

## Project Title: EcoExplorer



**Project Summary:** EcoExplorer is an innovative and interactive website designed to educate and engage children in understanding their local natural ecosystem through hands-on exploration. The focal point of this fun and educational platform is the integration of a soil moisture sensor that allows kids to actively monitor and interact with the environment.

Welcome to EcoExplorer, where the magic of nature comes to life! 🌱 Get ready for an amazing journey into your local world. Our special tool, the 'Soil Moisture Sensor,' is like a superhero gadget that lets you talk to the ground and discover the secrets of your natural neighborhood. Are you ready for an adventure? Let's explore together and learn the coolest things about the great outdoors! 🌍🔍✨

Tagline: Explore, Play, and Grow with EcoExplorer - where soil sensors meet fun, unlocking the secrets of your local ecosystem!

**Project Importance:** EcoExplorer aims to instill a sense of curiosity and responsibility in children towards their local environment. By combining hands-on experience with technology, the platform encourages active participation in nurturing and understanding the delicate balance of nature.

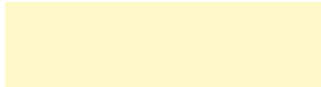
Through EcoExplorer, children not only contribute to the well-being of their local ecosystems but also develop a lifelong appreciation for the natural world around them. This project fosters a generation of environmentally conscious individuals who are empowered to make positive changes in their communities.

We mix hands-on adventures with tech magic to help you understand and protect nature. By exploring with EcoExplorer, you're not just having a blast – you're becoming a superhero for your local world! Let's go on this exciting journey together and make our planet a better place!

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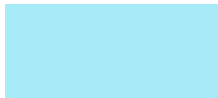
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**Soil Moisture Sensor Integration:** Children can plug in a soil moisture sensor into their local soil, providing real-time data on the moisture content. This interactive tool serves as a gateway to understanding the environmental conditions that impact plant life.

**Recommendation Engine:** The website analyzes the data from the soil moisture sensor and generates personalized recommendations for kids to improve soil moisture content. These

recommendations include fun and educational activities like planting specific types of flora, creating DIY watering systems, or organizing local cleanup events.

**Flora Fun Facts:** EcoExplorer Kids not only offers practical tips but also enhances learning through interesting facts about the flora in the nearby area. Kids can explore a virtual field guide, learning about the various plants, their unique characteristics, and their role in the ecosystem.

**Interactive Maps:** The platform features interactive maps, allowing kids to mark and explore different locations where they have tested the soil moisture. This promotes a sense of community engagement as children can share their findings with friends and classmates.

**Rewards and Achievements (maybe idk):** To motivate continuous engagement, EcoExplorer Kids includes a rewards system. Kids earn badges and achievements as they actively participate in soil moisture monitoring, implement recommended actions, and share their experiences with the community.

**Educational Resources:** The website offers additional educational resources such as articles, videos, and quizzes, providing a well-rounded learning experience about environmental conservation and the importance of maintaining a healthy ecosystem.

### **1. (90%-100%): Too Wet, Please Do Not Water**

Tip: If your soil moisture sensor reads between 90% and 100%, your soil is like a sponge that's already soaked!

Why: Overwatering can drown plants, making it hard for them to breathe and grow. Just like you wouldn't want to swim all the time, plants need breaks from too much water.

### **2. (80%-90%): Ideal Moisture Levels**

Tip: Fantastic job! Your soil moisture is in the perfect range between 80% and 90%.

Why: Plants love this level of moisture – it's like having a refreshing drink on a hot day. Keep up the good work, and your plants will be thriving!

### **3. (50%-80%): Too Dry, Consider Watering It**

Tip: Uh-oh, your soil is a bit on the dry side if it's between 70% and 80%.

Why: Just like you feel thirsty when it's hot, your plants might be a bit thirsty too. Consider giving them a little water, but be careful not to flood them! Keep a close eye on your soil buddies.

