Avid collectors know part of the fun of collecting is organizing and cataloging your collection. LEGO is infamous for collecting and there are apps abound to keep track of your brick sets, but for minifigure lovers, cataloging systems come up dry. Enter **Zack Driscoll** (Game Programming) and his Student Innovation Project (SIP),

The Minifig Bin.

The Minifig Bin is an app that enables you to catalog and keep track of all your minifigures. While there are other similar apps out there that focus on just LEGO sets or specific collectible minifigure series, to Zack that's too small of a scope.

"There are plenty of times when I want to buy a LEGO set because I'm more interested in the minifigures than the build itself. It could be a set that's marketed toward say four-year-olds, but it comes with really cool, unique minifigures, so of course I'm going to get it; I want those characters. The minifigures are such an important part of [LEGO] that I want to really focus on them."

A LEGO lover from the start, Zack fondly remembers growing up building LEGO sets with his family, who helped inspire this project. "It helped me build more of a relationship with my mom and brother. We've loved it for as long as I can remember. That also bled into my love of video games because one of the first video games I can remember playing

was the original *LEGO Star Wars* from 2005. This inspired me to become a game programmer in the first place. I feel like LEGO has always been a huge part of my life, and I'm still going to buy it today."

With the end goal of cataloging each and every minifigure for collectors, Zack started with three LEGO themes, Ninjago, Harry Potter and Star Wars, totaling approximately 60 different minifigures to prove his concept. Within the app, users can add different minifigures from their profile and view collector information, such as what year the minifigures were released and what set they appear in. While the end goal is to have LEGO's entire minifigure collection available, Zack has bigger dreams for the app.

"Since the idea of LEGO is building, why not let people upload their own custom minifigures into the app? That's something I definitely want to do, because that's just LEGO."

Zack built the mobile app using Visual Studio Code as the integrated development environment (IDE) with React Native and JavaScript as the programming language. Developing the same app on iOS and Android usually requires creating and maintaining two programs in different programming languages. Using React Native, Zack only had to write one program in JavaScript, enabling his mobile app to run on both iOS and Android devices.

Through React Native courses at UAT, Zack learned new skills in the Expo framework for Rapid Application Development (RAD) to quickly create and publish React Native mobile apps. Although, as a game programmer, many core concepts apply to app development, and already taking JavaScript courses at UAT sped up the React Native learning curve for Zack. Professor Tony Hilton, who teaches the React Native courses at UAT, was a huge help.

Zack Driscoll
Game Programming

"It is a more tedious experience than you might think, but it was definitely a lot of fun trying to make the app. I wanted to have at least two different versions of each character's minifigure, provide some basic information and have a system to keep track of how many a collector has, which can be modified through the app."

Zack plans to continue developing this project in his free time.

A spring 2022 graduate, Zack reflects on his time at UAT, "My favorite thing is the culture. A lot of other universities are very big, so you don't get to know a lot of people, and you can't always form a good connection with your professors. At UAT, you get that opportunity. I can have a casual conversation with my professors and not have to worry about booking it to the other side of campus for class. I can relax, I can talk to people. And we're small enough where everybody knows everybody for the most part. I just really liked that about the campus experience."

> "When it comes to skills learned in the class, Professor Hue Henry always asks if it's fun. He always tells you that if it's not fun, scrap it, because that's the point of games. One thing I learned in this class is to really pay attention to how my playtesters are reacting. Are they having a dull moment? Do they want to win, and is it competitive?"
>
> – Christelle Cyprien (Virtual Reality)

TEAM

Morgan Soetaert
Game Design,
Game Programming

Anthony Marquez
Game Design

Christelle Cyprien
Virtual Reality

UAT INVASION

Taught by Professor Hue Henry, GAM170 is a game design prototyping workshop better known to UAT students as the paper prototyping class. The class spans building five physical games (two individual and three group projects) that culminate in showstoppers. For the final project, students are tasked with putting together all the elements previously learned in class. Students Christelle Cyprien (Virtual Reality), Anthony Marquez (Game Design) and Morgan Soetaert (Game Design, Game Programming) brought a new level of competition and innovation to the table with their final project, UAT Invasion.

UAT Invasion is a two-player board game in which players compete to control the most rooms and territories on the board. Based on UAT's campus, one player takes the role of UAT professors whose goal is to protect the campus, while the other player takes the part of an evil form of AI, whose primary objective is to hack and take over the school. The goal of the game is to be the first player to take over four of the seven rooms.

