



◀ Hyrum Johnson
Game Programming

APPLYING LEARNING TO CREATE PRACTICAL SOLUTIONS WITH LIBERTY'S ESTIMATION STATION

For University of Advancing Technology (UAT) students, coming up with a unique idea for their Student Innovation Project (SIP) can be a challenge that requires brainstorming, critical thinking and perhaps even a small epiphany.

For Hyrum Johnson (*Game Programming*), the idea for his SIP, Liberty's Estimation Station (L.E.S.) came about organically, as the family business is in construction. Estimating is a time-consuming, but crucial, element of contracting any project. It all goes back to the family business, as Hyrum's father started Rockwell Homes, a top builder of houses in Eastern Idaho, as well as a custom home building business called Liberty Homes—the namesake of L.E.S. While home for Christmas and working for Liberty Homes, Hyrum's brother presented him with a common problem: Why is it so hard to get an accurate quote for a home building project?

With this dilemma in mind, Hyrum easily dreamt up the possibility of a software that can not only help contractors tally up actual costs of a project based

on square footage, but also factors in fluctuating material costs. With this vision of a solution, Hyrum set to work on L.E.S., a software designed to create more accurate quotes for home building. An ambitious goal to be sure, but UAT would turn out to be just the environment needed to make his vision a reality.

A motivated student in high school as well, Hyrum began taking college coursework before receiving his diploma, so he can speak firsthand to what makes the UAT experience different from other universities.

"The classes are smaller and not as lecture-based—you get your hands in there and do the projects," Hyrum explained. "There are not as many quizzes on the theory behind code, rather, you actually write code and make projects out of your code."

Originally from Idaho Falls, Idaho, Hyrum knew he wanted to be a game programmer from a young age; he just needed to find the right degree program to help him learn the skills

and knowledge. The clear answer arrived after Hyrum filled out his career interests on his SAT form: A flyer from UAT advertised its one-of-a-kind Game Programming degree, exactly what Hyrum was looking to find.

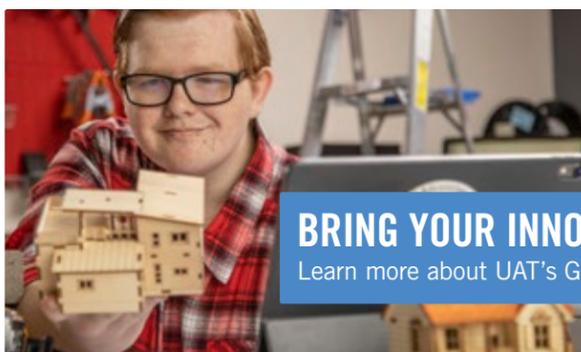
Hyrum would soon develop a slew of skills at UAT in order to bring his SIP from idea to fruition. From Python to C#, Hyrum had to learn multiple programming languages, as well as develop a keen understanding of machine learning and algorithms. He says he is grateful to Professor Tony Hinton for guiding the direction of his learning in order to achieve his complex SIP goal, as well as the freedom of "long hours with me, myself, and I" needed to actually complete the project. Compared to his expectations, Hyrum feels that UAT coursework has been both harder and easier in some ways than he anticipated.

"It's rigorous coursework, and there's a lot I'm learning that I never thought I would be learning. But I've been able to pick it up so quickly that I've surprised myself with how natural coding feels

to me," Hyrum said. "It's been a crazy journey doing all this advanced programming and I've thought, 'Wow, there's no way I could learn that'—and I just learned it."

Looking toward the future, Hyrum will soon be moving to Baltimore to complete a religious mission, but he hopes to eventually apply the skills he learned at UAT toward a career in the game industry. He's keeping an open mind in terms of the studio and location of his future job, but he would love to work for one of his favorite video game publishers or developers, like Activision or Treyarch. He feels the practical experience he's gained at UAT can help get him there.

"There's not a teacher that's sitting up there lecturing you, which is very nice. I don't really like lectures," Hyrum said. "It's great to have teachers who have hands-on experience who can help you—everyone is really accommodating."



