims to create an artificial-intelligence powered chatbot that is able to analyze the symptoms of thyroid cancer survivors and provide an accurate at-home evaluation regarding the likelihood of their cancer returning, allowing them to seek medical attention quicker, and increasing the chance of their survival.

Methods/Materials: We began our research by identifying and collecting data that could be utilized to build a chatbot tailored to thyroid cancer survivors. We ensured that the data represented a variety of thyroid cancer patients within different age ranges, genders, and exhibiting different physical symptoms. Additionally, the data was a balanced representation of various types of thyroid cancer, including papillary, follicular, medullary, and anaplastic. Through rigorous testing and validation of hundreds of cases, we were able to refine our chatbot's ability to deliver concise and precise responses, making it an incredibly valuable tool for both patients and healthcare professionals.

Results: We successfully created an artificial-intelligence powered chatbot that could provide thyroid cancer patients with personalized assessments on the likelihood of their cancer recurring, giving them the clarification they need in a timely manner.

Conclusions/Discussion: Our artificial intelligence chatbot demonstrates the potential of artificial intelligence when detecting disease and sickness. This idea has the potential to be a huge step for the personalized healthcare of the future. Through systems like this, individuals who do not have access to medical attention can receive it easily.

Summary: This project aims to use an artificial-intelligence chatbot, trained through machine learning, to democratize personalized healthcare and medical awareness around thyroid cancer recurrence.

Team: **Innovative Thinkers (HS2)**
Title: Technology Reimagined: AI Agents
Participants: Ojas Shrivastava, Krish Joshi, Zain Javid and Milan Shah

Objectives/Goals: Our main objective is to show the pros and cons of AI agents and show an example of how they can be used in a real-world scenario through customer service.

Methods: We will create a research slideshow on the differences between AI agents and other more commonly used artificial intelligence. We will then create an AI that can specially focus on a lot of monotonous tasks, which, in our case, is customer service assistance. This AI will be trained and tested to improve after more responses.

Results: We hope to inform our audience of the future of AI agents and how it can change the world for the good and what problems it may bring.

Team: **Brainy Badgers (HS3)**
Title: Robo Dog
Participants: Ayush Sharma, Daivik Shah and Nethra Gujja

Objectives/Goals: Our goal is to design and build a four-legged robotic dog that mimics basic

animal-like movements. Long-term, we aim to explore how such robots could assist in companionship, simple tasks, or robotics education.

Methods/Materials: We used an Arduino Nano and a servo motor driver to control the robot dog's legs, head, and tail. The robot has 10 small servo motors on a lightweight 3D-printed frame. It's powered by a battery pack with components connected via jumper cables and a breadboard. Each leg uses two servo motors, with one each for the head and tail. An onboard speaker allows it to bark, and the Arduino Nano serves as the system's brain, coordinating all actions.

Results: The Robo-dog will walk forward, backward, and turn smoothly. Servo motors will ensure stable, balanced movement. The head and tail will add realistic motion, and the speaker will enhance lifelike behavior with barking sounds. Overall, it will function like a miniature dog.

Conclusions/Discussion: This project helps us understand how coding and motor control come together in robotics.

Summary: We designed and built a four-legged robot dog using an Arduino Nano, servo motors, and a 3D-printed frame. It will walk, turn, move its head and tail, and bark. Through this, we're learning how to combine programming and mechanical design to create life-like motion. The project demonstrates how technology can mimic animals and shows potential for future use in education or community support

Team: **The Prognosipals (HS4)**
Title: Why Certain Popular Drugs Worsen Anxiety and Insomnia and How We Can Improve
Participants: Arnav Dogra, Siya Patel, Ummi Hashim and Alagumeenaa Ram

Objective/Goal: This initiative addresses the question of how some of the most frequently used prescriptions exacerbate anxiety or insomnia. It seeks to identify the underlying biological mechanisms that make these side effects occur and offer potential substitutes or alternatives that curtail their toll on physical and psychological well-being.

Materials and Methods: We simulated the internal environment of the human body using water, lemon juice, vinegar, and basic solutions. A pH meter tracked changes in acidity, mimicking the way that drugs respond with the body's digestive liquids. Models of drugs were based on known work on the biochemical responses of medications such as SSRIs, beta-blockers, corticosteroids, and antihistamines. A review of clinical trials, FDA reports, and pharmacology provided us with an understanding of drug action and side effects.

