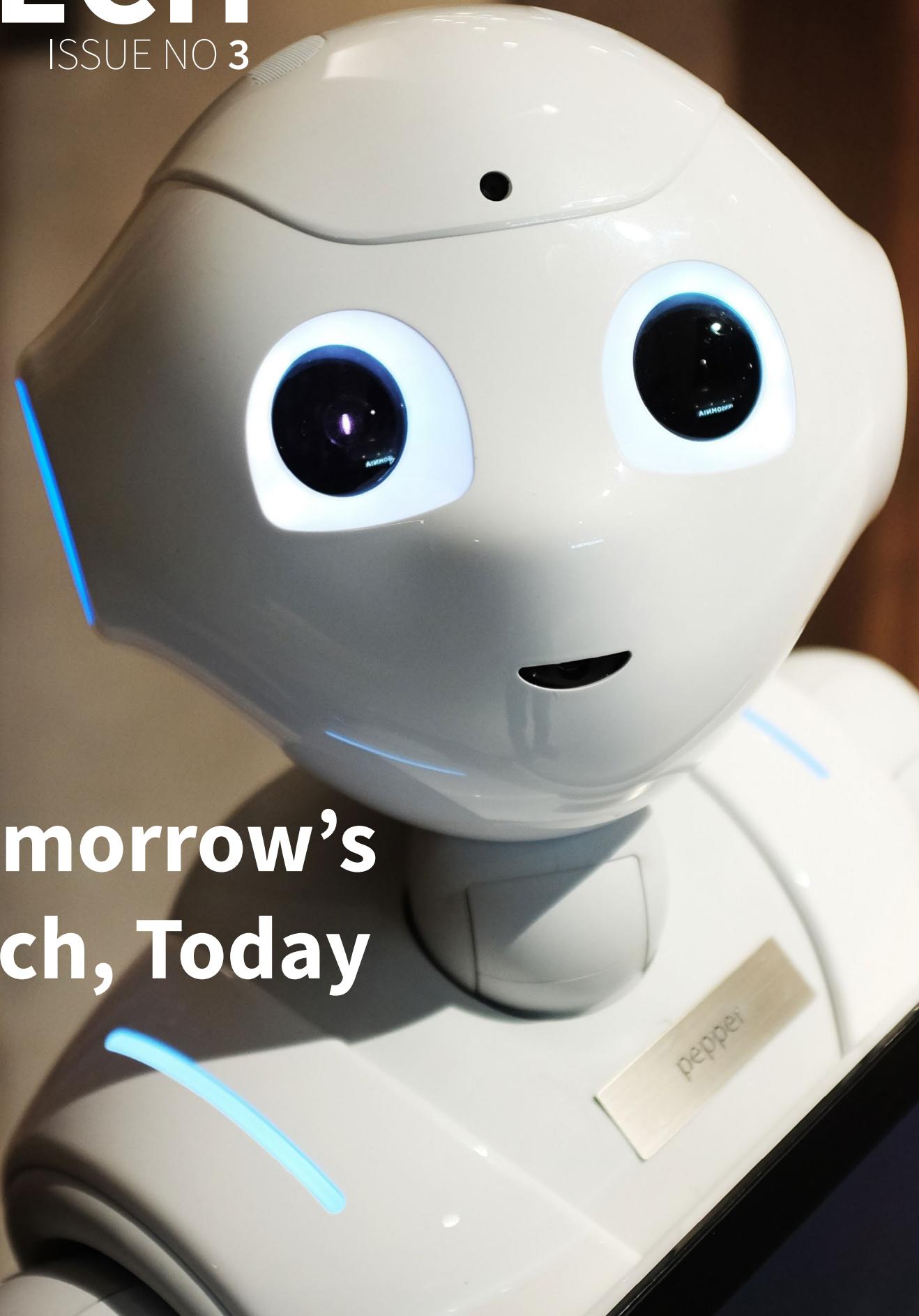


DS  
**TECH**

ISSUE NO 3



Tomorrow's  
Tech, Today

pepper

# Foreword

Greetings!

It can be said, without doubt, that technology pervades our lives today. From the simplest alarm clock to the thin slab crammed with electronics that is probably in your pocket, technology has not failed to influence nearly every aspect of our lives.

What seemed like mere dreams to humankind a few hundred years ago, are now becoming reality.

It was only until a few years ago that self-driving cars—whose idea was introduced by General Motors in 1939—actually hit the roads. Who ever thought that they would be able to control appliances in their home from the other side of the world?

However, while technology advances at this rapid rate, it is important to consider our position on the path of feasibility, viability, and desirability. Most new innovations are made to be as feasible as possible. Most innovations, today, are also viable and sustainable business opportunities. However, the desirability of many innovations is still a question we ask ourselves.

Do we really want robots and AI to take over, and replace human jobs? We aim to provide you with information in this issue of ds Tech, so you can look for solutions to these fundamental questions.

Owing to the Founder's Day Computer Science Exhibition this year, the editorial board of ds Tech has collaborated with the teams working on various projects to be showcased at the exhibition. Thus, ds Tech also aims to encapsulate and supplement this year's Computer Science Exhibition with reports and stories from teams working in the exhibition.

We hope you enjoy reading this publication, and we look forward to your feedback.

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Computer Science Exhibition

# Self-Driving Cars

● Arav Dixit

Imagine being driven to a neighbouring city by your own car as you relax and watch a movie. Self-driving technology will change the perspective about the cliché concept of manually driven cars. Drivers will no longer be needed by the users of this technology.

An autonomous car is an automobile which drives by itself—similar to autopilot technology used in modern aeroplanes. The car uses a number of peripherals to drive. The typical autonomous car, today, uses various radars, lasers and sensors to ‘sense’ and interpret its surroundings.

The once-fictional dream of travelling in a driverless car is coming to a reality by companies like Google, Mercedes-Benz, BMW, Audi, etc. Multiple western universities say that their roads will be densely populated by self-driving vehicles by 2040.

Self-driving cars are a step in the right direction for society, and ought to become available to the public as soon as possible for a more efficient and safe driving experience. Vehicle to Vehicle (V2V) technology, as its name suggests, communicates between vehicles. The V2V will tell vehicles how fast to drive, when to brake and take decisions on manoeuvring. It will also warn and prevent accidents on roads by communicating with other AI (Artificially Intelligent) vehicles.

Google’s cars not only record images of the road, but also view road signs, find alternative routes (by using map and GPS technology) and see traffic lights before they’re even visible to a person. By using

lasers, radars and cameras, the cars can analyse and process information about their surroundings faster than humans can. After testing a driverless car in 2012, Google found that their car had driven over three hundred thousand miles with only two accidents being reported (both were due to human error). Autonomous cars will have better ‘reflexes’ than humans and will be able to make more reliable judgements due to the use of intensive and precise mathematical calculations. This innovation can save much money of the government each year, besides preventing accidents on road due to errors in human judgment.

Besides the concept of driverless cars on its own, the higher energy efficiency (again, due to powerful algorithms and technology) of such autonomous vehicles will also prove to benefit the world.

We will also (hopefully!) witness less congestion on roads due to the introduction and adoption of such technology.



A Waymo self-driving car.

Sources:

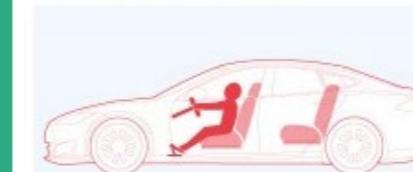
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# The Six Stages of Automation

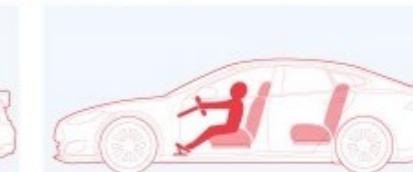
Tesla and other companies are working on automated-driving systems that would eventually allow cars to drive themselves.

## Level 0: No Automation



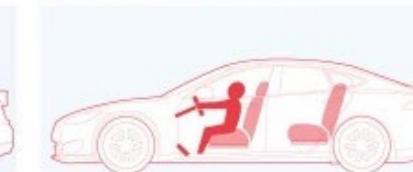
A human controls all the critical driving functions.

## Level 1: Driver Assistance



The vehicle can perform some driving functions, often with a single feature such as cruise control. The driver maintains control of the vehicle.

## Level 2: Partial Automation



The car can perform one or more driving tasks at the same time, including steering and accelerating, but still requires the driver to remain alert and in control.

