Rock, Paper, AI Sensors

A Stem Day Presentation on Artificial Intelligence and its Applications

Concepts Taught: Artificial Intellgience, Sensors, and Computer Programming

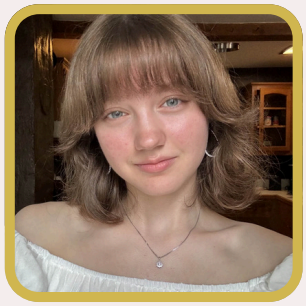
Rock, Paper, AI Sensors, **BIOGRAPHIES**

Katelynn Johnson

Hello! I'm Katelynn, a freshman Chemistry major in the Burnett Honors College at UCF. I currently plan to work as a materials scientist with a focus in nanotechnology.

Sebastian Candelaria

I'm Sebastian, a Computer Engineering student at UCF focused on hardware design. I want to work in the silicon chip industry after I graduate.



Kai Sprunger

Hello, I'm Kai! I'm a UCF freshman majoring in Computer Science! In the future, I plan on going into full stack development.

Katherina Dayaon

Hi, I'm Katherina! I'm a freshman Computer Science major at UCF. My current plan is to work with software development in the future.

Julia Going

I'm Julia, a senior in Environmental Engineering. I am the recording secretary of Tau Beta Pi, an undergraduate researcher in the Microsensor Biofilm lab, and a coxswain on the D1 Women's rowing team. I plan on attending graduate school in the future.

Project Overview

STEM Day is an interactive event on the University of Central Florida campus which is tailored to teaching students in kindergarten through eighth grade about various concepts and inventions in the world of science, technology, engineering, and math. Through the Honors Fundamentals of Technical Presentations course, our group has developed the project "Rock, Paper, AI Sensors" which highlights what artificial intelligence is and how it performs in daily life so that students may better understand more about this technology and how it could be applied to the world around them.

Developing our Presentation

When we began this project, our group hoped to create an engaging and educational activity that was applicable both to the lives of students in our target age group as well as the real world they experience outside of class. Our pitch reflected this from the beginning as we spoke with a desire to educate students about artificial intelligence, sensors, and computer programming by creating a game which uses AI computer vision. Outlining the specific creation and concepts we aimed to build on allowed us to complete our project in an effective manner as we considered what we saw each day relative to our project and reflected on activities we enjoyed at their ages. For example, we encountered video games which use eye tracking, which can be one of the applications of AI that children could potentially relate to.

