



Purdue Chapter  
Association for Computing Machinery

# Purdue ACM Newsletter, Fall 2016

Volume 7, Issue 1  
September 2016  
Edited by Nikolas Ogg  
ogg@purdue.edu

## The New and The Old

After seeing a lot of its members graduate last year, ACM is back with an (almost) entirely new leadership. Nikolas Ogg made the jump from Vice President to President. Tim Vincent, Dhiman Swadia, and Jordan Field were elected as Vice President, Treasurer, and Secretary respectively.

In the Special Interest Groups (SIGs) much has

changed too, SIGAPP, SIGBOTS, SIGGD, and SIGSAC all have new SIG leaders. Additionally CJ Jacobs has started our newest SIG, SIGCHI (Special Interest Group on Computer Human Interaction). SIGAI continues on with Matthew Page returning as its president.

ACM plans on continuing hosting popular events such as its High School Coding



**Above: Nikolas Ogg answers questions at the High School Coding Competition.**

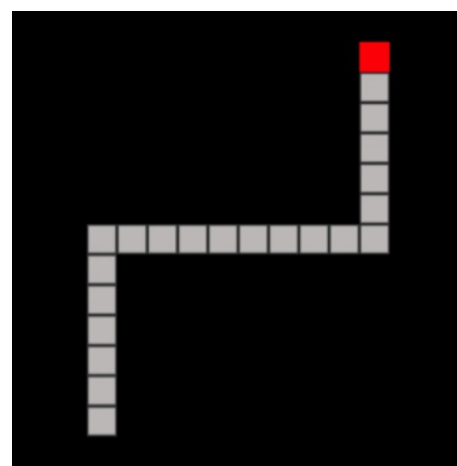
Competition in the upcoming year.

## Writing a Snake AI with SIGAI

In fall 2015, SIGAI worked on an AI to play the popular game Snake. Our goal was to create an AI that operated as quickly as possible, while getting as far in the game as possible and never dying. We began by using a simple a-star implementation, which is a heuristic graph searching algorithm. This posed an issue, however: If the snake always takes the shortest path to the food, the grid will quickly become very cluttered with units of the snake, preventing the snake from quickly getting to the next food. The snake will also more quickly corner itself more quickly, sometimes without any moves that could

keep the snake alive.

The first change we made was modifying our algorithm's heuristic such that the snake takes an "L" shaped path to the food, which significantly helped with the clutter of the board. In the later stages of the game, we would also check that the snake could get to the food, and then get to the tail of the snake, before the snake would attempt to travel to the food. If the snake cannot do this, it simply goes to the tail of the snake. This guarantees the snake will always live, and will never corner itself into an unsurvivable situation, so long as the return from the



**Above: The snake eating a food item.**

food to the tail of the snake does not pass through any block that the snake occupied during the path to the food.

# ALLSTON

## TRADING

### WHO WE NEED:

Software Developers

Computer Science  
Computer Engineering

threading OOP LINUX  
PATTERNS software  
platform LATENCY

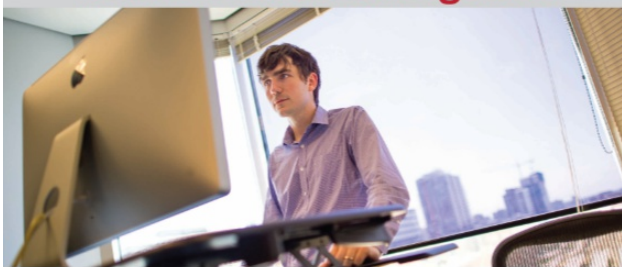
Java SQL

GUI structures

team C++

THREADING modules  
HIGH PERFORMANCE throughput  
NETWORKING algorithms

[www.allstontrading.com](http://www.allstontrading.com)



## GrapplingHookFighters

Progress is ramping up to finish our game from the Spring Semester, which we call “GrapplingHookFighters”, for lack of a better name. Two level themes have been designed, and we are starting to insert player animations and weapons. We are hoping to finish it by the middle of the Fall semester, in time for the tutorial and training of the new members to conclude, hopefully getting some testing from them.

For new members, we have a 3-part introduction to game development. It will start

**Below: A look at SIGGD's upcoming game, GrapplingHookFighters.**



with a small step-by-step tutorial for making a simple game, followed by a 2-3 week long game jam where the new members will group together with our guidance to make a game following a theme.

After each group demos their games, we will then start making tasks to finish up GrapplingHookFighters. Once the game is fully tested and completed, we will start brainstorming for our new game. The scope of course will be small enough to finish before the end of the semester.