BRING YOUR INNOVATIVE IDEAS TO LIFE AT UAT

Learn more about UAT's Game Programming degree: uat.edu/btb/game-programming

RICO GARCIA'S AI-POWERED STUDENT INNOVATION PROJECT DEMYSTIFIES MEN'S STYLE

BRINGING STYLE TO THE MASSES WITH THE POWER OF AI

Rico Garcia ▶
Robotics and Embedded Systems



While Rico admits he is eager to graduate and start the next phase of his career, he is also glad to have had the personalized assistance and to have been a part of the exclusive culture that UAT offers. He specifically mentions Professor Tony Hinton as a source of support while converting the programming language of his SIP from Python to JavaScript, and also credits influence to Professors Craig Belanger and Matthew Prater.

Rico's interest in fashion started during his time in the Navy due to being limited to a few select outfits that he had to wear, which led to feeling like he looked just like everyone else. Rico now feels his personal style is defined by what most might overlook—accessories and the little details that make an outfit pop. Notably, he feels the most crucial accessory for any outfit is the confidence needed to complete the look.

"It's 90% confidence, 10% fit," Rico said, noting that he can help with the fitting and aesthetics, but the rest is up to the wearer. "The confidence comes when you learn how to wear it all correctly or learn to mix patterns and colors that complement each other. That's when you can look in the mirror and say, 'I look pretty damn good right now.'"

For the future of Eros, Rico envisions a version of the application that allows users to not just receive fashion advice, but also catalogue their wardrobes and generate customized outfit suggestions.

Rico wants to work in AI, but is keeping an open mind about where the future can take him. On track to graduate in the summer of 2023, he would love to work at Tesla or even in the field of human prosthetics, acknowledging that his experience and knowledge in robotics are applicable to a wide variety of industries.

Rico says that three years ago, he would have had "no idea where to even start" when it came to developing Eros, as he learned most of his coding skills and technological savvy at UAT.

"The main goal behind Eros was to really push the boundaries of my experience and what I could do with AI, coding and everything I've learned so far."

After moving to Arizona and starting at University of Advancing Technology (UAT), he took a part-time job at a Men's Wearhouse, where he would soon learn what seemed to be a near universal truth: "Men want to look good, they just don't know how."

Enter Eros, an AI-powered chatbot designed to help men demystify personal style, build a coveted wardrobe and look sharp in any setting. Rico's Student Innovation Project (SIP) is named after the Greek god of love and desire.

As if taking a cue from his mischievous, legendary namesake, Eros' first interaction with its creator involved the AI mocking Rico's attire choices, telling him his outfit looked horrible. Refinement was necessary, and Rico used a combination of tools including Python, ChatGPT, JavaScript and React Native to keep working on Eros until he got it right.



Rico Garcia's (*Robotics and Embedded Systems*) career has taken him around the world. As a Navy veteran, he went all the way from his home state of Wyoming to being stationed in Pearl Harbor, and from there, he spent four years traveling 12 countries—traversing everywhere from Latin America to the South China Sea. When it came time to pursue his college degree, Rico didn't care where he'd be, so long as his robotics degree would be applicable to his future career.



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When it comes to investing, whether in stocks or in cryptocurrencies, the only guarantee you can really count on is the unpredictability of it all.

That's why University of Advancing Technology (UAT) students Chris Tomaskovic (*Advancing Computer Science, Artificial Intelligence*), Hunter DeVries-Ramirez (*Network Security*) and Anthony Shank (*Advancing Computer Science*) decided to construct a solution. With Alexander AI, a stock forecasting tool and the group's Student Innovation Project (SIP), they strive to illuminate how public perception of a company can impact rising and falling stock value.

Alexander AI performs sentiment analysis with data from Twitter to evaluate stock value based on what people are saying about the company and key partners. The AI used for the project makes predictions using a long short-term memory (LSTM) model, which is ideal for processing sequential data such as stocks. LSTM algorithms aid machine learning and help the AI understand complex data. The AI is able to take both positive and negative tweets to form a mean sentiment score, which is then used to inform the anticipated value of stocks for a five-day period. In an effort to manage the scope of the project, Alexander AI in its current form only evaluates the value of Tesla stock.

A project as complex as Alexander AI has many moving parts, so each student worked on a different element to bring their collaboration to life. With Chris heading up AI elements and putting his Python skills to use, Hunter securing the website from potential threats using JavaScript and Anthony developing the app and using Flutter to code the user interface for multiple platforms, the three were able to lean into their strengths and interests to complete their SIP.