## Level 3: Conditional Automation Under Development



The car drives itself under certain conditions but requires the human to intervene upon request with sufficient time to respond. The driver isn't expected to constantly remain alert.

## Level 4: High Automation Under Development



The car performs all critical driving tasks and monitors roadway conditions the entire trip, and doesn't require the human to intervene. Self-driving is limited to certain driving locations and environments.

## Level 5: Full Automation Under Development



The Holy Grail. The car drives itself from departure to destination. The human is out of the loop. The car is as good or better than a human and steering wheels and pedals are potentially unnecessary.

Sources: SAE International; National Highway Traffic Safety Administration

# Ethical Choices

If we ever reach Level 5 of automation, humans will have practically no control over the vehicle they may be travelling in. This requires that humans invest a huge amount of trust in such vehicles. However, there are times when the human brain may prove itself necessary, rather than some software.

This is especially necessary when making ethical considerations.

For example, if a vehicle is faced with three choices: to hit a tree and kill the occupants of the vehicle,

to run over two children and a puppy, or to kill two jaywalking adults, which choice will the vehicle make? This is similar to the Trolley Problem—a fundamental question on morals.

Will the computer make calculations on the basis of what it interprets from the real world and rank all possibilities on some sort of scale? Additionally, who will be blamed for the result? These are all considerations to make before the adoption of such technology.

# The Internet of Things

● Arav Dixit

"If you think that the internet has changed your life, think again. The IoT is about to change it all over again!" – Brendan O'Brien

The Internet of Things is an interrelated system of computers — or, simply, a web of computers. The Internet of Things (IoT) has uses ranging from industrial purposes to household purposes. Products that use IoT technology have limitless capabilities.

Take for instance this example of home automation powered by IoT technology. You are to reach your home in thirty minutes and want your room air-conditioned. With the press of a button using an app on your smartphone — or by the use of a virtual assistant (Siri, Google Assistant, Alexa, etc.) the process of cooling your room will begin—even as you are away from home! On your way, you are caught in traffic and anticipate that you will miss the live episode of your favourite TV show. So, perhaps by using an app again, you may instruct a device at your home to download that episode so you can view the entire episode later.

Lighting, water heating and fans can also be toggled using IoT technology.

## Raspberry Pi

The Raspberry Pi is a cheap and efficient CPU (the size of a credit card!) that can be used to create IoT products. The Raspberry Pi can be connected to various peripherals to carry out several tasks. The Raspberry Pi, being a computer, needs to be told what to do (like any other computer), and so, the programming language Python is (popularly) used. The automatic doors in supermarkets are made using technology similar to the Raspberry Pi. Another use of such technology lies within the realm of security. Consider this example of such a device managing the entry and exit of persons at a site to which access is restricted. The device

can be connected to cameras or other peripherals that validate biometrics against a database. The database will contain the data of people allowed to access the site. Besides allowing permitted persons, in the event that an entrant is unidentified, the human sector of security may take care of the problem.

The Raspberry Pi can be used in home automation (as explained earlier) too.

## The World-Sized Web

On the larger scale of the world, by creating such IoT devices, are actually designing world-sized robots—which may simply be called the World



Sized Web (WSW). The World Sized Web is more than just the Internet of Things. Much of the WSW's brains will be in the cloud (online), on servers connected via cellular, Wi-Fi, or on short-range data networks. The World Sized Web is mobile, of course, because many of its components move around with us (like our smartphones).

It is persistent too. Small components of the WSW may be disabled in smaller numbers, but the core components of the WSW will always be present and enabled. None of these technologies are new, but they're all becoming more prevalent and accessible. We are at the brink of a 'phase change' of the technology that drives our networks and devices.

This simple difference in degree will become a difference in kind. "The Internet will disappear. There will be so many IP addresses, so many devices, sensors, things that you are wearing, things that you are interacting with, that you won't even sense it. It will be part of your presence all the time. Imagine you walk into a room, and the room is dynamic. And with your permission and all of that, you are interacting with the things going on in the room." — Eric Schmidt, Google chairman.

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## Google Home



Source: Wikimedia Commons

Introduced in 2016, Google Home is one of Google's many entries into the ongoing race for domination within the consumer electronics market. Google Home is a set of 'smart' speakers, in which users can speak their commands to interact with Google's Personal Assistant.

The Personal Assistant can provide information pertaining to sports scores, set alarms, and can stream video/audio content too.

Besides the aforementioned utilities, Google Home can also help in home automation, by acting as a central hub for a household that may contain many smart devices.

## Philips Hue

The Philips Hue series is a collection of IoT-enabled light bulbs created by Philips. Besides their customizable brightness, their colour can also be seamlessly changed. Originally released in 2012 as the first iOS-controlled lighting appliance, Philips Hue bulbs have become a popular IoT-enabled household appliance in the West.



Source: Philips

# Big Data, Machine Learning and the Future

● Shreyas Minocha

Machine learning, big data and the like have rapidly become buzzwords across the Tech industry. However, few are aware of the potential of these technologies. Let us begin by developing an understanding for what these are, how they work under the hood and what they could hold in store for us for.

Arthur Samuel, in 1959, defined machine learning as a branch of science that gives “computers the ability to learn without being explicitly programmed”. Now while this may sound similar to AI, bear in mind that machine learning is just an approach to artificial intelligence. The idea of artificially intelligent machines can be traced as far back as the ancient Greeks. However, it took until the 20th Century to craft this reality. As attempts were made to empower a machine to recognise trends in data, an entire field of computer science emerged, ‘computational learning’.

In a very broad sense, email spam filters can be considered as a form of machine learning. Spam filters are trained by providing large samples of spam messages. The filter is programmed to identify ‘patterns’ found in spam messages. Hence, the spam filter gets better, or ‘learns’ to differentiate between spam and non-spam.

Another example of machine learning one might come across would be that of suggestions on online stores. The technology responsible for these not only look for trends in your previous searches, but it also looks for patterns in the views of other users who might have similar view history as yours. Machine learning is not a concept borrowed from science fiction. In fact, it is very much here.

To quote Uncle Ben, “With great power comes great responsibility”. In some remote location, a fleet of servers is running complicated machine learning algorithms on our browsing histories, location

data, friend circles, “likes”, “reactions” and more. After all what enables the “technology giants” to maintain their “giant” status?

Highly targeted advertising, I hear you say. With time, we would increasingly see corporations and individuals exploiting the impeccable power of machine learning. It should not be overlooked that this, too, is an application that provides user convenience, by providing information when it is relevant. However, the cost of this convenience, our privacy, is at this stage at least, too precious to sacrifice.

## Analytics

Sentiment analysis can be run on thousands of social media messages, tweets, feedback, etc. to gauge the overall sentiment of the sample audience. Companies can use this to understand the overall impact of their social media campaigns. Online stores could process natural language to estimate your satisfaction with the product and suggest you better options. Machine learning could be harnessed to power relatively powerful language translation by giving the relevant algorithms large sets of information translated by humans into multiple languages. The opportunities are endless. Indeed, a great assortment of companies are looking to exploit these technologies. Some sectors that are interested in machine learning are those of manufacturing, finance, marketing, crime prevention, government, engineering, medicine and agriculture (and perhaps even terrorism).

Recently, AlphaGo, was created by a team at Google. AlphaGo is a system to play games of Go (an ancient Chinese game) against humans. Until AlphaGo was created, no computer had been able to defeat a human. Hence, it was considered a landmark of Artificial Intelligence achievement. Rather than using “decision trees” or being taught

to evaluate positions (like IBM’s Deep Blue), it was trained by playing millions of games against itself, as well as by observing professional games. This amazing feat was achieved using a combination of “deep learning” and “reinforcement learning”, with the former being a subset of machine learning. Machine learning can be used to provide deep insights in various fields of study as well as in various industries (as explained above). The Los

Angeles Police Department modified an algorithm used to predict earthquakes and fed it crime data. This move has led to a reported 33% reduction in burglaries and a 21% reduction in violent crimes in the areas it was used. Such technologies could potentially revolutionise medical diagnoses. By feeding thousands of cancer patients’ and normal patients’ body scans, the machine is given power to differentiate between potential patients.

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- “Machine Learning On Big Data: Opportunities And Challenges.” Sciencedirect.com.
- “Introduction To Big Data/Machine Learning.” Slideshare.net.