We still have plans for a SIGGD-hosted game jam in the Fall, with more details coming soon.



**Above: SIGGD helping teach game development to second graders.**





## SIGCHI: Designing for Human-Computer Interaction

How many times have members of younger generations tried relentlessly to aid their older parents in using a new technology? The process of technological adaptation is much easier for users from younger generations because in an average case, the users from younger generations have had more exposure to various technological interfaces and when one is young with a rapidly developing brain, those technological interfaces become second nature to use. One might argue that users that didn't grow up with exposure to many different types of technology will always have difficulty picking up a new technology.

This doesn't have to be the case. For a practitioner studying and applying HCI, the goal is make technology be easier to use for all. This can manifest itself in a multitude of forms such as visual design, interaction modeling, hardware design, tutorial design, etc. Problems that seem very simple grow in complexity the more they are analyzed.

Let's look at an example of "Company A" who provides a software service that helps users file taxes. The CEO of Company A has had experience as a tax accountant for several decades and he partnered with a friend of his who is a mathematic and software

wizard. This seems like a recipe for success, but after releasing their MVP (Minimum Viable Product) they noticed the trend that a large number of people visited their website's front page and began to use the software they developed. However, few finished the entire process of the software setup or would not return to purchase their full product.

Analyzing this from a business standpoint, one might come to the conclusion that the product simply wasn't good enough or the users found it to be too expensive. This can be a frustrating place to be as a product because if the analysis is never done to talk to actual customers about their Continued on page 4.

# Designing for Human-Computer Interaction (cont.)

experience, many man hours could be wasted building new features that will never be utilized because the product is simply too difficult to use.

If Company A went out to the customers who had chosen to not continue using the product they might find the insight that users quit since the learning curve was too high for them to get the usefulness out of the product. If Company A discovered this insight and are looking to modify their product, having a background in HCI will be of great help. The implementation of how to make the software easier to use is even more important than the customer insight because without implementation, improving the interaction is just boardroom talk.

This is why we study HCI. This is why HCI is important. The implications that proper HCI has in the industry can be the difference between a product that is built on hype which dies after a week versus a product of sustained success.

That is why HCI lives and thrives in industry, but in academics it can come through in a very different light. I had the opportunity to attend CHI '16, which is the international conference for SIGCHI. The conference is full of academics and researchers from the most reputable companies and universities sharing their latest

would involve as a bottom line what makes them more money.

With academics being free of the restraint of everything they do having to result in a financial net benefit, many more interesting and sometimes even strange topics are studied. Here are a few presentation titles that I witnessed when I was at CHI: Visual Design Principles for Unconventional Designs, Paying



# SIGCHI

discoveries and networking.

Academic HCI is siblings with industry based HCI, but there are some stark differences. The most obvious being the metrics of success. Take an academic study which looks at what colors make a user more likely to click on a button; the metric of success is what percentage of users clicked on one button versus another. While this could have implications within the industry, an industry-based experiment

Attention to Smartphones, Crowdsourcing and Creation, etc.

Academic HCI will always live and thrive along with its industry counter part as there have been many examples of a seemingly random study resulting in the discovery of a previously unknown issue within an active industry product. Also, academic studies are often used as a foundation for the creation of a new product.

# facebook



# Microsoft

No matter what your passion is, you'll find it here. Imagine the opportunities you'll have in a company with more than 100,000 employees in more than 100 countries, working on hundreds of products—spanning games, phones, developer tools, business solutions and operating systems.

## Jobs at Microsoft!

### Currently hiring for Full-time and Intern opportunities in Software Engineering and Program Management

Software engineers at Microsoft are passionate about building technologies that make the world a better place. At Microsoft, you will collaborate with a team of programming experts to solve problems and build some of the world's most advanced services and devices. Your efforts on the design, development, and testing of next-generation applications will have an impact on millions of people. You are the link between abstract concepts and delivered solutions – the one who understands the consumer, solving problems, and building applications that will impact millions of people. To apply and read more information, visit [www.microsoft.com/careers](http://www.microsoft.com/careers)

## What's new at Microsoft?

### HoloLens in space: NASA astronaut Scott Kelly dons Microsoft's holographic headset

by Todd Bishop - [www.geekwire.com](http://www.geekwire.com)

Microsoft posted an initial picture of NASA astronaut Scott Kelly wearing the company's HoloLens holographic headset on the International Space Station — part of a collaboration between the Redmond company and the U.S. space administration.