### **4. (0-50%): Try Putting in the Soil Calibrator Again to Be Sure!**

Tip: If your soil moisture sensor reads between 0% and 50%, it might be time to double-check with the soil calibrator.

Why: Sometimes sensors can get a little confused, just like our senses. By recalibrating, you ensure more accurate readings and better understand what's happening in your soil world. It's like giving your sensor a quick check-up to make sure it's seeing things clearly! 🔄 🌱

### ##Inspiration

The inspiration behind EcoExplorer stems from our collective passion for environmental education and a desire to engage kids in discovering the wonders of their local ecosystems. Recognizing the importance of fostering a connection between children and the natural world, we envisioned a project that combines technology, hands-on exploration, and fun learning experiences. The goal was to create a platform that not only educates but also instills a sense of responsibility and curiosity about the environment.

### ##What it does

Throughout the development of EcoExplorer, our team delved into various aspects of environmental science, child psychology, and interactive web technologies. We researched soil types, local flora, and effective ways to communicate scientific concepts to children. This learning process not only deepened our understanding of ecology but also helped us tailor the project to be engaging and informative for our target audience.

### ##How we built it

In order to create EcoExplorer, we split into two teams that were focused on the hardware and software independently, and we came together in the end in order to create the interactivity that we are looking for with this website. The following platforms are listed and detailed with how we used it in our project.

#### **\*\*Technology Stack\*\***

\_Web Framework:\_ We opted for the Flask web framework due to its simplicity and ease of integration with SQLAlchemy for database management.

\_Database:\_ SQLAlchemy was used to create a dynamic database that stores soil moisture data and user interactions.

\_Frontend:\_ We employed HTML, CSS, and JavaScript to design an intuitive and visually appealing interface for EcoExplorer.

\_Arduino:\_ The incorporation of soil moisture sensors added a hands-on element to the project, allowing children to actively participate in monitoring their local environment. The core of EcoExplorer is the soil moisture sensor, providing real-time data for analysis.

\_Recommendation Engine:\_ The website generates personalized recommendations for kids to improve soil moisture content based on sensor data.

### ##Challenges we ran into

Creating EcoExplorer presented us with an array of exciting challenges that spurred our team to think creatively and problem-solve collaboratively. Our most significant challenge involved seamlessly integrating soil moisture sensors with the website, ensuring accurate readings and a user-friendly experience for kids. There were a lot of problems with the Bluetooth module that caused us to have to look into multiple different paths in order to resolve these issues. Striking the right balance between educational content and child-friendly design proved another hurdle, pushing us to craft an interface that captivates young minds while delivering essential information. Encouraging active participation from kids in soil monitoring and community engagement posed its own set of challenges, which we addressed by incorporating fun facts and the interactive portions of the website. Overall, navigating the technical intricacies, ensuring

child-centric design, and fostering community engagement required us to blend innovation with accessibility, resulting in an enriching journey of challenges turned opportunities.

### ##Accomplishments that we're proud of

We could not be more proud of the accomplishments achieved in bringing EcoExplorer to life. One major triumph was successfully integrating soil moisture sensors into the platform, creating a tangible and interactive experience for kids exploring their local ecosystems. Crafting a visually appealing and child-friendly interface that seamlessly blends education with entertainment stands as a testament to our dedication to making learning fun. Seeing the project evolve from a concept to a fully functional and engaging tool that empowers children to connect with and care for their environment has been a source of immense pride for our team.

### ##What we learned

The journey of creating EcoExplorer has been a profound learning experience for our team. Delving into environmental science, child psychology, and interactive web technologies expanded our knowledge base, providing valuable insights into effective ways to communicate complex concepts to children. The integration of soil moisture sensors taught us the importance of precision in technology and calibration, ensuring accurate readings for an educational tool. Above all, witnessing the positive impact of EcoExplorer on fostering a connection between children and their local ecosystems has reinforced our belief in the power of technology to inspire the next generation of environmental stewards. This project has not only enhanced our technical abilities but has also instilled in us a profound sense of responsibility toward creating meaningful and impactful educational tools.