Results: We discovered a number of ways that these medications might aggravate anxiety or insomnia. SSRIs augment serotonin but overstimulate the receptors of susceptible individuals in the beginning. Beta-blockers lower adrenaline but interfere with normal sleep cycles. Corticosteroids raise cortisol levels, giving way to restlessness when consumed late. First-generation antihistamines make one drowsy but interrupt REM sleep. Stimulants such as those used for ADHD raise alertness and become more difficult to sleep when taken late.

Such side effects are commonly the result of unforeseen influences on neurotransmitters, hormones, or sleep patterns. Greater insight into pharmacodynamics and individualization of drug administration times should decrease adverse consequences. Potential remedies range from individualization of drug regimens with respect to patients' sleep cycles to substitution of less psychotropic drugs and the inclusion of behavior therapies in treatment aimed at decreasing reliance.

Team: **Biomedical Besties (HS5)**
Title: Biocompatible Prosthetic Coatings Through Electroplating
Participants: Eva Patel, Yashvi Patel, and Sunidhi Mitikiri

Objective/Goal: The objective of this project is to investigate how electroplating using an electrolytic cell can enhance the properties of metals used in prosthetics, specifically by improving their resistance to corrosion and increasing their biocompatibility, by constructing a basic electrolytic cell to demonstrate the electroplating process. Corrosion experiments are conducted using common acids and oxidizing agents to simulate the conditions metals might encounter within or on the human body. In addition, research was conducted to examine how metal ions released from prosthetic materials interact with human tissue and to determine which metals are most suitable for biomedical applications.

Methods/Materials: Corrosion test materials:
- Metal samples, which include iron nails, copper wire, aluminum foil
- White vinegar (acetic acid), hydrogen peroxide (H_2O_2), saltwater (NaCl + tap water) ● Containers, such as small glass jars or plastic cups
- Timer or clock for monitoring corrosion over time

Method: Place each metal sample in separate containers filled with different liquids. Record visual changes (rust, discoloration, pitting) at intervals. Compare corrosion levels between treated and untreated samples.

Results: Corrosion testing revealed that iron corroded rapidly in saltwater and vinegar, with visible rust forming within 24 hours. Aluminum showed significant reactivity with hydrogen peroxide, producing bubbles and surface pitting. Copper exhibited the least corrosion, with only minor surface changes observed over the course of several days. Additionally, research on electroplating showed that metals like gold, titanium, and stainless steel are commonly electroplated for their high resistance to corrosion.

Conclusion/Discussion: The corrosion tests demonstrated that iron and aluminum corrode rapidly in acidic and oxidative conditions, while copper exhibited better resistance but still showed signs of tarnishing. These findings emphasize the need for protective coatings in prosthetics, as corrosion can lead to the release of metal ions which negatively impact biocompatibility by causing adverse reactions with human tissues. Electroplating, however, especially with metals like gold or titanium, forms a protective layer that improves corrosion resistance, preventing degradation.

Electroplating increases the durability and thus the safety and longevity of prosthetic devices in the human body.

Team: **Energizers (HS6)**
Title: Caffeine and Sleep Deprivation
Participants: Anusha Vakkalagadda, Prerana Santosh and Annie Yin

Objective: Our hypothesis is that students who consume caffeine and have sleep deprivation will exhibit a higher resting heart rate compared to those who are well-rested and caffeine-free. The combined effect of caffeine and lack of sleep will be a prolonged increase in heart rate.

Material/ Methods: To test this hypothesis, a controlled experiment will be conducted. Resting heart rates of teenagers will be recorded at multiple time points. Sleep duration and caffeine intake will be monitored. Data will be collected and analyzed to identify trends in heart rate fluctuations among the different groups.

Results: Results will be presented during the symposium.