*“Information is the oil of the 21st century, and analytics is the combustion engine.” — Peter Sontergaard*

## Big Data: Facts & Figures

- Akamai analyses over 75 million events daily to target advertisements more accurately.
- Walmart handles more than 1 million customer transactions per hour, all of whose data is stored and imported into a database estimated to contain more than 2.5 petabytes (2,500 terabytes) of data.
- Data production will be 44 times greater in 2020 than it was in 2009.
- At the time of publishing this magazine, there have been nearly 1.6 trillion Google searches in 2017, till date.

# Robots in Our Quest for Perfection

● Jaiveer Misra

Robots feature strongly in our dreams of tomorrow. These dreams centre around our hopes and a fascination to perfect ourselves.

The idea that machinery can be made to work for us, was first conceptualized 500 years ago in clockwork machines. Drawing a parallel, scientists wondered if the human body also functioned through a certain kind of clockwork mechanism. Likening the human body to clock work was the driving idea that powered the human mind to create the earliest version of robots. The mechanical tusk was an invention in these times that mirrored the idea. It was a chess playing machine with a human head and a torso with a mechanism similar to clockwork operated by a hidden human. Then came mechanized machines in the industrial revolution, and the rest as they say is history.

Our robotic dreams are full of hope and excitement, Robo Thespian (UK 2016) is a perfect example of this – he can act, has starred in films and plays and has officiated a wedding in China. As ‘social robots’ enter our lives, with advancements in computing we can actually talk and converse with them in human language and through movements and gestures. Minitaur (Ghost Robotics, US 2017) is a lightweight robot and can negotiate rocks and debris. With its “feet” it can also run, jump, climb, crouch, and bounce up onto its back legs to open doors.

The human obsession with perfecting ourselves sees us recreating ourselves as machines. Today robots are found in a multitude of fields such as astronomy, medicine, industrial applications and the entertainment industry. As more and more

people in different fields stake a claim on robots, there is always this fear of machines controlling humans instead of the other way round. As robots advance there may come a time when they are able to fulfill more detailed roles and the relationship between humans and robots might also undergo a change. At this crucial point, the question we must ask ourselves is that with our rapid rate of advancement, will the robot’s artificial intelligence (AI) take over human intelligence and instinct? The human brain is designed to “think” and remain active, do we want to hand over this task to a machine and in doing so, loose control? Supercomputers are a human creation and we need to be aware of how far we want to give away control, so as to keep the balance. This is the question we must think about.



*Note: The author attended an exhibition on Robots at the Science Museum in London in July 2017. All information for the article was gathered from this event.*



## The Great Robot Race

With twenty-three cars, zero drivers and one route in the Mojave desert to race along, this is not something that is going to happen in a couple of years, but rather something that happened exactly twelve years ago. On 8th October, 2005, the world was able to catch a sight of the natural rivalry between the computer science departments at Stanford University and Carnegie Mellon University. Stanley, the autonomous car created by Stanford University ended up winning the two million dollar prize and settling their age old rivalry. Stanley used 100,000 lines of software to interpret sensor data and execute navigation decisions using raw data from LIDAR, the camera, GPS sets and inertial sensors into software that programs the vehicle’s speed and direction.

## Kuri—The Home AI Robot

Extreme cuteness and serious technology are two attributes that perfectly define the robot Kuri. This small and adorable robot is a lot like your simple home assistant AI Google Home, but does a lot more. The little robot is way more powerful than it may appear. Besides being able to move around, it can also act as a spy, by recording video footage of your home while you are away. It can also play hide and seek with children! Users can also pet Kuri like they may pet an animal—only adding to its cuteness.

Source: Kuri



# Planned Obsolescence

• Ranvijay Singh

In a quiet corner of the small town of Livermore, California, resides the Centennial Light. A light bulb that has been working continuously for the past 116 years, it proves that the bulbs made today have an artificial cap on their lamp life. Putting artificial limits on the life span of products, and other various methods to limit the full potential of a product, is known as Planned Obsolescence.



The Centennial Light Bulb at Livermore, California.

Planned Obsolescence is an economic and design policy of designing a product in a manner such that the product is bound to become obsolete. This ensures that consumers keep replacing that particular product. From an economic standpoint, this is highly profitable as it ensures high volumes of sales as it reduces the time between each replacement purchase. There are various types of Planned Obsolescence, some of them being Contrived Durability, the prevention of repairs and Perceived Obsolescence. While Perceived Obsolescence relied heavily on the marketing

strategy of a company, the prevention of repairs and Contrived Durability are based on the design and technical functions of the product.

## Contrived Durability

Contrived Durability is the strategy to shortening the life of a product before it even releases, by designing it a such way, that it is bound deteriorate quickly. This was used by a majority of American automobile manufacturers in the first half of the 20th century but, with the coming of Japanese automobiles in the market, which were designed to be reliable, American manufactures were caught out. As the consumers began to favour Japanese automobiles, American manufacturers such as General Motors and Ford had to drop the design strategy of Contrived Durability. This strategy was also implemented in the production of bulbs in the early 20th century. All major bulb producers in the world came together and decided to artificially limit the life span of all the bulbs they sold to a thousand hours. This was done in incognito, so that the consumers would believe that producing a bulb which worked more than a thousand hours, is next to impossible.

## Prevention of Repairs

The prevention of repairs is a method of Planned Obsolescence that is used heavily in the world of technology. In this method, a company designs a product in such a manner, that it becomes virtually impossible to repair it when it gets spoilt, thus ensuring the need to buy a replacement. This design strategy has been infamously adopted by many big tech corporations, for example, Apple. Apple is known for the usage of the Pentalobe security screw. A type of screw that can only be opened by Apple, the Pentalobe security screw makes even simple repairs, which one could carry out by oneself, very hard to make. Simple

procedures, like replacing a dead battery, become impossible to carry out.

This leaves the consumer only two options; either buy a new product (which would most probably be of Apple), or take the product back to Apple for repair. If one would opt to repair their device, the price of repairing their device would, in most cases, match that of buying a new one. This high cost of repairing Apple devices has been done on purpose, to promote the quick replacement of the old device. Thus, through these measures, Apple ensure that most of its consumers change their devices in two or three years.

### Sources:

Future - Here's the truth about the 'planned obsolescence' of tech by Adam Hadhazy

Planned obsolescence <http://www.economist.com/node/13354332>

Popular Mechanics - Brian ClarkHoward, Chris Sweeney <http://www.popularmechanics.com/technology/g202/planned-obsolescence-460210/A>

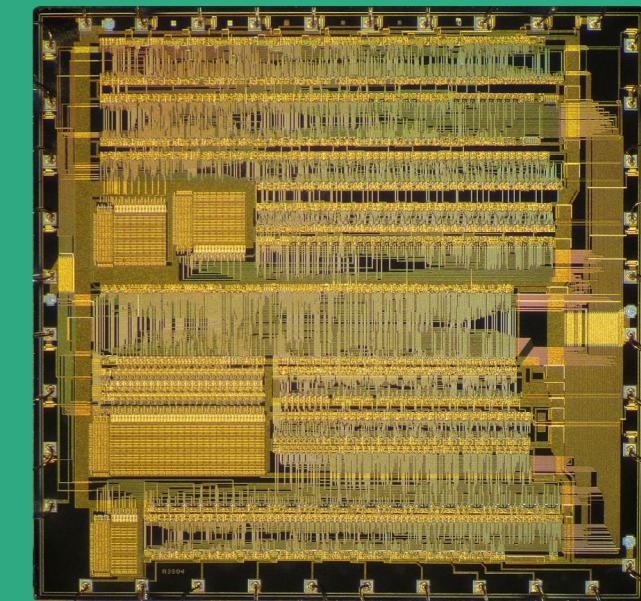
## Pros and Cons

At first glance, Planned Obsolescence seems very unfair for the consumers. At the end of the day, the producer is making better technology unavailable to the consumer. Ethically speaking, the repeated replacement of products leads to a large waste but, there is another side of the story. Planned Obsolescence does have many positive uses. The shortening of the replacement cycle does have many positive impacts on the economy. Even still, is Planned Obsolescence right?

# Physical Security

The tamper-resistant pentalobe screw by Apple is not only preventing further damage, but also reducing the risk of third-parties damaging the product. Many other companies and giants took inspiration from this idea, and started making tamper-resistant products of their own.