Starting in designated spots, each participant plays with three character markers on the board at once and can move in any direction across the board, aside from diagonal. Focused on strategy, skill, tactics and chance, the mechanics of the game are implemented via movement cards and dice, with bonuses including puzzles, blocking and special abilities.
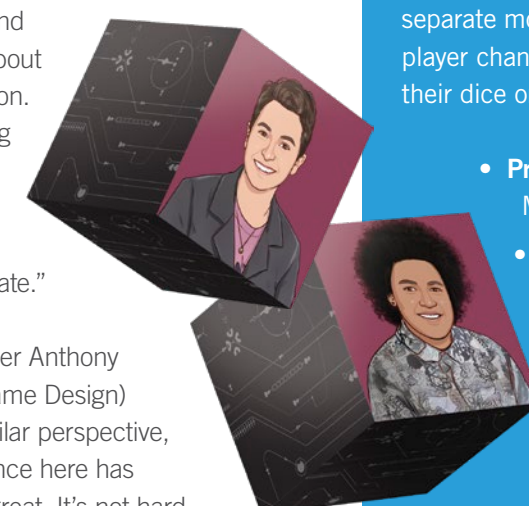
HOW TO PLAY

1. The participant playing as the Professors goes first.
2. On the first turn, the player draws a movement card to move across the grid. At the start of every following turn, each player will add however many cards they used for that turn. If a player uses two cards—for example, a movement card and a blocking card—they will draw two cards instead of one during their next turn. A player can hold a maximum of seven cards in their hand at a time.
3. Players can play a blocking card at the start of their turn before they move. They can block any one of the other player's characters on the board for one turn.
4. If a player lands on a room, they roll a die to gain control of the room. If the room is empty, the player can roll any number and the room will be theirs. If the other player has already taken control of that room, the player will have to win control of it by rolling the same number as the die in the room or higher. If successful, they replace the other player's marker with their own and the room has a new die number to beat. If they fail, they will have to wait until the next turn to try again.
5. Players can land on any of the puzzle spaces that match their characters to earn special abilities. To earn the special ability, the player needs to solve the puzzle under two minutes. If they are successful, the player will pick up the token for the space and earn a special single-use ability that is determined by the character they are using. Players can use this ability whenever they want, as long as it's during their turn. After they use an ability, the player will return the token to its matching space on the board.
6. There is an elevator spot on the board. Players can move across the board and land on it to move between stories.

With characters categorized as Artists, Programmers, Math Experts and Designers, the game includes a slew of familiar faces around UAT. Play as Professors Matthew Marquit, Nathan Glover and Adam Moore, to name a few, or the Computer Tower, Art Tablet and VR Headset, and unlock special abilities depending on the characters chosen.

Additionally, UAT Invasion includes a special room on the second story of the board for Provost Dr. Dave Bolman, which has different rules from the other six rooms. At the start of the game, both players roll two dice to determine the number needed to control this room. Both players will then leave the two dice in the room with a player marker next to them. When a player reaches the Provost's room, they have 30 seconds to try and roll the number required to take the room. If they succeed, the player will control it for the rest of the game; the other player cannot steal this room. If they fail, the player will have to wait until their next turn to try again.

When asked about her experience at UAT so far, team member Morgan Soetaert (Game Design, Game Programming) states, "I love it here. I love the environment. The people are just unique. We're all very similar, you can talk to anyone and immediately have a related interest. The professors are helpful and really care about your education. I enjoy talking to all of them. They're very passionate."

Team member Anthony Marquez (Game Design) shares a similar perspective, "My experience here has been really great. It's not hard, but it's not easy. You learn a lot because it's hands-on and the teachers are cool because they're just older versions of us. The people here [are my favorite], you can talk to anyone because they're interested in the same things, and you don't feel left out."

SPECIAL ABILITIES

Land on a player square, complete the puzzle and win special single-use abilities. Programmers unlock the ability for a player to roll a die twice when they are attempting to capture a room. Artists enable players to swap the cards in their hand for new ones in the deck. Designers allow the player to move twice; they can choose to move one character twice or two characters once during that turn. Players will use a separate movement card each time. The Math Experts let a player change a die's value. They can add a point to one of their dice or remove one from an enemy's die.

- **Programmers:** Professors Hue Henry and Adam Moore vs. the Monitor and Computer Tower
- **Designers:** Professors Derric Clark and Lynn Understiller vs. the Flash Drive and Laptop
- **Artists:** Professors Matthew Marquit and Jorge Portillo vs. the Art Tablet and Phone
- **Math Experts:** Professors Heather Peters and Nathan Glover vs. the Drone and VR Headset

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THE MADNESS PROJECT

IMAGINE EXPLORING an ancient forest and coming across a collapsed, rundown barn. As you explore, you realize the environment is starting to affect you and small things are changing—you are losing your sanity. This is how Emily Szymanski (Game Art and Animation) chose to visualize her Student Innovation Project (SIP), The Madness Project.