Innovation distinguishes between a leader and a follower.
- Steve Jobs

Learning and innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow.
- William Pollard

Judges at a Glance

Barbara Wendell

Barbara Wendell is a dedicated and experienced science educator with over 11 years of teaching experience, including the past 6 years at Linwood School in the North Brunswick Township School District. She brings a rich academic background and a strong commitment to environmental education into her classroom and beyond. Barbara holds dual Bachelor's Degrees in Biology and Environmental Science, providing a robust foundation in both life and earth sciences. She further advanced her professional qualifications with a Master's Degree in Educational Leadership, with concentrations in Educational Management, Administration, and Supervision. Her academic and professional journey reflects a deep passion for fostering scientific literacy, critical thinking, and responsible citizenship among her students. In addition to her role as a classroom teacher, Barbara is actively involved in enhancing student engagement through extracurricular and community-based initiatives. She is currently working in collaboration with Linwood School administrators and faculty to establish an Environmental Club. This initiative is designed to extend students' understanding of environmental issues through hands-on experiences, community outreach, and interdisciplinary learning opportunities. Barbara also contributes to environmental advocacy and stewardship outside the school setting. She is a participant in the Rutgers University Environmental Stewardship Program and a member of the East Brunswick Environmental Commission, where she supports community-wide efforts related to sustainability, conservation, and education. Through her teaching, leadership, and community service, Barbara Wendell continues to inspire young minds to explore the sciences and develop a lifelong respect for the natural world.

Subir Dutta

Subir Dutta is an Information Cybersecurity and Technology Risk Director at Wells Fargo, responsible for developing and implementing comprehensive cybersecurity risk remediation programs. He has 25+ years experience in the Financial Services industry and has proven ability to lead and manage security teams, identify and mitigate risks. Subir is a pioneer and leader in security engineering and is distinguished for starting new areas of research in hardware, software and systems. He has made trailblazing contributions that helped establish a number of new research topics including Data Encryption and scanning frameworks. Subir holds Masters in Technology Management from Stevens Institute of Technology, New Jersey. Subir has received various recognition and awards including a London Technology award on behalf of a Swiss bank, for leading a team to build an innovative financial product for Capital Markets business that saved millions of dollars.

Frank Sweeney

Frank Sweeney is a Sr. Process Safety Engineer at LyondellBasell. A graduate of NBTHS, Frank went on to receive a B.S. in Chemical & Biomolecular Engineering, as well as a Masters in Engineering Management, from Johns Hopkins University. He has held a variety of engineering roles in fields such as Li-Ion batteries, fluorochemicals, and plastics. Frank is also the co-founder and treasurer of Intellection Institution, a 501(C)3 organization promoting STEM education.

Dr. Madhusudan Reddy

Dr. Reddy obtained M.Sc.in Chemistry from Osmania University, Hyderabad and Ph.D. from National Chemical Laboratory, Pune, India in 1990. He has worked at Imperial College, London and University Laval, Quebec as post-doctoral fellow on projects to develop the selective absorbents and catalytic materials for fine chemical processing. He moved to the USA in 1994 and served as a research faculty at Energy & Fuel Research Center, PennState University where he taught a graduate course on catalytic materials and also worked on multiple research projects in the development of catalysts for fuel processing. Throughout his research career Dr. Reddy has published multiple research papers in international journals and filed patents in various countries. The Council of Scientific and Industrial Research (CSIR), India has recognized him for his patent on the material and process for the selective cracking of hydrocarbons for the dewaxing process of petroleum processing. Dr. Reddy is currently working at the Consolidated Edison of New York.

Rajeev Shrivastava

Rajeev Shrivastava is IBM Watson's Thought Leader Level Chief Solution Architect, with more than 25 years of global experience in leading the large and complex delivery of end-to-end solutions in the area of Artificial Intelligence, Machine Learning, and Deep Learning. He completed his Master of Philosophy in Computer Science and Masters in Applied Mathematics, from India. He is also involved in various community services such as the P-TECH program that helps high school students build the skills they need in tomorrow's careers. Mentoring middle school kids for problem solving skills as well as coaching soccer for young children in North Brunswick.

Kelly Sookdeo

Mrs. Kelly Sookdeo graduated from Montclair State University with her Bachelor's degree (B.A) in Family Science and Human Development with certifications in Science, Math, Special Education, and K-6 Education. She then went on to continue her education at Montclair State University for her Master's Degree (M.Ed.) in Special Education where she graduated in a year and a half with a 4.0 GPA, was awarded the Graduate Student- Dean's Award, and was the Graduate Assistant to the Chair of the Education Department participating in Educational Research. Mrs. Sookdeo is currently a 5th grade Science teacher, serving as the Subject-Area Leader, and the 6th grade Engineering Challenge teacher at Linwood School and the Head Winter Varsity Cheerleading Coach at the NBTHS. She is a member of the District Health and Safety Committee and the Math & Science New Jersey Tiered Systems of Support Data Team (NJTSS) at Linwood. During the summer months, she is the Aquatic Director and Instructor at an aquatic facility down the Jersey shore. She loves to explore the different fields of STEM inside and outside of the classroom! "You only fail when you stop trying"