One such example is the cryptoprocessor. Secure cryptoprocessors are dedicated to carry out cryptographic operations and due to their multiple levels of physical security measures they easily provide us with temper resistant microprocessors. Secure cryptoprocessors are widely deployed in systems such as ATMs, TV set-top boxes, military applications, and high-security portable communication equipment. What might have started as a method to prevent blunders while attempting to repair, has now inspired high levels of physical security too.



Western Electric 229G cryptoprocessor.

Source: Wikimedia Commons

# Sixth Sense

● Paavan Agrawal

'Sixth Sense' is a wearable gestural interface that augments the physical world with digital information. It allows the use of ordinary hand gestures to interact with that information.

Steve Mann is considered to be the father of the technology that drives 'Sixth Sense'. He experimented with 'Sixth Sense' technology as early as 1990. Worn around the neck, it consisted of a camera attached to a projector. He called it the "Synthetic Synesthesia of the Sixth Sense".

His work was then improved upon Pranav Mistry. The devices which are used to make Mistry's version of 'Sixth Sense' are a camera, some coloured markers, some mobile components, a mirror and a small projector.

## How It Works

The camera captures an object in view and tracks the user's hand gestures. The data obtained is sent to some mobile components. It acts like a digital eye, connecting interpreting the world around you, so your surroundings may be augmented. The coloured markers are placed on the user's fingertips. Marking fingers with different coloured markers helps the 'Digital Eye' recognise gestures. Any web-enabled smartphone work is compatible with this product. The smartphone will process the video data obtained from the camera, and interpret hand gestures. The projector projects visuals, enabling surfaces and physical objects to be used as an interface. A tiny LED projector displays output from the smart phone on any surface in view — an object, a wall, or even a person.

## Applications

Sixth Sense may be used to view maps, capture images, draw digitally, and interact with physical objects using digital methods and fetch information (from the internet). The user may project a keypad onto their hand and use that virtual keypad to dial a phone number. With a map application on the user's phone, the user may run it and navigate using it just like the user would use the app on their phone. When the user draws a circle on their wrist, Sixth Sense displays a virtual watch. To capture an image, the user may position their fingers and thumb into a quadrilateral. The drawing application allows the user to draw on any surface, using their fingers as drawing instruments. Sixth Sense uses image recognition or marker technology to identify objects that we may be holding. If the user is holding a book, Sixth Sense can also fetch reviews of that book.

Sixth Sense Technology works in real-time while also being portable and cheap. Besides, the software it is powered by is open-source too, meaning that other developers can also access and improve the technology.

It has the potential of becoming the ultimate 'transparent' user interface for accessing information about everything around us. Some enhancements which have been planned for the future may be: getting rid of the coloured markers, incorporating the camera and projector inside the mobile computing device, adding 3-dimensional gesture tracking, and making Sixth Sense friendly for use by the disabled.

### Sources:

atinav242. "The Sixth Sense Technology Complete Ppt." Slideshare.net.  
Pranavmistry.com. (2017). Pranav Mistry. <http://www.pranavmistry.com/>



Source: Pranav Mistry

# Microsoft HoloLens

Augmented Reality is one of the fields of technology many big tech giants have been trying to perfect. Augmented Reality, as its name suggests, *augments reality* by generating digital objects and modifications in real-time within the 'real' world. Imagine playing the game Minecraft, but rather than using a remote control, it is you who is playing. Microsoft has released a device called the HoloLens which can help you visualise digital creations in an entirely different manner. Using the HoloLens, you can scan your entire house and digitise it. Imagine playing Call of Duty in your house! What if your house became the map, and you, an actual player in the game.



Source: YouTube

# Coolest Video Games in 2017

• Amogh Tiwari

## Red Dead Redemption 2 by Rockstar Games (PS4 XONE)

Red Dead Redemption 2 is a prequel to its first title and is one of the most known series made by Rockstar Games. It features gameplay in third person as a cowboy with signature pistols. It has a massive freeworld and follows a decent storyline. It is going to release later in 2017.



## Destiny 2 by Bungie & Activision (PS4 XONE PC)

Destiny 2, the second game by Bungie in this series is also an online-only, first person shooter multiplayer game. It is set in a mythic sci-fi world, where the player can choose to play many different kinds of scenarios which include player versus environment and player versus player situations. It follows a "shared world" gameplay. It is this particular feature which attracts players from all over the world.



## Inside – From the creators of Limbo (PS4 XONE PC iOS NSwitch)

Inside is not a widely known puzzle-platformer adventure game just like its precursor Limbo. Made by Playdead, this game features 2.5D gameplay which means that it has basic 2D gameplay with 3D graphics. It uses the original Limbo's custom game engine.



## Bombsquad - This legendary game by Eric Froemling has taken over almost all Doscos' laptops with a sensational "bang". This game features third person gameplay, and is played as a multiplayer game. Players spawn and throw bombs at other players as they try to kill each other and score points.



## (COD) Call of Duty: WWII by Sledgehammer Games & Activision (PS4 XONE PC)

COD WWII, the latest flagship of Sledgehammer Games is hugely anticipated by the Call of Duty fans simply because it features the WWII--a whole new landscape for the series. It features first person gameplay like all its previous titles and has a story mode along with a multiplayer mode.



## Sonic Forces by SEGA (PS4 XONE PC NSwitch)

Sonic Forces, a game developed by Sonic Team is a second development after Sonic Generations. Players can play as two variations of Sonic – Modern Sonic and Classic Sonic, where, as Modern Sonic, players have 3D gameplay and as Classic Sonic, players have 2D gameplay. Players can also create their own avatar in a brand new mode and play as them in the 3D environment.



## Middle Earth: Shadow of War by Warner Bros.

(PS4 XONE Android PC)

Middle Earth: Shadow of War is the upcoming sequel to its predecessor Middle Earth : Shadow of Mordor. Made by Monolith productions, this action role-playing video game is hugely anticipated by the gamers in the fantasy genre. Shadow of War is based in the Tolkien universe and takes place between The Hobbit and The Lord of The Rings. It is open world and has third person gameplay.



## Friday the 13th: The Game by IGFonic & Gun Media (PS4 XONE PC)

Friday the 13th : The Game is a horror/thriller game based on the film of the same name by Paramount Pictures. It is an asymmetrical multiplayer game, which means that players play with different kinds of advantages and disadvantages. It pits up to seven players against one player as the killer, Jason Voorhees. It is semi-open world and follows a third person gameplay. There are various other characters to control depending on the circumstances of a session.



Source: "Metacritic - Movie Reviews, TV Reviews, Game Reviews, And Music Reviews." Metacritic.com.

# Innovative Tech to Look Out For

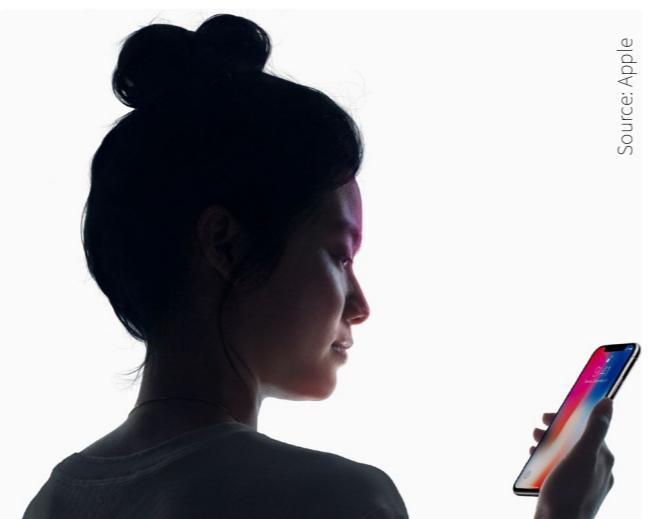
● Raghav Kapur

**1. Jacquard:** In collaboration with Levi's, Google has released a 'smart' jacket using its new technology termed Jacquard. Google's ATAP (Advanced Technology and Projects) group claims to have found a way to weave capacitive threads with a copper core into the cloth itself. In the jacket, the left cuff takes in inputs from the user's hand and translates them into controls for smartphones. The current controls include basic music controls, as well as minor actions in Google Maps. With haptic feedback, the cuff also notifies the user of any calls or notifications as they come in on their smartphone. In fact, an app on the users smartphone allows them to control their jacket's 'abilities'. Customisable abilities include messages, phone calls, navigation and music as well as choosing whether to be notified by LED or haptic feedback. The jacket is currently available for retail and can be picked up for \$350 on Levi's global website.



