

ENGINEERING INSIDE: GAMING

2012, Issue 3

Playing the Game-But First, Making It

July, 2012

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Meet Simon Lui

July, 2012

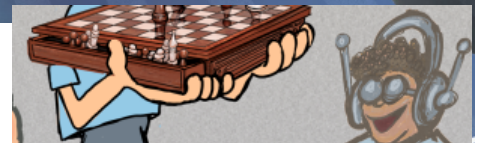
Simon Lui is an Assistant Professor of Information Systems Technology and Design (ISTD) at the Singapore University of Technology and Design (SUTD). In 2008, he founded EC2 Hong Kong to develop iPhone and iPad apps and sell them in the iPhone app store worldwide. Simon developed 7 apps, including #1 bestselling apps in several countries.



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You've probably played lots of computer or phone based games — but would you like to try making your own game? We've gathered and tested lots of available software and in this activity you can build your own game.



There is Nothing Like a Great Game.

Credit: Ergun Akleman

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Playing the Game-But First, Making It

July, 2012
by Robin Hegg



Video games today are a far cry from where they began, but from Pong to the latest motion capture and 3-D graphics technology, engineers have been the backbone of this exciting and entertaining industry.

Early video games were entirely the creation of computer and software engineers. As the video game became more complex, their development required people from many different disciplines, such as graphic designers (who design a game's graphics), game designers (who design the gameplay, rules, and logic of a game), composers (who score a game's music), and writers (who write a game's storyline and dialogue). Not only do engineers program the core of each game's functions, technology developed by engineers determines how much freedom and creativity every other contributor can have in doing their job.

Engineers have played a huge role in the impressive and quickly growing technologies of video games. Today, video games can be played on many different devices, such as personal computers, mobile phones, tablets, and multiple video game consoles, each with their own unique operating system and approach. Video games also use several input devices, such as mice, keyboards, console-specific wired and wireless controllers, and motion- and heat-sensing cameras.

One of the main ways new video game technology is felt by the player is in the increasingly realistic and impressive graphics and sound that games offer. While graphic and sound designers deserve much of the credit for these, they wouldn't have been possible without the help of engineers. Engineers created the tools and programs that allow designers to build advanced, 3-D, and motion-capture graphics. They also created the programs and systems that allow for higher quality and fully integrated sound effects and music.

Engineers are needed to program the core engine of the game—the basics of how it works, how objects move, and how graphics are displayed. But as engineers have expanded the technology available to video games, and as this technology has become more advanced, more (and more specialized) programmers have been needed.

3-D graphics programmers specialize in the creation of 3-D graphics. These engineers use complex mathematical concepts, like quaternions, linear algebra, and vector and matrix math to render these impressive graphics. Other programmers focus on sound. While almost all games, even the simplest of them, involve sound, some games today have their own musical scores, and employ advanced technology like 3-D positional sound, which produces sound using a variety of sound sources positioned throughout a three dimensional space. Sound programmers often create and maintain the tools used by sound designers to assign different sounds to different

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events, characters, and actions, along with applying atmospheric music to different moments or settings within the game.

Physics engine programmers work specifically to develop the physics needed in a game. Different video games require different types of physics to be simulated. Many games will require that gravity, density, and water viscosity be rendered, while sports, racing, and fighting games can bring up more specific physics needs.

Certain games require an artificial intelligence programmer—someone to develop the game's logic in order to develop the actions of the player's computer-run opponents. Other programmers specialize in programming the user interface for a game or group of games.

As technology has advanced, many games and gaming systems now allow players to team up or compete using the Internet. This has created the need for network programmers who focus on developing the network systems of a game.

Other engineers specialize in creating the tools used in the building of the games themselves. These tools are used for things such as scripting, building game levels, and importing and converting art, and can make everyone's jobs much easier.

Porting programmers specialize in converting a game from one platform to another, so that mobile phone game can also be played on your PC, or the hot new game is available for people with a PS3 and an Xbox. The porting programmer needs to know the two operating systems and their languages in order to convert all the different elements of the game successfully.