Dr. Vijay Reddy

Dr. Reddy is a Senior Director at BioXcel Therapeutics Inc., New Haven, CT. Vijay has extensive experience in the areas of drug metabolism and pharmacokinetics. His current research involves the development of therapeutics for the treatment of agitation associated with bipolar disorder, schizophrenia, and Alzheimer's disease. Vijay obtained BSc from the Osmania University, Hyderabad, MSc from the Kakatiya University, Warangal, and PhD from the Indian Institute of Science, Bangalore. Following postdoctoral research at Oregon Health Sciences University, Portland, Oregon, Vijay joined Merck Research Labs, NJ, where he worked for 19 years with focus on drug discovery. Prior to joining BioXcel, Vijay was a Senior Director at Rafael Pharmaceuticals, NJ, where his research was focused on the development of novel therapeutics for the treatment of pancreatic cancer and leukemia.

Dr. Manohar Sriramoji

Dr. Sriramoji obtained PhD in Physical Chemistry from Osmania University in 1991. Following Post Doctoral Fellowship at University of Oklahoma Norman. Dr. Sriramoji joined Chemtex, Port Arthur, TX as Analytical Chemist. During the course of his research period, he submitted a number of publications in various International journals. Dr. Sriramoji currently works at Merck in the Information Technology division. In addition, Dr. Sriramoji is actively involved in social activities including establishment of "Srinivasa Memorial Trust" in his native village in India and has been providing scholarships to first & second rank students in 10th grade for the past 13 years. He has also sponsored "Lead India 20-20", a three days program to inspire young students in the very high school where he graduated from.

Abhay Navale

Abhay Navale is Global Head of Digital Assets Technology at BNY Mellon. He has worked in Financial services technology across Fintech and Global banks. He has a passion for building great engineering products that solve business problems and delivering improved customer value.