**2. 360° Camera:** Along with its widely acclaimed phone, Essential Products Inc. boasts the world's

smallest 360° camera. Coming in at a mere 67mm x 32mm (height x width) and weighing 35 grams the camera is made to work with their flagship Essential phone and claims to offer 4 microphones and dual 12MP fisheye imagers. With a built in real time stitching engine, the camera promises user-friendly 360° immersive photographs without the need of bulky equipment and cumbersome processing. Essential's 360° camera promises, and delivers a major revolution in the field of immersive photography as well as user experience.



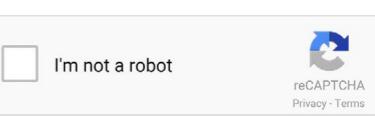
**3. Facial Recognition:** Along with its revolutionary TrueDepth camera system on the iPhone X, Apple is also ushering a new era of facial recognition in with Face ID. Mainly focused on replacing Apple's fingerprint security Touch ID, Face ID uses a Dot Projector and Flood Illuminator to project invisible infrared light on the users face to track and recognise the facial map and depth map of the user. The software claims to even track changes in the user's face with each scan, therefore, allowing access even if the user has developed any facial characteristics that did not exist in the initial setup. Apple also claims that Face ID is 'attention aware' —it only attempts to scan a user's face when they look toward the device with their eyes open.

**4. Reinforcement Learning:** Marketed as a means to make computers learn like people without explicit instruction, reinforcement learning is an approach which allows computers to learn like people, through experience, rather than through explicit instruction. Using reinforcement learning, virtual cars can perform complex manoeuvres on four lane highways. This might not sound very new, but consider that the software made to control these cars was not programmed in the conventional sense at all. The cars learnt to merge and move, slickly and safely, through practice. During the test, the virtual car ran the course again and again, altering its instructions a little each time. Every time the car smoothly merged, the machine favoured that set of instructions. This occurred up to the point where the car was able to seamlessly merge between traffic, all by itself. Through means like this, technology can move closer to self-driving cars and the next technological revolution.

**5. The new reCAPTCHA:** I'm pretty sure all frequent internet service users have filled in a CAPTCHA before. The old CAPTCHA involved identifying letters and numbers from scanned text. Google has now created, using advanced AI, the No CAPTCHA reCAPTCHA. Said to be effortless for humans yet impenetrable for bots, the reCAPTCHA analyses behaviour (such as cursor movement) sent from your browser to Google and accordingly identifies whether you are a legitimate user or a bot. Google's 'Advanced Risk Analysis' backend considers the entire user experience with the CAPTCHA instead of merely utilising the entered text. Should there be enough red flags for the system to consider the user to be a robot, it provides a challenge that would be considerably harder for robots, compared to the previous text field entry.



reCAPTCHA



source: Google

Sources:

"iPhone X." Apple.

"These Are The 10 Breakthrough Technologies You Need To Know About Right Now." MIT Technology Review.

# Tech That Seems to be Fading Away

● Raghav Kapur

1. **Blackberry:** Every businessperson's piece of hardware, Blackberry had lost its position after 2000 due to the introduction of the iPhone, and Google's open source Android OS. The maker of Blackberry, RIM, says that it still hasn't given up on the market. The question is, has the market given up on Blackberry? In a desperate attempt to capture some part of the market, Blackberry released the Motion, powered by Android instead of Blackberry's own proprietary BB OS. Despite the change, the QWERTY keyboard devices are struggling to stay relevant in a world dominated by virtual interfaces like those of Apple's iOS and the many variants of Android.



Source: Blackberry

2. **Digital Cameras:** Let me explain via a question - how many times do you use your digital camera to take photos anymore? Yes, the answer is possibly never. With the evolution of smartphones (and their cameras) digital cameras are slowly moving toward the point of extinction. With the introduction of dual lens cameras like the one on the iPhone X or the OnePlus 5, novice photographers are being able

to take better images with their phone cameras as compared to digital cameras. It's not just about the images. Realistically, it's also about the practicality. Who would carry around a bulky 12MP camera when, instead, they could carry around a (almost) weightless smartphone.

3. **The Pointing Stick:** Older computer users would remember the little red (or blue) dot between the G, H and B keys on keyboards found on older devices. This widely overlooked piece of hardware is called a 'Pointing Stick'. To a knowledgeable user, the 'Pointing Stick' is of great utility. It can allow fast navigation in web pages, documents, spreadsheets and within practically any program. With newer forms of input like Touch Bars and larger, more accurate track pads, the small red dot is now rapidly becoming irrelevant. Earlier, this piece of hardware used to be standard on any laptop on the market whereas, nowadays, hardly a handful of brands offer the device on their laptops, the most famous being Lenovo's ThinkPad where the red dot has been dubbed the TrackPoint. With newer, more relevant technology, it is possible that the era of the TrackPoint has reached a sad end.



Source: Wikimedia Commons

4. **The VGA Connector:** Before the emergence of HDMI and DisplayPort, existed a 3 row, 15 pin DE-15 connector called a Video Graphics Array (VGA).



Source: Wikimedia Commons

Once a revolutionary technology, the VGA port, today, has become outdated and has been pushed to the backseat by more advanced means of connections. The VGA port was, once upon a time, found almost everywhere, from consumer laptops (at that time) to high definition television sets. The maximum output of 2048x1536 is what made the VGA cable die. Technologies like DisplayPort can transmit video data in 3840x2160, far above what any VGA could ever do. Additionally, HDMI 2.1, released recently, supports content up to 10328 x 7760 at 120 hertz. Conclusively, the VGA connector is already dead.

5. **The 3.5mm headphone jack:** Look at your phone, does it have a headphone jack? Chances are, if it's a current flagship phone, it doesn't. Apple eliminated this 'necessity' with the introduction of

the iPhone 7. This decision was highly criticised. However, with Google following suit by removing the jack on their newest Pixel 2, critics are being silenced as consumers believe that tech giants are now effectively ushering in the era of wireless audio. With the introduction of Apple's AirPods and Google's Pixel Buds, amongst the thriving market, consumers now have a wide variety of wireless personal audio devices to choose from across various price points. Starting from the bare minimum, unbranded Bluetooth headphones to the \$1,000 Beyerdynamic Xelento Wireless earphones (the most expensive of their type) users have a wide variety of products to choose from. To me, the removal of the headphone jack is worthwhile, since it gives the consumer audio experience a change. A change it desperately needs.



Source: Vecteezy

Sources:

"The Headphone Jack Is Dead And I Blame Google."  
"Dying Technology: Modern Hardware That's On The Way Out." The Telegraph.  
Vaughan-Nichols, Steven. "The Dying Technologies Of 2016." Computerworld.

# How a Jailbreak Really Works

● Janak Prajapati

During his presentation to School last term, Rakshit Tandon explained how ‘jailbreaking’ your device is harmful for you and poses innumerable threats to both you and your device. This statement, however, is not entirely true. Jailbreaking your device itself will not make you vulnerable to security threats. However, it can become dangerous if one installs software which he/she does not understand properly. A user, in most cases, with a jailbroken device, can make his/her phone more secure than a normal phone with the right knowledge.

A jailbreak should also not be confused with a ‘root’. A jailbreak is only restricted to devices manufactured by Apple. As the name suggests, a root is a much deeper process which gives ‘root access’ to the Android OS, which in turn enables you to completely replace the OS itself.

The jailbreak was first introduced by an Australian who got frustrated with all the restrictions placed by Apple on the user. Jailbreaking wasn’t famous then, and was quite complicated (it still is). With time, many realized that the Apple actually restricts its users, as those with a jailbroken device demonstrated and showed everyone the true extent to which one could use their device.



Source: iDownloadBlog

The Cydia App icon.

‘Jailbreak’ is a fairly common term in today’s world now. While most of us have regrettably failed to understand it, referring to it as “something that installs ‘Cydia’ so that I can pirate an app”, it is actually a complex and intricate process which essentially removes the Read-only permissions of the user and gives the user ‘Read-Write’ permissions. This process is known as ‘patching’. A person with ‘Read-Only’ permissions cannot make any changes to the device, he/she can only ‘read’ the data from the device (installing apps from the App Store does write data, but the App Store is a verified store). And a person with ‘Read-Write’ permissions can make changes to their device, such as, applying a theme or installing tweaks which can change the way some functions of the device work.