Chris believes the best part of studying at UAT has been the emphasis on practical application of studied concepts over theory.

"What I really like about UAT is the project-based approach," Chris said. "Not having to worry about tests and quizzes, and actually doing the hands-on work is how I learn best."

Chris also added that since attending UAT, the community has been a favorite part of his experience. "It's a lot of like-minded people," he said.

The UAT community is one in which curious, engaged and ambitious students can thrive and collaborate with others who also think and work differently. For Hunter, he appreciates that UAT offers more than just the cookie-cutter four-year trajectory for earning a degree.

"I like the accelerated program and getting done quicker than the normal four-year mark," said Hunter, who will be wrapping up his UAT degree in just two semesters at the age of 21.

Anthony also loves the project-based style of learning and the way UAT gives students the freedom to explore their interests while still providing the support from professors as well as the resources they need to be successful.

"It's exciting being able to create something on your own," Anthony said. "And one of the best things about it is that UAT doesn't claim the projects that you create."

Anthony is referring to the fact that any IP created by students during their time at UAT remains student owned. This way, any SIPs or other projects can still be developed by students after graduation.

Because the students own their IP, this leaves Chris, Anthony and Hunter free to continue to develop Alexander AI after graduation, which all three have expressed interest in continuing because the project is so innovative. While there are existing AI-generated stock trading guidance services, these use news headlines and other media to form their sentiment analysis. Alexander AI, however, is different in that it forms its recommendations purely via public sentiment.

All three group members are on track to graduate from UAT within the next couple of semesters, at which point they plan to pursue their careers independently. Still, they see the possibility for continuing development of Alexander AI.

"If we can build a business off of Alexander AI, I'd love to keep working on this," Chris said.



▲ **Chris Tomaskovic**
Advancing Computer Science,
Artificial Intelligence

Hunter DeVries-Ramirez
Network Security

Anthony Shank
Advancing Computer Science

UAT FUTURE

WITH ALEXANDER AI

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HOT COURSES GIVE YOU A COOL EDGE

KEEP YOURSELF IN-THE-KNOW WITH UAT'S COOL COURSES AROUND TRENDING TECHNOLOGICAL ADVANCEMENTS. SPECIAL TOPICS COURSE OFFERINGS VARY FROM SEMESTER TO SEMESTER, BUT HERE IS A GLIMPSE INTO SOME OF THE INNOVATIVE CLASSES YOU CAN ENROLL IN SOON AT UAT!

HUM250: World Building requires students to develop their creative writing abilities and expand their minds as they form a lore, mythology, cartography and more for their own speculative universe. Guided by Professor Dan Pike, students will determine the guidelines of various components that make up their own fictional world, from bestiaries to magical systems. In groups or individually, students will learn and draw inspiration from popular speculative fiction genres to form their own IP, including Cyberpunk, Post-Apocalyptic scenarios, Urban Fantasy and many others. They will then refine the fictional world they've built in a series of pitches and workshops, resulting in a final product that could then be gamified into a tabletop or virtual RPG, or even serve as the basis for a film, novel, comic book or narrative podcast series.

Students will be challenged with investigating the ways haptic feedback can be incorporated into various technologies by Professor Jake Perrine in **SPT323: Haptic Technologies**. Haptic capabilities are integrated into so many areas of everyday life, from the vibration felt from an incoming text message to more complex uses like fully rendered haptic VR gloves. Students will learn the two sensory modalities that generate haptic sensation as well as how to render the modalities digitally. Building on this base of knowledge, students will then create a product or device that thoughtfully and innovatively incorporates haptic feedback into the design as a final project.

SPT323: Art Jam is a special topics course that expands the joy of a game jam—an event which sets a time limit and theme constraint for developers to produce a video game within—into a full course that allows students to develop their artistic sensibilities. Challenged by Professor Matthew Marquit via a set of aesthetic themes and other limitations, students will be tasked with creating game art assets that vary in style and intention, both individually and collaboratively. Art Jam is an ideal course for students wishing to diversify their game art portfolio while also developing their artistic capabilities and software knowledge.