The initiative, dubbed "Sidekick," currently uses the HoloLens in two modes: "Remote Expert Mode," which connects to operators on the ground who can see what the astronaut is viewing through the HoloLens and annotate the scene to provide real-time guidance for complicated tasks; and "Procedure Mode," which augments the view through the HoloLens with animated holographic illustrations, on top of the real world.



# SIGBOTS: Looking Ahead

ACM SIGBots had a successful 2015-16 season, making trips to the College of Southern Maryland and later Louisville, Kentucky (shown below) for the Vex U World Championships. The team helped pioneer the extensive use of 3D printing for the robots after a rule change allowing for an unlimited number of size restricted



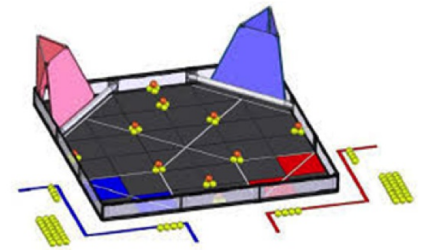
**Above: The 2015-16 SIGBots team.**

pieces, and continued to innovate in the software realm with updates to PROS, the Purdue Robotics Operating System.

## 2015-16 Vex U Game

Matches are played with two alliances: one “red” and one “blue”, each of which are comprised of two teams each. The object of the game is to score more points than the opposing alliance by scoring the balls and bonus balls in the low and high goals, and by elevating the alliance partner’s robot in the “climbing zone”. Bonus points are awarded to the alliance with the most total points at the end of the 45 second autonomous period.

There are one hundred and



**Above: The 2015-16 Game.**

Image from VEX Nothing But Net Rulebook, copyright VEX Robotics, Inc

four scoring objects, which includes the ninety-four balls and the ten bonus balls. Each robot has four balls available as preloads for the autonomous period of the match, and each alliance has twenty-four balls available as driver control loads during the driver control period. Thirty balls and ten bonus balls will start at set locations on the field in the Continued on page 7.

# Playing Soccer With SIGAI

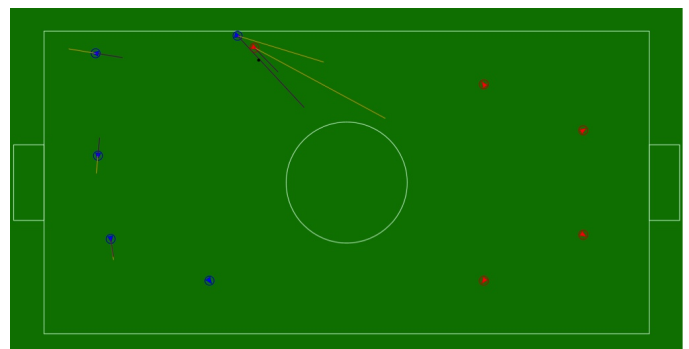
In spring 2016, SIGAI worked on an AI to play a virtual soccer game. Before we built the AI, we created the engine that it would run in, providing access for the AI to control all the players’ behavior in a 5v5 game of soccer.

When we got to the AI portion of the project, we began by implementing strategies for individual players: staying still, going to a specified point, and pursuing another entity (either the ball or the player). We then implemented strategies for the entire team. We began by having the players spread out, so they can cover more opportunity

as the ball moves throughout the board.

We then implemented passing from one player to another, and also scoring goals. The system we used was that the player would pass to the goal if an enemy player would be unlikely to intercept, otherwise pass the ball to the nearest player that can safely receive it.

**Right: An image of SIGAI's soccer game.**



# SIGCHI @ Purdue

The future of SIGCHI at Purdue conveniently has some already existing potentials stemming from the international level organization. Such as during the CHI conference, there are three different student competitions going on. They include a Student Design Competition, Student Game Competition, and Student Research Competition. These existing competition structures give Purdue SIGCHI the opportunity to have goals from its creation. There are no limits for how many teams from each university can compete, so

everybody is welcome. On top of the competitions, my vision for the club is to have reoccurring meetings where all members can expand each other's perspective on design through learning case studies, reading famous HCI literature, and being visited by guest speakers either in academics or the industry. For a larger and more long term goal, I want Purdue SIGCHI to host its own competitions that are very similar to that of hacka-thons, but give a focus more towards the design of software instead of just the technological accomplishments of what was

built. There are many different directions in which Purdue SIGCHI could grow and prosper and I am anxious and excited to witness it.