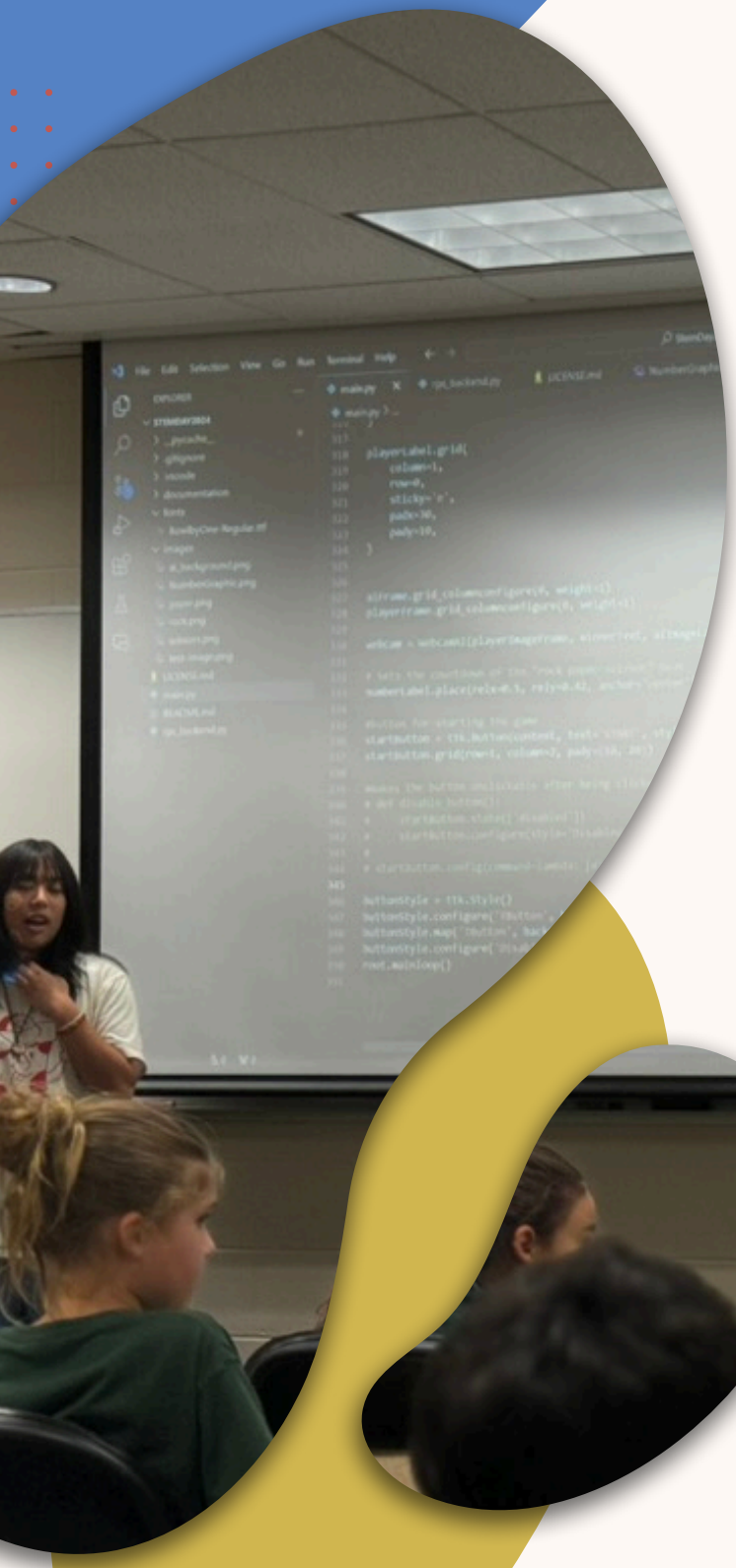
People Behind the Project

We formed our group based on our individual interests in working with Artificial Intelligence and the aspect of teaching kids using a fun yet informative game of Rock, Paper, Scissors. Though most of our members are Computer Science or Engineering majors motivated to share their passion and skill at programming, our other members contributed through work as liaisons and project planners who were excited to educate students about an intriguing emerging technology. These diverse ideas and backgrounds of the group allowed for a multitide of perspectives on our pitch, transforming it from what could have been a narrow explanation to a great project.

Audience Analysis

Rock, Paper, AI Sensors enhanced the STEM curriculum for the elementary and middle school students attending STEM Day by aligning with learning concepts beneficial for these ages found in the relevant literature. CPALMS, Florida's official source for educational standards, as well as the Florida Department of Education, show that critical thinking and implementation of scientific thinking such as hypothesis are common in the curriculum for elementary and middle school students. According to an article by Bolyard et al. (2021) in the Canadian Journal of Science, Mathematics, and Technology Education, STEM education allows students to experience struggle and collaboration in a controlled environment, which is vital to long-term success in educational and professional careers. This article specifically cited discussions with open-ended questions that did not necessarily have a correct answer, along with subjecting students to novel experiences that required a range of knowledge, as beneficial aspects of a STEM lesson plan. Rock, Paper, AI Sensors aimed to provide both an effective and engaging presentation by incorporating these ideas. The lesson plan allowed for open discussion in break-out groups of students while emphasizing that there are many correct pathways. This allowed for critical thinking and collaboration to be fostered as students work together to build a response. If students become confused or frustrated, the presenters aimed to lead the students to a conclusion rather than simply saying the 'correct' answer.

In an article by Changtong et al. (2021) in the International Journal of Educational Methodology, three models of learning were analyzed with middle school students to understand the effectiveness of STEM lesson plans: stand-alone, linear, and jigsaw. Stand-alone, which takes 4-5 hours and provides students with a set of materials and lessons for how to complete an engineering design. It was found to be less effective for metrics such as reasoning and problem-solving than the linear and jigsaw methods. Based on the time constraints of the STEM day lesson, the Rock, Paper, AI Sensors team used the linear method. The linear model of teaching consists of a sequential series of investigations that are presented to the students in order of complexity to begin exploring fundamental concepts and systemically transition to advanced ones. This method begins with simplistic examples of STEM topics that are easy for middle school children to relate to and understand, for instance, an AI-generated image using Dalle-3. The linear method then progresses to more complex examples. While students learn how the AI sensor identifies the shapes and positions of their hands in order to play against them, the presenters would highlight other real-world examples of AI that are still relatable to the students but perhaps are more difficult to understand. For instance, the presenters would explain the use of AI for traffic light cameras and eye tracking in popular video games. Additionally, presentation aids such as diagrams would be used to illustrate the conceptual foundation of AI and model an example of sensory AI: which is the AI sensor opponent which competed against students in rock, paper, and scissors games. While students learned how the AI sensor identifies the shapes and positions of their hands in order to play against them, they grew their knowledge and critical thinking through open-ended questions and real-life connections.



Lesson **PLANNING**

Our group first decided on the AI project we wanted to present to the students. The advantages of our AI project were the student interaction it provided, and the familiar concept (rock, paper, scissors) which could be applied to a more complex system. Our audience analysis had a large influence on the lesson planning. Primarily, learning more about the linear model of learning allowed us to create learning objectives that built upon one another in a productive manner. We started our objectives with a concept that would allow the students an immediate relevant connection between their personal experiences and our project: identifying different examples of AI in the students' lives. We then expanded into more technical learning objectives after creating this connection: What is AI and how does it work and learn? After determining our learning objectives, our team worked on developing a flow for the lesson plan that would hold the students' attention. We concluded that a short presentation, followed by the interactive AI activity, and then recap questions to gauge student learning would be the most appropriate breakdown. Following these planning steps, we could begin creating our visual aids — both the presentation and AI activity.