With the focus on taking two states of mind and shifting the environment between them, Emily chose to depict the states of sanity and insanity. As you walk through the environment, your character becomes restless as paranoia eats away at the mind. As your sanity ticks down, the environment turns sinister.

Appreciating the horror aesthetic, Emily chose to visualize the morphing environment through grotesque aspects. Over time, the fireflies get larger and slowly morph into floating eyeballs. The rain shifts from calm pitter-patter into raging blood rain. The tree gapes open and exposes hideous looking teeth. Changing audio aspects also play a role, with music and environmental sounds starting out gentle and then turning more intense, giving an overall creepy feel as you spend more time in the environment and lose your mind.

Players also have the opportunity to manage their sanity and reverse the effects by resting at a gravesite. Then, players can go on exploring.

Emily was inspired by another project she worked on a few years ago in UAT Game Studios, Madness in Our Hearts, which focused on the struggles of mental illness and how somebody who isn't well in the mind goes about different tasks. Emily wanted to use her SIP as a way to extend the idea that mental health is a constant struggle to ensure you're in a good state of mind.

Originally creating the barn environment for Professor Matthew Marquit's class, she wanted to create a project focused on environmental storytelling, a concept that's stressed in Professor Marquit's courses, by telling more than one story while walking through the environment. The environment took Emily a couple of months to develop, then she moved on to refining the overall feel, post-processing effects and creating the morphing elements.

For the next phase, Emily went to Lyndsey Boggs, a UAT Game Design and Game Programming graduate, for programming help. They pitched ideas back and forth about what could be done to shift the environment.

"[Lyndsey] programmed all of it and did an incredible job. There are no bugs in it, which wasn't always the case. She had to create the sanity manager, which would create the shift, and the gravesite, which would control the shift back, as well as other aspects."

In the last few weeks of the project, Emily brought on Christian Vece, the creator of Madness in Our Hearts, to help produce the trees that bare their terrifying teeth.

"Christian Vece is very knowledgeable about his own project and most of this degree's field. Having him work on it was really cool, he's very skilled at what he does."

This project is close to Emily's heart. She's had multiple people in her life who struggle with their own inner demons, whether it be a mental illness or bouts of anger, sadness, trouble feeling stuck, etc.

"I feel like even if you don't have what could be described as a mental illness, everybody still goes through their own struggles and it's important to bring that forward and validate it. People might not feel like their struggles are entirely valid because somebody might have it worse, and that might be true, but they're still your struggles. I want to eventually make sure that more people are aware of that."

Emily can see this concept being used in games to visualize karma or honor systems, or if the character perceives the world in a different way—something bad happens and they have a sudden shift in emotion—the world can change to meet how they perceive it.

"Funny enough, I also had issues, or struggles, with my SIP. I struggled with thinking it was good enough or that I did enough, so there was a lot of mental doubt. However, I had two very supportive teammates, and I'm grateful they worked on the project."

Emily credits all skills to UAT, stating, "There are some things I did learn on my own, but I definitely wouldn't have had the direction to even begin to look into it if I hadn't come here and met the professors. I honestly can't praise the professors here enough. They're incredibly talented and knowledgeable in their subjects."

Emily has thrived during her time at UAT, enjoying the intimate size, the feel of campus and personal attention and relationships created with professors and students. "I've been able to connect with the professors here. We've been able to look at each other as colleagues rather than teacher and student, which is really nice. With that relationship, the professors can cater the experience to each student and help them out a lot more."

Graduating in Spring 2022, Emily has been considering where she would like to take her degree. Now understanding the entire game production pipeline from concept to creation to implementation, it's difficult to pinpoint exactly which part of the creation process she wants to be involved in.

"It's a really cool field to work in. I really like creating designs. I think I would like to work in creature design and creation, and I would like to get some of my creature designs out there, whether that's in personal projects or with other projects."

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TEAM

Emily
Game Art and Animation
UAT Alum

PROJECT CONTRIBUTORS:
Lyndsey Boggs
Game Design,
Game Programming
UAT Alum

Christian Vece
Game Art and Animation
Current UAT Student

MUSIC IN ME: MEGA MELODY

When it comes to learning and playing music, sight-reading and ear training are very important for band, orchestra and choir classes, and is typically taught in middle and high school. Although, Sam McKinley (Game Programming) has found that when it's taught earlier, people understand music a lot better. This is where his Student Innovation Project (SIP), Music in Me: Mega Melody, comes into play to teach sight reading and ear training to grades 3-5.