Video games are not only fun, they're often at the cutting edge of new computer, interactive, graphics, and sound technology. Engineers have been, and will continue to be, major contributors to video games, improving technology and making even the most creative ideas into on-screen reality.

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Meet Simon Lui

July, 2012

Simon Lui is an Assistant Professor of Information Systems Technology and Design (ISTD) at the Singapore University of Technology and Design (SUTD). In 2008, he founded EC2 Hong Kong to develop iPhone and iPad apps and sell them in the iPhone app store worldwide. Simon developed 7 apps, including #1 bestselling apps in several countries. Most of his apps are daily utilities and mini games that sell for US\$0.99-\$1.99.

Simon's apps reflect some of his interests.

For example, Simon has a great interest in music, and minored in music as part of his undergraduate degree. So, he developed "ec Shamisen" — a musical instrument app. so users can play the traditional Japanese instrument "Shamisen" on the iPhone. Also related to Simon's interest in music and sounds is "SoundMitate," a sound imitation game where players choose a sound and see how well they can imitate it. This app also lines up with some of his current research. Simon plans to develop this concept further into other useful apps such as a language learner. And, he also developed Tinha War, which is one of his bestselling games. The idea came from a traditional Hong Kong 1980s childhood paper game.



Q: How did you decide to study computer science? Was it a tough decision?

In 2000, I choose computer as my major because I have many dreams to achieve. For example, to invent an "intelligent music search engine," and to be one of the characters in a computer game, etc. I think the digital virtual world provide me the platform to do so.

It was not that tough to make the degree decision, since I believe the Chinese proverb. "Every profession produces its own leading authority." No matter which subject I take, if I enjoy it and work hard, I believe I can be successful.

Q: Did you play lots of electronic games as a child? What was your experience then?

Yes I did play a lot. I got a Nintendo in 1988. I remember the game I played most is the "Fire Emblem" released in 1990. I am still playing their latest release on the Wii and NDS platform. This game impressed me a lot; it is a strategy-demanding game with strong story background. On the other hand, I also love the "Pac Man", since I can just play it without thinking. I think both "simple" and "strategy-demanding" games have strong markets.

Q: How did you get interested in gaming as a career?

I hoped to work on something that I enjoyed. I loved playing games, so I wanted to develop my own creation. I need it, so I write it!

Q: Where do you get your game ideas from? What is your inspiration?



Screenshot from ec Shamisen. Image Credit: Simon Lui

USEFUL LINKS:

Singapore University of Technology and Design
"Tinha War" App on iTunes

WORK FOCUS:

At the Singapore University of Technology and Design, Simon focuses on both teaching and research. As Assistant Professor in the Information Systems Technology and Design Pillar, he teaches different "information system" subjects in different semesters. For example, this semester he is teaching Mathematics and Physics. He'll be teaching other subjects such as computer programming and app design in future semesters. In terms of research, Simon works on audio engineering and mobile application design. His research attitude is practical and he publishes real application by using his research outcome. For example, the SoundMitate app is a combination of "Game" and "Audio Similarity Research."

EDUCATIONAL BACKGROUND:

Ph.D., Computer Science, Hong Kong University of Science and Technology, 2010

M.Phil., Computer Science, Hong Kong University of Science and Technology, 2005

B.Eng(hons), Information Engineering and minor in music, Chinese University of Hong Kong, 2003

Many ideas come from daily life. I remember once I said to my girlfriend: "I will rescue you when you are in danger." But she complained: "When?" So, I make it happen in a game! In "Tinha War" stage 24, the princess is trapped, the hero is going to save her. I am actually the hero and she is the little princess! Tinha is a Hong Kong traditional board game, which was very popular in 1980s-1990s. In this game, you will lead an army, aim to destroy the enemy bases. In the game you can draw your own soldier, or capture an image from a photo.