For those interested in joining please attend the ACM's callout meetings. There are many future careers available to those with interest in HCI who are both technical and not. Some potential careers include usability engineers, visual designers, website consultants, etc. I hope you join me on my mission of making the world, both digital and not, more beautiful place that is accessible for all.

## SIGBOTS: Looking Ahead (cont.)

shape of pyramids, where three balls form the base and one bonus ball tops those three. Each alliance has one low goal and one high goal of their respective color for scoring objects into.

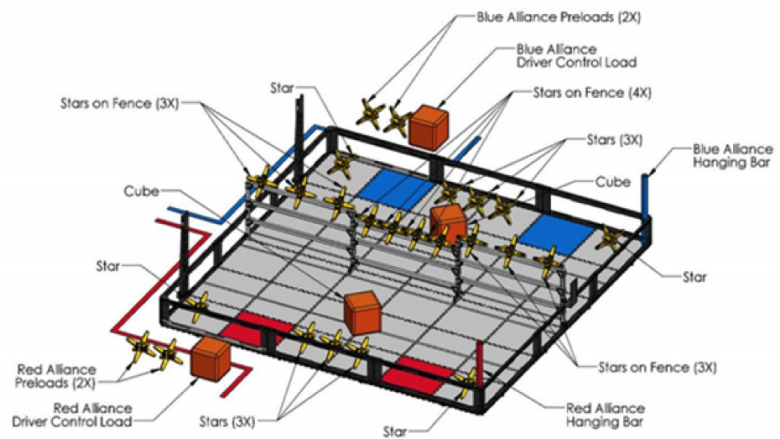
The team created three robots for use in last year's competition: Newton, a 15"³ robot equipped with a double flywheel mechanism to shoot the game objects, Kepler, a 24"³ robot also equipped with a double flywheel mechanism and then a lift to pick up the other robots, and Rockem-Sockem, a 15"³ robot equipped with a slip gear linear puncher for use in skills events.

### 2016-17 Vex U Game

Matches are played with two alliances: one "red" and one "blue", each of which are

composed of a single 24" robot. The object of the game is to score more points than the opposing alliance by putting the star shaped scoring objects on the opponent's side of the center fence that divides the 12' by 12' field, either in the near

zone (1 point) or the far zone (2 points). Additional points can also be scored by putting large cubes on the opposing team's side for either 2 points (near zone) or 4 points (far zone), or for hanging on the post at the end of the match for 4 points (low hang) or 12 points (high hang). Continued on page 8.



**Above: The 2016-17 Game.**

Image from VEX Starstruck Rulebook, copyright VEX Robotics, Inc.

## SIGBOTS: Looking Ahead (cont.)

hang). Bonus points are awarded to the alliance with the most total points at the end of the 45 second autonomous period.

There are 24 stars and 4 cubes available as scoring objects in the game, with 1 star per team designated as preloads and 1 cube per alliance available as a driver control load in the last thirty seconds of the match. As a

result, 20 stars and 2 cubes are available to both teams as a part of the field.

This season, the team aspires to be more involved in the Vex U league by hosting three tournaments (a scrimmage in the fall, a qualifier in winter, and a skills event in spring), and regaining the team's previous emphasis on groundbreaking electronics and software

development to help encourage a more industry-like experience both in SIGBots and other teams within the Vex U league. In addition, one of the primary goals for the team this season is to greatly improve documentation and ensure that the team is able to build on its existing knowledge base for years to come.

## SIGAPP: Develop all the things!

Over the years SIGAPP has created a released a variety of Android apps. Building everything from the App itself to the server backing it.





Every year, SIGAPP chooses a project to work on and release that semester. No more small one off scripts with jumbled code that you will never look at again! SIGAPP aims to use industry techniques to give members experience in developing real maintainable software.

Ideas for every SIGAPP

project come from members. Last year, ACM SIGAPP developed an Android app which allows students to better manage their time by allowing them to view the current status of the Purdue dorm washers and dryers.

Purdue has made this information available on a website that students can Continued on page 9.

**Right: A view of SIGAPP's Purdue Laundry.**

Purdue Laundry	
	<b>Cary Hall West</b> 7/12 3/13 Washers Available Dryers Available
	<b>Earhart Hall</b> 5/16 6/16 Washers Available Dryers Available
	<b>Harrison Hall</b> 8/14 3/16 Washers Available Dryers Available
	<b>Hillenbrand Hall</b> 11/14 5/24 Washers Available Dryers Available

EMC Opportunities: EMC's Isilon storage division builds the world's largest, fastest filesystem using clustered computing development in both the kernel and userspace, delivering a proprietary distributed filesystem on top of FreeBSD.