As simple as it may sound, it is not. The read/write rights of a user are maintained in the ‘kernel’ of a device. The kernel is, to put it simply, a bridge between the applications (i.e. the user) and the main framework of the device (i.e. the hardware). The kernel, itself, could be called an Operating System, but let’s not get into that right now. The role of the kernel is to control all the other programs on your device and is also responsible for assigning memory space which allows software to run.

Multiple exploits together can ‘patch’ a kernel and enable the user to get Read-Write access. Older Jailbreaks never relied on kernel exploits as there were other easier methods to achieve full system access.

Apple has now introduced many security checks such as code signing, Kernel Patch Protection and many others.

The role of Code Signing is to change the permissions of the kernel to Read-Only every time a device boots up. While this can be easily

avoided once one has jailbroken their device by simply disabling the Code Signing, Kernel Patch Protection (KPP) is what really troubles the developers. Introduced in iOS 9, the Kernel Patch Protection, as the name suggests, is a protective measure deployed by Apple. KPP performs random ‘checks’ to ensure that the kernel is in its ‘original’ state. It runs during the boot-up and keeps running after the boot sequence is over. Now, each time you reboot (not respring) your device, the ‘patched’ kernel loads without any snags. This is where KPP comes into action and changes the permissions back to ‘Read-Only’ and ensures the integrity of the kernel.

The KPP hasn’t been defeated by anyone yet, but Pangu (A famous Chinese ‘jailbreaking’ team) has found a way to bypass it (While this might be great news for the time being, it certainly isn’t good for the future since we still haven’t found a way to defeat KPP).

What Pangu has done is certainly quite ingenious. It ‘races’ with the Code Signing during boot and reaches the kernel before Code Signing, it then changes the kernel permissions to ‘Read-Write’ and disables the Code Signing check. After this, Pangu uses another exploit to disable the Kernel Patch Protection (Note: This is only for iOS 9, and so there’s no way to defeat KPP for the newer firmwares yet)

KPP is also the reason behind developers not being able to release an ‘untethered’ jailbreak. When a device has an ‘untethered’ jailbreak, it will not lose

its jailbroken state even after reboots. Due to the KPP not being disabled completely, after each reboot, the permissions get changed back to ‘Read-Only’ and the device is no longer in a jailbroken state. This is called a ‘semi-tethered’ jailbreak, after each reboot, the user would have to re-run the jailbreak app from his/her device to perform the jailbreak again.

Undoubtedly, jailbreaking a device gets harder with time, the reason behind it being that a jailbreak works on the bugs in Apple’s code and exploits them to get what they want. As one developer releases a jailbreak, Apple quickly checks those bugs which enable users to jailbreak their device and patches them up, thus removing the earlier exploits.

But, Apple owes a lot to the jailbreaking community, since most of their software’s features have been stolen from the Jailbreaking community and have been ‘polished’ to make it seem as if the idea was authentic. Due to this, Apple does help the jailbreaking community, though not directly. Apple recently open-sourced their Kernel, so that anyone can view their code. This is a clever way to improve their security over time. But for now, developers can easily view their code, find bugs and make exploits.

To conclude, jailbreaking does sound like an extremely tough process. We’ve still got an ample number of skillful developers who release their work for free to the jailbreaking community, and obviously, for everyone else.

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- “Kernel Patches.” Kernel Patches - The iPhone Wiki.
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# First Generation Computers in the Space Race

Shivendra P Singh

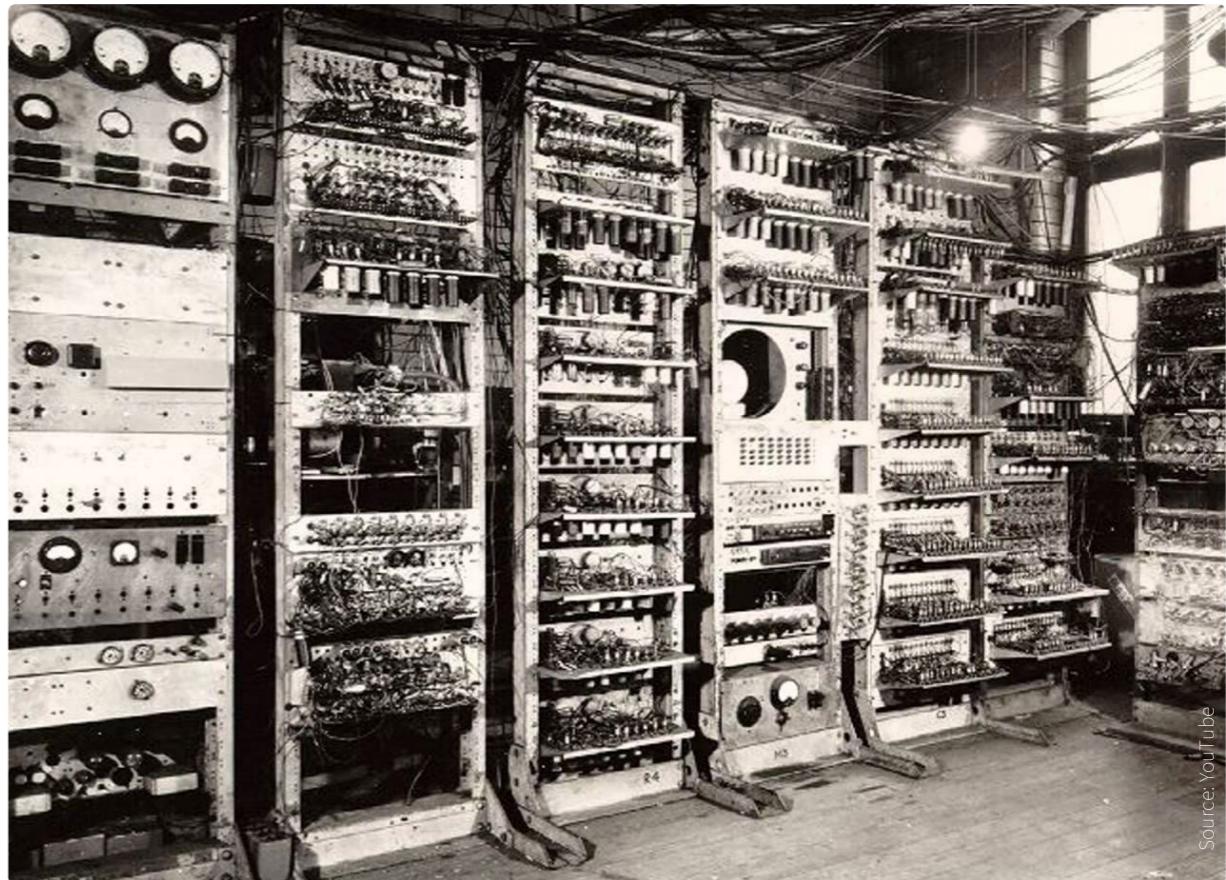
It has been seventy years since the first modern computer of the world, the ENIAC, was built. In these very seventy years, computing has leaped across technological gaps of unimaginable lengths, and it is hard to reckon the amount of progress our race has made. About a decade-and-a-half after the ENIAC was successfully launched, the United States space program took its first steps as the explorer satellite was placed in orbit. To the Americans' dismay, the satellite was the third to reach the exosphere, after the two Russian Sputnik satellites. This too, was only achieved because of the U.S. government's restarting of the explorer program, otherwise the first Project Vanguard launch was expected only after a year of the Sputnik's launch. For the latter program, the U.S. Navy had commissioned one of the first large-scale computers in Washington D.C. – the IBM 704 – which was capable of executing more than 40,000 instructions. When the turn for man to venture out into space came, NASA awarded two more contracts for computing and tracking centers to be built, again in D.C., for Project Mercury. By 1960, the IBM 7090 (one of the most competent data-processing machines of its time, also used for the Ballistic Missile Early Warning System) was ready for operations at NASA's Goddard space center. As the years passed by, Americans witnessed the launch of Project Gemini, a human spaceflight program intended to act as a rehearsal for the upcoming Apollo missions – the supposed 'Grand Finale' of the Space Race. At the heralding of Gemini 4, the new space center at Houston (later to be named after Lyndon B. Johnson) became

the new Flight Control, taking over the mantle from Goddard. Soon, the first manned flight of the Apollo program took place and returned to earth after encircling the moon. From this point of time, the new IBM 360 took over as the flight computer, having over 1 million bytes of memory space. But the issue with the Apollo program was that due to the enormity of its requirements, even seldom-used programs were incorporated into the memory of the twin IBM-360s aboard the Apollo command module, which filled up the backup space of the computers as well. To decrease the memory size of the code, programmers started to complexify it. A solution to this issue only came after components of the code were developed using the FORTRAN procedural language, which was much easier to understand than the IBM 360 assembler. The control computer witnessed a relatively successful run with only one recorded failure occurring during the Apollo 10 mission.