Q: Did your formal educational training prepare you for your current gaming work? Why or why not?

Yes. I learned programming, algorithm, design pattern, and most importantly, I learned "how to learn." In the world of computer gaming, we need to catch up with the latest technology all the time.

Q: You started a company to help market your games...did starting and running your own business take away from your game development time? How do you balance the work?

Since I run a small-scale company, the business workload is not that heavy. Also, the good thing about selling products on the iPhone app store is that I can do business at any time online. For example, discuss with blogger via email, purchase Facebook advertisement on web, etc.

For game development, I keep the creative and high-level jobs for myself, such as game design and code architecture. I leave the time consuming jobs such as programming and data input to freelancers.

Actually, other than this app company, I also have another business on going, but I didn't find much pressure in time management. Nowadays doing business online is really efficient.

Q: What challenges did you face when trying to market your games?

It is difficult to get my product in front of target customers. There is too much information on the web, so I have to work to attract the potential customers and stand out from my competitors online. In Hong Kong, we can make use of newsgroup; in the U.S., perhaps it is better to do it via technical blogs. In Japan, better to use a lovely girl as advertisement thumbnail....so marketing strategy can be different in different countries.

Q: Do you often have to redesign a game or app? How many versions do you create before a new game is ready for launch?

Usually, I develop an alpha version for my friends to try it out. Then follow up with a beta version for a focus group to test — and then I will release the game.

Developers can update their app on the iPhone app store at any time. Usually it takes 7 days for Apple to review your update. Then the latest version will be automatically downloaded to all your customers' iPhone. I revise my game frequently by considering customer's feedback. One of my apps has had 17 minor updates after it is released, and my customers are happy about that — they love to be listened to!

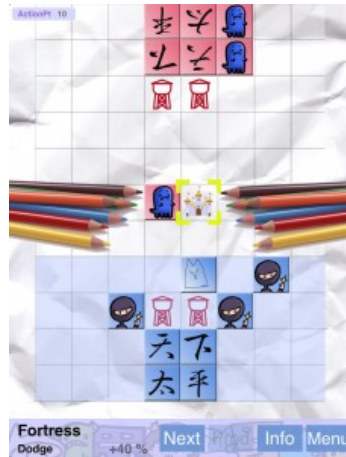
Q: You have many degrees....why did you decide to go for PhD?

It requires a Ph.D. degree in order to be a professor. Ph.D. is my final degree.

Q: How long have you been a member of IEEE? What prompted you to join?

I have been an IEEE member for 5 years. I had my first academic publication in IEEE Transactions on Multimedia in 2006. IEEE membership is essential for my academic career.

Q: What is the most rewarding thing about the work you do?



Screen shot from "Tinha War."
Image credit: Simon Lui



Screenshot from SoundMitate. Image Credit: Simon Lui

Once I saw a stranger on train, he was playing my game happily with his friend. I am delighted to find my game did entertain people in real life!

Q: Can you share a story about how the work you do has impacted the world of gaming?

To be frank it is not me who has impacted the world of gaming, but rather all those developers who write apps on the mobile platform that did the job. For example, I was one of the first developers who released games on the iPad. Before that, no one carried such a big console and played game on the go. Thanks to iPad's processing power and mobility, many people are now holding their tablet computer and playing games on trains and buses and in cafés. Also, with its big screen, more types of game start to appear. It enriches our lives.

Q: What advice would you give a pre-university student who was interested in working in the gaming industry?

The industry will keep on expanding, but the focus can be changed frequently. For example, customers' primary interests are switching from household game consoles, to desktop Internet games, and then to mobile consoles, and then to mobile games with Internet access...

For a pre-university student, make sure you are equipped with fundamental technical knowledge during school days, and "learn how to learn": be able to search for answers on your own, and discover interesting topics and ideas. Then, you will be able to catch up with the ever-changing but exciting world of gaming!