If you've ever wanted to create a printed circuit board, let Professor Matthew Prater teach you the essentials in **SPT323: PCB Build!** From soldering, to digital signal processing (DSP), to PCB design and manufacturing, students will obtain hands-on experience in each stage of the PCB building process. Building on the skills learned in the course, students will produce an oscilloscope as well as circuit boards, learning three different techniques to accomplish the latter. The course will culminate in a final project which requires students to encompass knowledge gained from all components of the course, such as a badge for UAT commencement.

READY SET GO »

The UAT admissions process should begin as early as your sophomore year of high school. This can be a great benefit for you since it allows you to create a relationship with an advisor from the University who can help guide you every step of the way. In addition, applying early gets you access to:

- > More scholarship opportunities
- > Notification of scholarship eligibility when you apply
- > Select your spot in the dorms
- > Better class choices
- > Campus events
- > Student news

WHO'S ADMITTED TO UAT?

UAT welcomes exceptional students who are passionate about learning in every phase of their life. Just as important in the admissions process is your aptitude for technology. For instance, a good student who has been programming and building websites or advanced robots is of more interest to UAT Admissions than someone who has not demonstrated an aptitude for technology, but has top grades and test scores. In other words, we're looking for future technology innovators and patent holders!

SO... WHAT'S NEXT?

Prospective students can apply online at uat.edu/btb/apply. Admissions requirements and the online application can both be found on this page. Soon after your application has been received and reviewed by our Acceptance Committee, you will be notified of your acceptance status. If you need help or advisement with the application process, or if you just have questions, please contact our Admissions Office at 877.828.4335.

FALL 2023 SEMESTER

September 5 - December 17

SPRING 2024 SEMESTER

January 10 - April 28

SUMMER 2024 SEMESTER

May 13 - August 25

FUELING CREATIVITY THROUGH EMOTION

For Hanna Richards (*Game Design, Game Art and Animation*), narrative has always been a key part of the video game play experience. She grew up playing video games renowned for their emotionally compelling stories—Naughty Dog's *The Last of Us*, Telltale Games' *The Walking Dead* and *The Wolf Among Us* were among the titles that sparked her inspiration. But still, Hanna saw the potential for further emotional sway: What if the *player's* emotion could impact the gameplay experience? Enter **Control Your Emotions**, Hanna's **Student Innovation Project (SIP)**. Control Your Emotions factors in the player's real-time emotions to the gameplay experience, impacting character interactions and story outcomes through procedural generation. The non-playable character (NPC) starts the scene in a neutral state, only to be swayed by player input regarding their emotional state while playing. While the project in its current state requires the player to input their emotional state, Hanna envisions a future version that could use detection hardware to automatically pull this data. Hanna feels that the types and structure of classes at UAT are different from the average university, but says what ultimately made her college experience unique was the dedication of the faculty. "The connection with the professors is really the most interesting thing about UAT," she said. "When working on projects for your portfolio and trying to get a job, they are helpful to the max. They're there for you, they're going to help you every step of the way." For Hanna, coming to Arizona from the small town of Adelanto, CA, building that connection with the UAT community was key to her success in completing her SIP as well as double-majoring in Game Design and Game Art and Animation. To complete her SIP, Hanna collaborated with UAT graduate Alec Carter (2021, *Game Programming*) and took guidance from UAT faculty—primarily Matthew Marquit (UAT professor and alumnus, 2016). Hanna chose Game Design as her initial major because she "fell in love with it" after taking a few game design courses in high school. After attending some of UAT's digital arts courses, she decided to add a second major in Game Art and Animation. Hanna feels that combining her two passions is a dream come true. Hanna had to learn a variety of skills in order to make her vision a reality. From visual scripting to prototyping in Unreal Engine 4, she had to expand her knowledge and capabilities to bring Control Your Emotions to reality. Hanna's claim to innovation is an impressive and daunting one, in that she wants to expand game design itself, taking video game narrative to the next level. "When players are playing games, they're designers in their own right too," Hanna explained. "They're feeling connected to these games, because games already do that to people—they make them feel connected, they make them feel special. And I think my SIP is another way to branch onto that and to make it even more special for those players." Hanna is graduating from UAT this fall, but doesn't know where the future will take her just yet. She plans to move back to California for a beat to polish up her resume and her portfolio, before tackling the next challenge of her budding career as a game designer and animator: beginning the job hunt. Hanna's staying flexible in that regard, keeping an open mind to wherever life and her career could take her next. "Wherever work takes me—I'd be willing to go and venture off."