Visual Aid **DEVELOPMENT**

When developing our slideshow presentation, the age range of our audience was a very important factor. To tailor our presentation to a younger audience, we included pictures, videos, and minimal words on the slide. The interesting slides helped to keep the students' attention, and we were able to present on the more technical AI learning objectives by relating them to a concept the students were familiar with: dogs. Our AI activity explanation did not require any slides on the presentation, as we were able to screenshare a live image of the rock, paper, scissors game as we explained it. Throughout the presentation, we used AI generated images, which helped provide students with another example of AI in their own life. Additionally, all the AI generated images followed a similar color scheme and theme, which maintained consistency throughout the entire presentation. At the end of our presentation, we included AI research projects that were currently occurring at UCF in an effort to foster enthusiasm about possibly joining UCF in the future.

Our presentation aids were successful in adding to our AI activity because they were simplistic enough to not distract the students, but they also helped the students pay attention and relate our learning objectives to their own lives. Based on the amount of time available for a particular session, we were able to spend more time on certain slides or, alternatively, skip whole slides altogether.

Highs and Lows

A reflection of the delivered STEM Day presentation and the different successes and areas for improvement within our group.

Group 1

11:30-12:00

Highs

- Good transitions between slides and presenters
- The students were engaged with our presentation and asking questions
- The students were excited about the AI activity

Lows

- Not enough time for review questions, so we were unable to track how much they learned
- Too technical when explaining code, which took extra time
- Students asked unrelated questions and needed redirecting

Group 2

12:15-12:45

Highs

- The students remembered the term datasets
- Comments from students about interest in the AI activity

Lows

- The movie video took up too much time
- Forgot to show the rock, paper, scissors gesture beforehand
- Needed to take less questions
- There was not enough time to talk about the UCF research projects

Group 3

1:00-1:30

Highs

- Included Scratch in the presentation, which garnered students' attention
- Better question time management
- Students correctly answered review questions
- There was time to include UCF research

Lows

- Had to trim movie videos

Group 4

1:45 -2:15

Highs

- Included Scratch again
- Better time management and hit all slides
- Students were interested and asking questions

Lows

- There were adult helpers talking loudly in the back of the classroom
- AI program was inaccurate

Reflection and **Learning**

Rock, Paper, AI Sensors was a successful lesson that helped introduce the students to the basic concepts of AI while giving them a first-hand activity to garner further interest in computer science. With each passing group of students that came in, our team was able to learn and improve our presentation. For instance, we had to adjust the timing of our presentation after finishing the second group. This meant for the third group, we reduced the number of videos we played so that there would be more time to discuss the AI research projects at UCF. Another additional area that we improved throughout the day was by adding in the Scratch component. By showing this website to the students, we further tailored our presentation for action-oriented learners and provided an outlet for the students to learn more about computer science after STEM Day was done. Overall, our group did an excellent job adjusting our presentation to improve the content delivery. Teaching younger students in a way that caught their attention was one of our main concerns, and throughout these four groups, we improved our methods in each session. In the future, depending on time constraints, it would be interesting to give the students a chance to code something simple by themselves.

Our takeaways and **ADVICE**

Our lessons learned from teaching a STEM-based lesson to younger students:

Real-life Applications

By beginning the presentation with examples of real-life applications of AI, we were able to immediately garner attention and interest from the students. This gave an initial interactive element to our session, as our interactive AI activity did not begin until the end of the session. We were able to relate to the student's lives outside of school with relatable AI examples like Minecraft and Alexa.

Taking Questions and Redirecting

The students had a lot of thoughts on AI. Some of these thoughts materialized as insightful questions about the coding process or AI in their life. However, time was also taken up by students talking about the new Minecraft update or telling a story about a coding program they did in school last summer. It was vital for our team to learn how to appropriately redirect these students in a respectful yet timely manner so that we were able to complete all of our presentation.

Answering Difficult Questions

Although our group spent countless hours programming our AI sensors, there were unsurprisingly moments when the AI was uncooperative, especially with the students' tinier hands. When this first occurred, our group was slightly unprepared for how to respond. However, after altering our presentation to show the code behind the activity, it was much easier to explain to the students why the AI didn't work correctly that round. We were able to turn a difficult question into a learning opportunity about the complex process of coding.

Use a lot of Interactivity

We found that allowing kids to interact with the program itself as well as letting kids themselves identify objects just like AI was a hit in terms of their attention on the presentation. Interactive questions and actions proved to be the most useful in terms of getting them to remember information and keeping them focused on the task at hand.

A big **THANK YOU**

to both our service-learning partner and our professor for giving us the opportunity to teach the young minds of our community. We hope that this project helped inspire kids to grow further into the world of STEM and one day contribute to our ever evolving future.