### ##What's next for EcoExplorer

In the future, we hope to expand EcoExplorer beyond the few Texas Counties that we have currently. We can consider creating an even larger database in order to allow kids to participate in EcoExplorer around the country, not just in Texas. Additionally, we might consider adding even more functions to the sensors that go beyond soil moisture content like soil PH or soil NPK levels.

## Research:

- **College Station, Brazos County**

- In Brazos County, the ground is usually a mix of different types of soil. Most of it is kind of like dark, fluffy dirt on top, and underneath, it's a bit like clay. That means around 11 to 20% of the land in the county is really good for growing crops like plants and veggies!
  - In Brazos County, the soil is like a hidden treasure for plants! Besides being great for farming, this special mix of soil also acts like a natural sponge, helping to keep water for the plants to drink when they get thirsty. It's like a cozy home for our little plant buddies! 🌱 ✨

- **Fort Bend County**

- In Fort Bend, the ground is mostly made up of clay soil, which means water takes its time soaking in, unlike sandy soil where it goes in quickly like a straw. Imagine our soil is like a giant sponge that likes to take its time sipping water! ☁️ 🧽
  - Did you know? Some plants in Fort Bend really love this slow-sipping soil, and they've become experts at making the most of every drop! 🌸 💧

- **Collin County**

- In McKinney and Collin County, the soil is mostly called Houston Black Clay, and it's like the superhero of fertility, meaning it's super good for plants! 🌱 💪 But here's the tricky part: it can only drink water at a slow pace, about as fast as a sleepy snail. So, we need to be careful not to give too much water to our plants, or they might feel like they're swimming instead of growing in their cozy beds! 🛏️ 💧

- **Harris County**

- In Houston, our soil is like a mix of different things, kind of like a soil smoothie! 🌈 It's made up of clays and chalk from the Blackland Prairies. Now, here's the cool part: these soils can change size a lot, like a balloon that shrinks and swells. It's like magic happening underground! ✨ 🎈

- **Potter County**

- In Amarillo, there is a special type of soil called Amarillo fine sandy loam, which is like the cozy blanket for plants on a flat field that faces the sunrise! 😊 🌱 This soil is super friendly and slopes just a little bit, like a tiny hill for plants to sit on. So, imagine it as a comfy garden bed high up in the air at around 3,745 feet! 🛏️ ✨

- **Nueces County**

- In the land of Nueces, there are soils called the Nueces series, and they're like the deep, secret treasure chests for plants! 🌱 ✨ These soils are kind of like fluffy sands layered over older, soft dirt, making a cozy home for plants to grow. The land is like a gentle, rolling carpet with slopes as small as 0 to 5 percent – just perfect for a plant adventure playground! 🏞️ 🌈
  - And guess what? The special sands in Nueces are like a secret handshake between the plants and the wind, creating a soft, welcoming space for our green buddies to thrive and play hide-and-seek! 🌬️ 🌱

## Resources:

- <https://www.soils4kids.org/>
  - Hey soil explorers! Soils 4 Kids is the raddest place to have a blast with soil adventures! Dive into cool experiments and fun games that'll make you love learning about the Earth. Let's turn soil into your coolest buddy – join us on this awesome journey! 🌍☀️
- Hey Earth enthusiasts! Ready for a soil safari? Check out these super fun YouTube videos that make learning about soil types a total blast! 🌍🚀 Join the adventure as animated characters and cool experiments guide you through the secrets beneath your feet. From sandy surprises to muddy mysteries, these videos turn soil exploration into an epic journey. So, grab your virtual shovel and let's dig into the world of soils together!  
🌱🌟 #SoilSafari #DiggingFun
  - <https://www.youtube.com/watch?reload=9&v=i--51DBtOGU>
  - [Soil Erosion | Types and Causes | Video for Kids \(youtube.com\)](#)
  - <https://www.youtube.com/watch?v=bgqea0E2eAY> (layers of soil)