Playing instruments from a young age, Sam learned the clarinet in fifth grade and tenor saxophone in seventh grade. He was in the jazz and honor bands and active in many different music groups throughout school.

"I noticed that when these topics are taught, people have that lightbulb moment, and realize they might actually be good at this because of what they learned through the process. I wanted to create those moments; I wanted to help people get to that point. I found the easiest way, other than teaching them in person, was teaching them through games. I was raised with so many educational games, and through those, I learned so much more."

Sam's mom, who is an elementary school teacher, was a huge inspiration, stating, "The thing that spawned the idea was watching her kids learn the very beginning instruments, like the recorder. And through that, I had the idea that I want to help with this, but I can't because of my own disabilities."

Sam is a familiar face around his mom's classroom and the elementary school. Until his vertigo set in, Sam's passion over the last couple of years was teaching kids all things music and instruments. He was a part of the after-school program, teaching music and general studies, and always helping in classrooms throughout the day.

"Because my mom was there all day, she would bring me. I was even asked to help with kindergarten and grades one and two. That was actually my passion; I just can't keep up with those kids anymore," Sam states.

Music in Me: Mega Melody was mainly built in Unity using C# and Visual Studio. Sam attributes
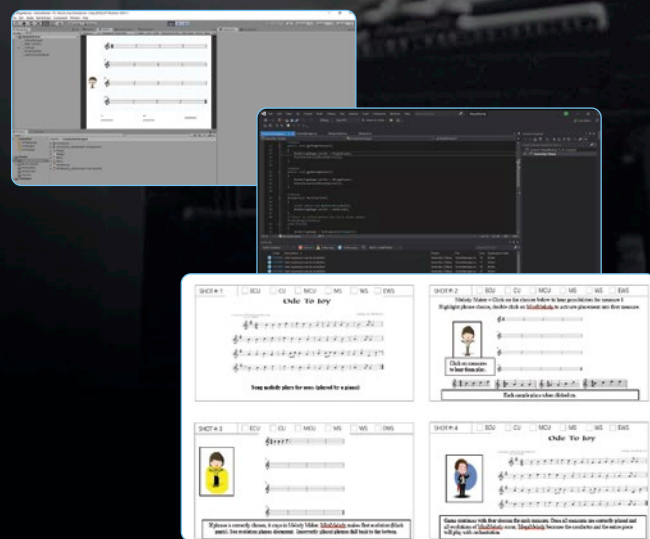
most of his programming knowledge to UAT. Coming into the University with a very basic understanding of game programming, Professors Tony Hinton and Adam Moore helped unlock Sam's potential.

For this project, Sam didn't secure an animator and took on learning how to edit sprites and make the game interactive with different character features and movements. Professor Adam Moore was a huge help with this aspect, as he introduced Sam to what is possible with sprites and cohesively implemented many ideas into the game build. Sam also shouts out science Professor Nathan Glover, who showed him a more creative way to think, not only with science, but with programming. This helped him come up with creative solutions to make the game more fun for kids.

"For a long time, I was searching for how I could interact and how I could help with this. With stuff like COVID, which slowed everything down, I realized that games help a lot. They relieve stress. That's when it really started to click for me."

A Spring 2022 graduate, Sam hopes to continue working on educational games at a company in the video game industry. "I hope to make that impact again, even if I can't do it in person. I've always loved making games; that's something I'd really like to do."

Overall, Sam loved his experience at UAT. "I love the interactions here. I love that it's more casual, like some teachers go by their first name, which I like because it's easier. Because of the walker, I am somewhat limited, but they have really helped me out here."

Sam McKinley
Game Programming

HOT COURSES GIVE YOU A COOL EDGE

STAY UP TO SPEED WITH UAT'S COOL COURSES ON THE LATEST TECHNOLOGY TRENDS AND ADVANCEMENTS.

Taught by Professor Tony Hinton, **CSC438:** *Algorithms, Frameworks and Design Patterns for Artificial Intelligence* prepares students to solve applied AI, machine learning and deep learning problems in the field of artificial intelligence. Teaching the ability to design, code, test and improve AI systems using algorithm-driven designs, students will gain experience modifying or replacing existing algorithms. This is a project-based class—build intelligent software bots to act anonymous and make swarms!

DBM150: *Introduction to Maker Studio* is an introduction to the use of the most common entry-level maker equipment to create props and functional prototypes, intended for non-majors. Maker-style technologies and techniques provide tools and pathways for designers from any of UAT's programs to rapidly create versions of their ideas. Bring your ideas to life with a physical form, as they evolve toward applications.