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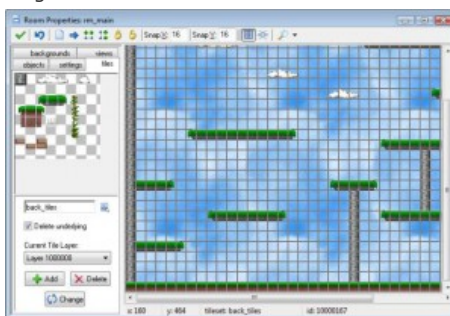
You've probably played lots of computer or phone based games — but would you like to try making your own game? We've gathered and tested lots of available software and in this activity you can build your own game.

Program Your Own Computer Game or App at Home

The easiest way to try to build a computer game is to download some of the free or shareware software designed for gaming. We recommend that you download and install the free version of YoYo Games GameMaker software.

(http://www.yoyogames.com/game_showcases/273/legacy_download) Note that there is a free limited version and higher level ones that charge a fee. The free one is best to start with — you can build some simple games and see you how enjoy the process.

You can share your game file with friends who also have the software and they can see what you created too! You may also wish to view the tutorials



first(<http://sandbox.yoyogames.com/make/tutorials/>) for some guidance on how to use the software.

Step One: It's best to start small and build a simple game like "pong" just to get used to the software. There is a nice tutorial that uses fruits instead of the original "pong" ball — that might be a good one to try.

Step Two: Think about something you enjoy doing and write down some ideas for a game that might be fun to do that relates to something you know a lot about or that you enjoy. Your characters can be anything you want them to be — and you can use clip art — you don't have to be able to draw to make a really fun and nice looking game.

Step Three: Try using the software to create your own game. You might do a simple release to friends and then keep changing it or improving it over time. Some app designers listen to user suggestions for how they would like to see the game improved over time — this is a great way to get ideas for how users might like to expand your original idea. You can also do this activity with a friend or family member, taking turns adding features and testing.

Questions:

1. Did the tutorial help you get a feel for how the software works? Software engineers often build tutorials to help users learn how to use software.
2. How did your original idea of for your own game change once you tried to build it? Why?
3. How long do you think it would take to develop a new piece of word processing or graphic

DID YOU KNOW?

1. One of the first computer games was developed in 1961, when MIT students Martin Graetz and Alan Kotok, with MIT employee Stephen Russell, developed Spacewar! on a computer used for statistical calculations.
2. The first generation of PC games consisted of text adventures or interactive fiction, in which the player communicated with the computer by entering commands through a keyboard.
3. In programming, or coding, software engineers instruct a computer, line by line, how to perform a function.
4. Mobile games are the most popular type of apps amongst smartphone users.

FIND OUT MORE:

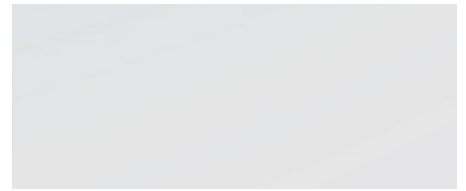
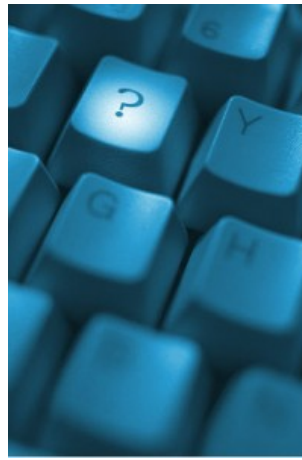
You can also visit **TryEngineering.org** to explore other activities and resources to explore engineering. Other activities and lessons can be found **here**.

software? How many people do you think it might take to work on the engineering team to build this type of software? Why?

4. Did you find that it was easier or harder than you thought to program a computer game? Why?

5. What challenges did you face in building your game?

6. Do you think it would be easier or harder to develop your game as part of a team? What are the advantages of teamwork vs. working alone?



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Try Engineering by Playing Games!