**Apply Online:** <http://www.emc.com/careers/index.htm>

# EMC<sup>2</sup>



## SIGAPP: Develop all the things! (cont.)

visit -- there's just one problem: the website design and functionality are not very mobile-friendly. Most

students would love to view the info from their phones, but it's very awkward with the current setup. Enter SIGAPP! SIGAPP decided to take this information and provide it to the students in the form of a mobile app to make it more easy and convenient to view. The Android app (currently available on the Google Play store) features notification functionality which allows students to set a timer which will notify them when a machine is free. The app also shows the status of all washers and dryers at a dorm

so a student can get an overview of how busy the laundry room is currently.

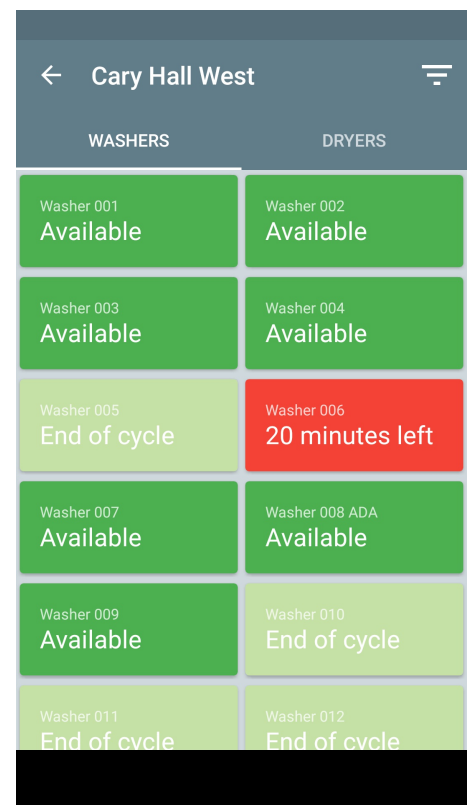
The data regarding the status of the machines is fed to the mobile app via an API which is written in Node.js. Students got hands-on experience working with an external API, building a server to back a production application, and gathering analytics while creating and releasing a mobile app. Overall SIGAPP is happy that the app has helped students leverage what little free time they have in their daily lives. Michael Hockerman, a previous member has said, "Purdue Laundry has literally changed my life. I feel confident when I leave to do

laundry that there will be machines available."

Check out "Purdue Laundry" in the Play store today. (Check the App store soon for an iOS version!).

To check out all of SIGAPP's projects, please visit: [github.com/Purdue-ACM-SIGAPP](https://github.com/Purdue-ACM-SIGAPP)

### Below: Another view of SIGAPP's Purdue Laundry.



The screenshot shows the 'Cary Hall West' laundry room interface. It features a grid of 12 machines, each with a status indicator. Washers 001-005, 007, 009, and 011 are 'Available' (green). Washers 003, 004, 008, 010, and 012 are 'End of cycle' (light green). Washer 006 is '20 minutes left' (red). Washer 008 is 'ADA' (green). The interface includes a back arrow, a location name, and a menu icon.

Cary Hall West	
WASHERS	DRYERS
Washer 001 Available	Washer 002 Available
Washer 003 Available	Washer 004 Available
Washer 005 End of cycle	Washer 006 20 minutes left
Washer 007 Available	Washer 008 ADA Available
Washer 009 Available	Washer 010 End of cycle
Washer 011 End of cycle	Washer 012 End of cycle

## SIGSAC: Reborn

SIGSAC has always been the SIG for people interested in learning about cyber security. In the past, the SIG has had talks about understand various cyber attacks and how certain pieces of widely used software were vulnerable to attacks. For the Fall semester, the focus of SIGSAC will be on show-n-tell format for events.

SIGSAC will be conducting events like 'Setting up your pentesting environment', 'Understanding vulnerabilities in wireless routers and how to exploit them' and walk-throughs about technology jargons like Tor, VPNs and proxies. During such events, the focus

is on learning by doing, hence members would be ideally writing live code that affects sandboxed environments, and understand how things work under the hood.

Along with these show-n-tell events, SIGSAC also planning on continuing its tradition of holding informational talks about most recent attacks and happenings in the fields of cyber security.

At the end of semester, if deemed plausible, SIGSAC is also planning on conducting a cyber capture the flag event, where teams of individuals would be exploiting a sandboxed vulnerable system in order to obtain certain

piece of information, while being on a vulnerable system themselves, so that they can understand how to protect their system, while attempting to exploit external ones.