After the culmination of the Lunar Program, a generational shift in the computational technology took place, and the era of Microsoft, Texas Instruments and Apple soon dawned. IBM remained persistent in its partnership with NASA and provided operations' technology for the Skylab and the Space Shuttle programs as well. Today, as NASA adopts a slower pace for its rocket developments, we can only reminisce the role the first-generation supercomputers played in accelerating the progress of space science and also how, they helped America get ahead of the Soviet Union and 'win' the space race by landing the first men on moon.

Sources:

"Apollo 11: The Computers That Put Man On The Moon." ComputerWeekly.com.  
"Ch8-2." History.nasa.gov.



ENIAC, the world's first computer.

Source: YouTube

## What's your Heartword?

Abhiraj Lamba

Just last month, Apple released its latest iPhone; the iPhone X, to celebrate the iPhone's 10th anniversary and everyone lost their minds over the new features it had introduced. Of these features, a particular one seemed to grab everyone's attention – the newly introduced Face ID. Apple's Face ID revolutionized face recognition technology by introducing advanced sensors and AI to the system so that it can be a much more convenient and secure way to authenticate your device. With biometric authentication taking over the future, a team of computer scientists at the University of Buffalo, New York, have developed a new authentication system which uses your heart's shape, size and heartbeat pattern (which is unique for each human) to identify you, and have currently dubbed it CardiacScan.

CardiacScan uses a low-level Doppler radar to measure one's heart and makes sure that no one else comes in front of your device and starts using it. Its technology is described in a paper which the creators would be presenting in MobiCom (International Conference for Mobile Computing and Communication) '17 to be held in Utah, later this month.

CardiacScan would be able to log you in as soon as you are in the vicinity of your device and would log you out as soon as you walk away, thus saving a lot of time that is wasted in logging in and out of our various devices. The radiation it emits is less than 1% of what our smartphones do and is thus not a major risk to us and doesn't pose any health concerns. It would take about 8 seconds to scan your heart and then would continue doing so till you walk away, making the need to log in and out a problem of the past.

This would further lead to a greater ease in maintaining privacy for people. The study's lead author, Wenya Xu, PhD, an assistant professor in the Department of Computer Science and Engineering in UB's School of Engineering and Applied Sciences has said, "We would like to use it for every computer because everyone needs privacy". Since people would not need to log in or out, forgetting to do so would not be a problem and because of this people will not leave their data open and unlocked by mistake, leaving it vulnerable.

Even though heart based biometric devices are nothing new and have been there for about a decade, the concept of having a non-contact remote device for the characterisation of our hearts' geometry is completely new and original. Its non-contact nature makes sure that users need not be bothered to authenticate themselves whenever they have to use their devices.

Currently, CardiacScan, is not deemed practical for day to day use as it still has some issues that need to be worked on, for example, its size. Currently it is too large a device to actually be used regularly but in the future, it is expected that the scientists will be able to shrink it so that it can be installed in the corner of keyboards, in smartphones and in other smaller devices. Another problem faced is that with this technology anyone would be able to access your devices if they could get you near them. So much for the privacy it otherwise offers. Once these problems have been worked on, CardiacScan could be used in all sorts of devices, computers, smartphones and even airport screening barricades. Truly, this is the technology of the future.

Sources:

"Goodbye, Login. Hello, Heart Scan." University at Buffalo, The State University of New York.

Khandelwal, Swati. "Cardiac Scan Authentication - Your Heart As Your Password." The Hacker News.

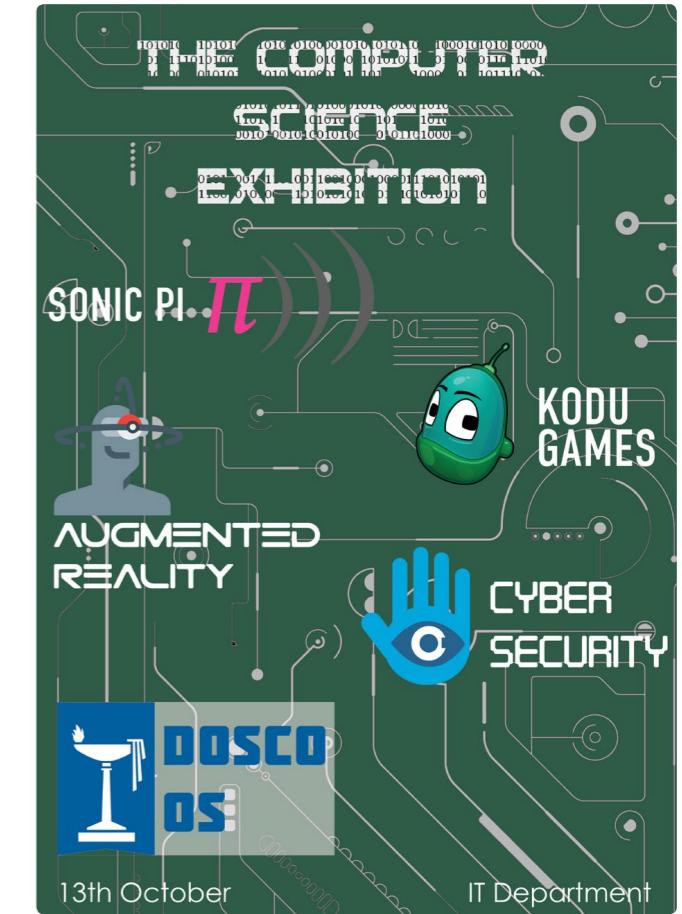
Press Trust of India. "Your Heart Size Can Be Used as a Password, Researchers Claim." NDTV Gadgets360.Com.

## Introduction to the Founder's Day Exhibition

Rishi Choudhary (Boy-in-Charge)

Pause, take a moment, look around you! We are in a world where everything—from the food on our plates, to the clothes covering us—has a 'machine' element involved. Programming, today, has no age boundary, from a 7 year old kid to a 107 year old man, anybody can program! Keeping that in mind, this year's computer science exhibition brings to you a myriad of technologies to observe, enjoy and most importantly learn. From the astonishing world of virtual reality, we bring to you the Augmented Reality Sandbox to give you a breath taking feel of that dimension. Combining Music and Computers, we present to you the mechanical melodies of Sonic Pi. To display the calibre of our little programmers, we present to you Kodu and Scratch games which will put your gaming skills to test! To make sure that this Founders goes frictionless, we present to you the Founders '17 app to help facilitate your experience at Chandbagh. Bored of Windows and iOS? Come try the all-new home-made doscoOS. And finally, to keep you safe in the online world we have presentations on cyber security.

OBSERVE , ENJOY , LEARN!



# Behind the Augmented Reality Sandbox

• The AR Sandbox team

The idea of the sandbox came to us when Mr Mohla showed us a video of an augmented reality sandbox. It immediately reminded us of class 10 topography, and how it was the most practical part of Geography. That is also why we have decided to give our device to the School Geography department, for better understanding of the concept. Led by Rishi Choudhary, Mr Vishal Mohla and Abhyuday Gupta, with help from the University of California, Davis, we present to you, the Augmented Reality Sandbox.

As its name suggests, we have augmented the traditional sandbox. Using various components and lengthy code, we designed a system that would project contour lines and, similarly, colours onto the sandbox on the basis of the relative height of sand within the sandbox. The sandbox treats sand above a calibrated mean level to be 'land', while the levels below this mean level are treated as water bodies. The land is highlighted (using a projector) with green. The colour of the land becomes increasingly reddish as the relative height of land increases, thus forming hills. The water is highlighted with blue, with the blue getting darker as the water body is made deeper.

Playing with the sand in the sandbox has been made even more fun with this augmentation!

## Technicalities

There are three working divisions of the sandbox: the hardware, the software, and the calibration. We built the box on top of a table we found in School, with barriers being the only modification. On top, 3D detection is aided by the XBOX 360 Kinect sensor. At different altitudes, it projects different colours to show contour lines. The projector and Kinect sensor are connected to a Linux Mint system, and simulations are supported by a very powerful NVIDIA graphics processing unit.