When a player is having an in-game conversation, the system will check for their current emotion and procedurally generate a message based on the combination of emotions

Control Your Emotions is innovative because it will use the data of a player's real-time emotion in order to procedurally generate the narrative of a game.

Hanna Richards
Game Design, Game Art and Animation

The system checks for the player's current emotions. This data will be used for the current conversation and affect the overall narrative.

LET CREATIVITY FUEL YOUR LEARNING

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Learn more about UAT student innovation:
uat.edu/btb/sip



BEHIND THE BITS



ISSUE 14

MOLDING THE FUTURE OF VIRTUAL REALITY

Victor Robles (*Virtual Reality*) was hooked the first time he tried out virtual reality (VR) at an arcade that offered play sessions for \$20 an hour, and it quickly became an exciting (and expensive) new hobby.

When Victor put on his first VR headset all those years ago, he was instantly immersed in the new, virtual world, and opened up a whole new possibility for the trajectory of his real-world life.

"From then on, I spent \$100 a day, just playing virtual reality," Victor laughed, recollecting his early visits to the VR shop. "And so, at first, the owner actually got upset with me, because I was taking up a slot for the whole day. He was like, 'Hey, why don't you get your own VR headset? You don't have to keep coming here and spending so much money!'"

Victor would go on to not only get his own VR headset, but would also choose a new career path. A military veteran, Victor chose UAT for his Virtual Reality degree after completing his service.

Feeling somewhat lost and in search of a purpose for his civilian life, Victor took to

Google, scouring webpages until he found what he was looking for: a Virtual Reality degree at University of Advancing Technology.

"This was one of the only colleges that offered a Virtual Reality degree," Victor said when asked why he chose UAT. "I took a chance."

A chance that truly paid off for Victor, as he is graduating August 2023 with a degree in Virtual Reality from UAT with not only the knowledge needed to pursue a career in the field, but also practical experience developing an impressive VR project for his Student Innovation Project (SIP).

Real Time Molding allows players to manipulate and prototype objects in a virtual environment. Users can shape and customize existing objects in the VR space, which will then dynamically adapt to their inputs in real-time.

Real Time Molding has a number of practical applications in video games, such as customizing items like in-game weapons or tools, allowing the player even more control over their gameplay experience. Outside of video games, Victor believes Real Time Molding could be used to assist in building virtual rather than physical prototypes, and could even serve as an alternative and more user-friendly option than complex 3D modeling software used by engineers.

In order to make such an innovative and complex project, Victor had to use a number of his newly learned skills at UAT. Whether in Game Design Fundamentals or other courses, Victor always felt encouraged by his professors at UAT, who often noticed his strong work ethic and desire to challenge himself to exceed expectations in his coursework and student projects.

"Professor Matthew Marquit would always tell the class to do certain tasks. And of course, to keep [scope] in mind and understand that you can't

do everything," Victor explained. "And I took that as a challenge. And I tried to do everything and make everything from scratch. I tried so hard to impress him."

Victor's insistence in going above and beyond in all of his projects meant increasing his skills and experience using Unreal Engine, a complex software used to create graphics, and so he accepted "being confused and lost" while in the difficult process of learning it. But eventually, like a complex puzzle, everything started to fit together for Victor.

"I really enjoy figuring things out. I really like the challenge—it's like a puzzle, there are so many different puzzles to solve," Victor said. "And when it comes to developing a game, or developing a simulation or anything really, there are things that are standard and then there are the bells and whistles."

Victor notes that future iterations of Real Time Molding would include improvements to user interface and the user experience.

As for what's next for Victor, after graduation he hopes to travel to Norway to meet and gain insight from Andrew Perkis, ME, MTM, PhD, an admired VR and augmented reality (AR) expert, and someone who inspired Victor to want to run his own business and eventually help mentor others pursuing their passion projects.

"I would like to be able to not only have a company that creates things, but also to facilitate the space and the resources to allow the world's most gifted and talented engineers, coders and designers to start creating the next generation of devices and technology—whatever it is."



Victor Robles
Virtual Reality



ARE YOU READY TO SHAPE THE FUTURE OF VR AND AR?

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