2024 NBT SCIENCE SYMPOSIUM WINNERS

Team#	Team Name	Category	Participants	Award
ES3	Germ Busters	Elementary School	Naman Venugopal	1st Place
ES3	Germ Busters	Elementary School	Kabir Gupta	1st Place
ES3	Germ Busters	Elementary School	Ranvir Gupta	1st Place
ES3	Germ Busters	Elementary School	Devyansh Sharma	1st Place
ES8	Gene Girls	Elementary School	Ayla Syed	2nd Place
ES8	Gene Girls	Elementary School	Hawwa Tahir	2nd Place
ES8	Gene Girls	Elementary School	Inya Ramachandran	2nd Place
ES8	Gene Girls	Elementary School	Isra Naeem	2nd Place
ES8	Gene Girls	Elementary School	Sara Mortigo	2nd Place
ES13	Electra	Elementary School	Arpitha Nair	3rd Place
ES13	Electra	Elementary School	Diya Elizebeth Mathew	3rd Place
ES13	Electra	Elementary School	Sidithi Vinod	3rd Place
IMS2	R.A.P Science Guys	Intermediate Middle School	Ajitesh Tiwari	1st Place
IMS2	R.A.P Science Guys	Intermediate Middle School	Rivan Ghimiray	1st Place
IMS2	R.A.P Science Guys	Intermediate Middle School	Priyansh Patley	1st Place
IMS5	Science Nerds	Intermediate Middle School	Karunya Gujja	2nd Place
IMS5	Science Nerds	Intermediate Middle School	Visesha Pasumarthi	2nd Place
IMS1	Science Squad	Intermediate Middle School	Aryan Vuggini	3rd Place
IMS1	Science Squad	Intermediate Middle School	Pranav Krishna Prasad	3rd Place
MS4	Brainy-Badgers	Middle School	Ayush Sharma	1st Place
MS4	Brainy-Badgers	Middle School	Daivik Shah	1st Place
MS2	Extravagant Engineers	Middle School	Vihaan Shah	2nd Place
MS2	Extravagant Engineers	Middle School	Karthik Voruganti	2nd Place
MS2	Extravagant Engineers	Middle School	Samik Makam	2nd Place
MS5	The Synthesizers	Middle School	Rishab Patel	3rd Place
MS5	The Synthesizers	Middle School	Nishchal Polanki	3rd Place
MS5	The Synthesizers	Middle School	Samarth Panchal	3rd Place
HS6	ToxicTitans	High School	Amruta Jayaganesh	1st Place
HS6	ToxicTitans	High School	Nishi Patel	1st Place
HS2	Biomedical Besties	High School	Eva Patel	2nd Place
HS2	Biomedical Besties	High School	Yashvi Patel	2nd Place
HS2	Biomedical Besties	High School	Sunidhi Mitikiri	2nd Place
HS5	The Ionic Innovators	High School	Anusha Vakkalagadda	3rd Place
HS5	The Ionic Innovators	High School	Aanya Muniyappa	3rd Place
HS5	The Ionic Innovators	High School	Meenaa Ram	3rd Place
ES1	Slime Making Geniuses	Elementary School	Selia Herrera	Outstanding Research
ES1	Slime Making Geniuses	Elementary School	Mila Dorjo	Outstanding Research
ES1	Slime Making Geniuses	Elementary School	Gianna Baskett	Outstanding Research
ES12	Builders	Elementary School	Ishan Shrivastava	Outstanding Design
ES12	Builders	Elementary School	Varun Mandava	Outstanding Design
ES7	Sparklers	Elementary School	Anvitha Gandhaveeti	Outstanding Presentation
ES7	Sparklers	Elementary School	Dhrithi Puvvada	Outstanding Presentation
ES10	Mini Minds	Elementary School	Arnav Raj	Outstanding Creativity
ES10	Mini Minds	Elementary School	Damian Likakis	Outstanding Creativity
HS1	Hydro Heroes	High School	Mythri Velagapudi	Outstanding Creativity
HS1	Hydro Heroes	High School	Virinda Popli	Outstanding Creativity
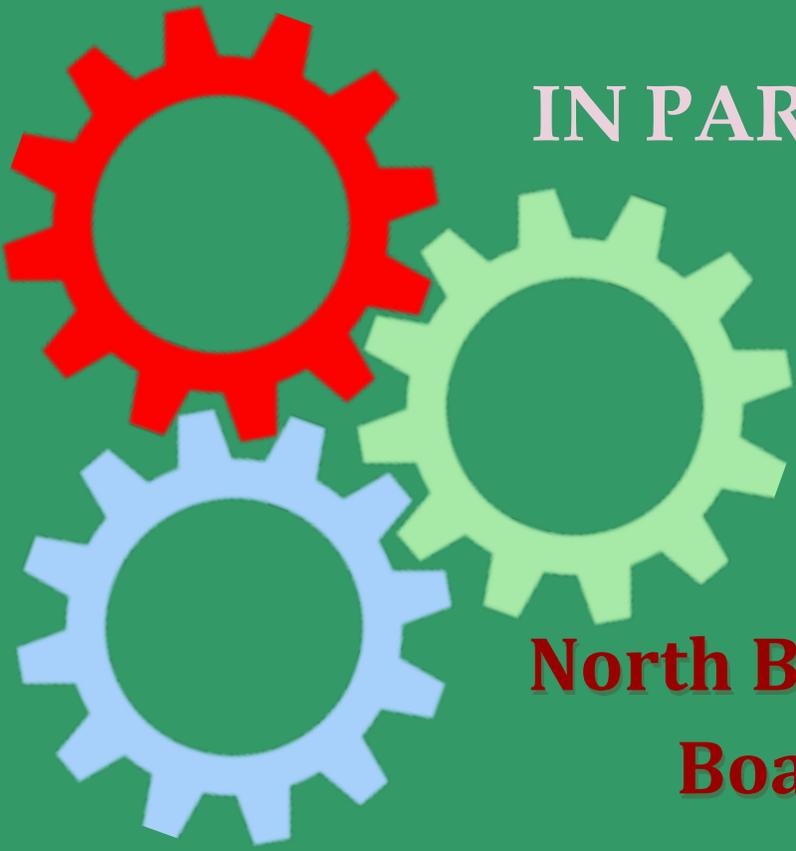
North Brunswick Township
Board of Education

North Brunswick Township
High School

Intellection NJ

North Brunswick Township