July, 2012

There are loads of games out there to play, but just a few that can give you a chance to see what engineers do. TryEngineering.org has developed several games that let you be the engineer — you can have fun playing and learn at the same time!

At <http://tryengineering.org/play.php> you'll find a Bionic Arm Design Challenge so you can virtually build and test your own bionic arm design. There's also a fun and fast paced trivia game called Questioneering, where you test your engineering knowledge and can play against friends or just go for the high score. Or, try out the Solar Car Racing game and design and race a car that will perform well on different types of tracks.

And that's not all...there are dozens of games linked from TryEngineering.org that allow you to do



everything from building a lifeboat, to designing a roller coaster, to crafting a trebuchet to destroy a castle wall. There's also a fun game called "Invention Connection" through which you can trace the paths of innovation from the microwave to the mouse.

With so many games to choose from, it may be tough to pick one — but give a few a try and learn about engineering while you have fun!

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How IEEE Supports Gaming Pros

July, 2012

Did you know that IEEE has 38 different technical societies that focus on specialized fields of interest? Many gaming professionals are members of the IEEE Computer Society. It has nearly 85,000 members from all over the world! They are involved with everything from computer hardware, software, multimedia, IT, security, networking, mobile computing, and more. Members interested in gaming have access to many resources that help them with learning new skills and keeping in touch with other gamers. There are books, conferences, magazines, online courses, software development certifications, standards, and technical journals. In fact, members can access more than 3,000 online courses and 600 online books.



Another IEEE technical society that gaming professionals might belong to is the IEEE Consumer Electronics Society (CE Society). The focus of this society was once limited to television, home hi-fi, and home appliances — but now it has expanded to reflect all the consumer products that integrate electronics! Members are involved with everything from gaming systems and equipment, to interactive information and display systems, home security systems, phones, music electronics, and much more.

In fact, the CE Society sponsors the IEEE International Games Innovation Conference each year, where all the latest in gaming is shared among developers — it's a great chance to see what's new, hear from gaming industry leaders, and be inspired by others working in gaming. Find out more about the 2012 conference online. (<http://ice-gic.ieee-cesoc.org>)

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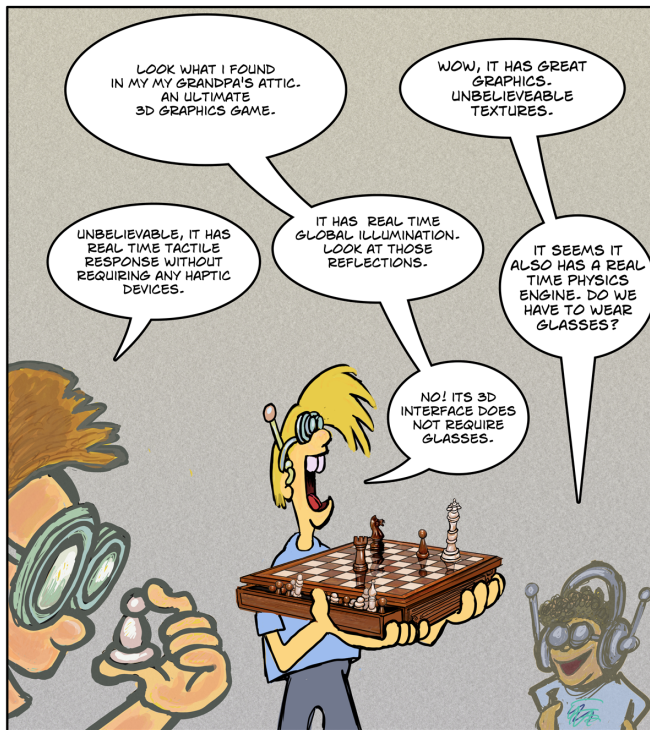
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MADmatic

Ergun Akleman



THERE IS NOTHING LIKE A GREAT GAME.



Credit: Ergun Akleman

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