RBT479: *Mechatronics* with Professor Kendra Kim introduces integrated modeling, analysis, design, manufacturing and control of smart electromechanical systems. Students will produce a project related to electrical components and analysis; mechanical components and analysis, sensors and instrumentation, drives and actuators, intelligent controls, digital processing and hardware or communication and interfacing.

Professors Heather Peters and Nathan Glover teach **SCI388:** *Science and Math in the Real World.* This course combines physical science and math, and is designed to introduce students to the wonders and complexities of the world around them. Learn to connect math and science in an integrative way, the scientific method, use math to justify reasoning and construct models to represent real-world phenomena.

Learn how to prototype with Professor Ron Zabawa in **DBM215:** *Prototyping Tools and Practices.* This course introduces students to the in-depth art and science of the prototype—and, in turn, explores the key steps of the engineering design process. Students will learn how to properly define a problem regardless of whether the solution is a product, a service or something else entirely. The course will illustrate the importance of the cycle of listening, building a prototype, testing, learning and repeating by following the humble beginnings and vast evolution of famous, world-changing products.

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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:

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> Select your spot in the dorms

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> 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/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.

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> "I WANTED A WAY FOR PEOPLE TO FIND SOMETHING THEY'D ALREADY LIKE WITHOUT HAVING TO GO THROUGH AND LISTEN TO A BUNCH OF BANDS THEY HAVEN'T HEARD OF BEFORE JUST TO FIND SOMETHING THEY'D LIKE TO GO TO."

TEAM

Joe Parisia
Advancing Computer Science,
Artificial Intelligence

COLLABORATORS:
Michael Hinsberger
Advancing Computer Science

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BEHIND THE BITS

13

THE UNDERGROUND

PICTURE THIS: IT'S SATURDAY NIGHT AND YOU DON'T HAVE PLANS. YOU AND YOUR FRIENDS LOVE LIVE MUSIC BUT ARE INUNDATED WITH CHOICES... AND CAN'T AGREE ON WHICH EVENT, VENUE OR EVEN BAND WILL BE THE MOST FUN. THE SOLUTION? THE UNDERGROUND.

The Underground is a mobile app that uses your location to show venues near you and recommends new bands based on what you already like. Created by Joe Parisia (Advancing Computer Science and Artificial Intelligence), the idea for the app started just to fulfill his own needs. With the sheer number of social media platforms, it's hard to decide where to go when looking for shows, especially when so many events are constantly thrown in your face.

When first signing into the app, users are prompted to enter some of their favorite bands which are added to a database. Using a collaborative filtering algorithm, similar to how Amazon recommends new products, the app suggests bands and events you might like based on the database that's unique to your music taste. As for location, the app relies on Google Maps to recommend venues near you. The Underground takes the hard part out of finding what you want to do on any given night by presenting you with options.

Initially, Joe was having a tough time coming up with an idea for his Student Innovation Project (SIP), then the real-world scenario that inspired the app happened. He had a bunch of events he was invited to and only had time for one, so he thought to create an app that would make the decision for him.

The app was refined by bandmates and friends at shows, who offered valuable recommendations and insight into actual use cases.

Joe's goals for the project were "to bring smaller, local acts to the light and allow people to find them without cycling through an endless number of other bands." While there are plenty of resources for

popular mainstream bands, it's harder for smaller bands to get noticed, even when they're really talented.

Being in a band, Joe already had a lot of material for the app. "It's just one of my passions. It helped the whole process because it's something I really care about and have been involved with for a long time. Instead of building an app that I don't have a connection to, I'd say my band is probably the main reason I kept going with the concept of The Underground."

Going on 10 years of being in a band, Joe plays guitar for TV TRAGEDY, a '90s-style punk band local to the Phoenix area. With a new lineup consisting of five members, they play faster, heavier music.

Joe had help from a couple of professors with coding issues, and UAT student, Michael Hinsberger (Advancing Computer Science), who helped iron out the recommendation system. Joe states, "Fun fact, I never touched any programming before coming to UAT. I always just played around on computers. I learned everything for this app here, except for previous Photoshop skills. All of the assets in the app I made."

With his SIP completed, Joe is now looking for help finishing the app to bring it to market, as it's getting to the point where it needs dedicated servers to be able to run (up until this point, the project has been running locally on Joe's personal computer). "I would love for the app to be released and utilized by anyone."

Joe recently graduated from UAT in spring 2022. "I want to find a job where I can use my skills to help people; that's always been the end goal."