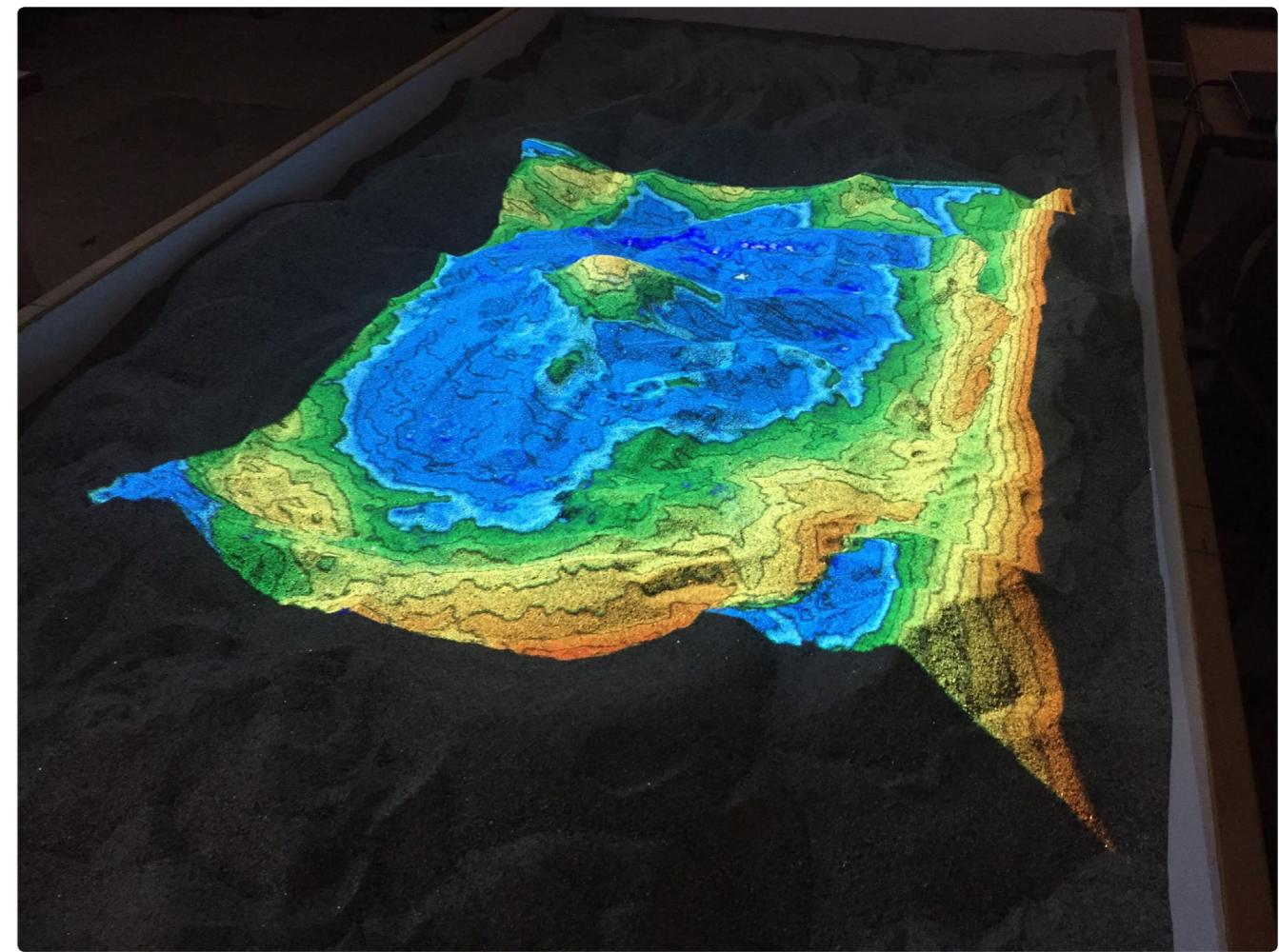
Most of the work was done through shell-scripting in the Terminal. Additionally, with the help of pre-designed code, we achieved something which seemed nearly impossible in the early stages.

The Kinect reads and detects the height of the sand, and sends data to the Linux-based system. The system then incorporates it in its average depths, and detects where sea-level should be placed. This calibration is done on many different heights, and on many different points--over and over again. The system displayed at the exhibition requires a total of 28 calibration rounds, which translates to 336 points, all taken at different altitudes.

This data is compiled and sent to the main projection, which projects different altitudes using different colours (as explained earlier) and has a simulation for water. In addition, our team added a feature to the project--rain. If a user places his hand(s) above the topographical representation and hovers around for a few seconds, some dark specs of blue will be noticed right below. This is the rain simulation, to make it more realistic.

The Augmented Reality Sandbox was originally designed by Oliver Kreylos. He designed it in the aforementioned university and the entire process was very tedious. In the words of Larry Page, co-founder of Google, "If you're changing the world, you're working on important things. You're excited to get up in the morning" and even though we weren't changing the world, the technology is, in itself, world-changing, and speaking for the whole team, working the entire day to move closer to perfection was absolutely worth it.

In conclusion, do visit the IT centre on the 13th of October to see this fantastic compilation of hard work, technology and sand. This is the first device of its kind to be made entirely by students of a school.



The Augmented Reality Sandbox at the Exhibition.

# The Founders '17 App

• Founders '17 App team

*The Dosco App Team: Siddhanth Jain, Pratinav Bagla, Hamza Hussain, Raghav Saboo, Mahir Kasewa*

The Founder's Day programme is one of the most buzzing events organised by the School. Mesmerising plays, fascinating exhibitions, concerts by budding musicians, dazzling dance performances and last but not the least, every Dosco's craving : food stalls. For students, it's a sublime opportunity, offering a wide variety of activities to indulge into. However, for the poor visitors, it is a completely different scenario. The confusion of trying to choose which event to attend, and then, the inability to cover all events, are just some of the many predicaments visitors face during Founders. One cannot help but sympathise with these visitors who have to attend numerous events as Doscos are involved with many events in the programme. Through the 'Founders '17' app, we aim to make the programme a little less perplexing for visitors by encapsulating the entire Founders Day programme in one application.

## The Planning

The application was made across a period of a little under three weeks. At first, the application was meant to cater to only iOS clients—owing to the simplicity and power of Swift, the application programming language designed for all Apple devices. Later, due to useful and well-timed advice by Mr Vishal Mohla, our Master-in-Charge, we decided to make a cross-platform app, thereby enabling any smartphone (or any other Internet-enabled device) user to access the app. The decision of making it a web application rather than a native app increased the security of the app too, since only users provided with the server address can access a web app.

However, due to time constraints, the application

does not contain all the features that we envisioned it would. A segment of the app that we were unable to create was a review of all Founder's Day events by visitors, as well as a 'lost and found' posting section in the app. We had to work for extended hours in the night to have the app well and ready before Founders, but we hope to incorporate these features in the new version of the app that will be released next year. Making an application had us involved in different capacities. From coding till late hours to obtaining permission from the various authorities in school. The development of the application has been a great learning experience and we have enjoyed every portion of it. We hope the app serves its purpose and makes the Founder's Day programme a little less frenetic.



## Features

The application has various tabs in its menubar that will make the app easier to use. The Schedule tab contains the timings and the venue of every event. The Home tab contains a newsfeed column

which will be updated to reflect happenings around campus. We have included all School publications within the app as well. This helps the community in two ways: It helps visitors who may be unable to obtain hard copies of the various publications, and secondly, also aids visitors so they do not have to carry hard copies around with them throughout the day.



Visitors who are new to the campus will never get lost again. The map feature of the app provides an interactive map to help the user easily find their way around the campus as they move from one venue to another.

## Founders like no Founders before

The application will transform the idea of the Founders Day programme itself. Provided that the app is efficient in serving its purpose, it will be like the perfect 'go-to mate' for every visitor. The app has incorporated all the salient features of the programme, namely the Founders' edition of all publications, and the schedule of various events such as drama performances and the exhibitions. Every publication will be inside your pocket and the newsfeed is only a few clicks away. The schedule will also receive real-time updates, in the event that any changes are made to the schedule.

We hope you enjoy using the application, and as always, feedback is always welcome.

## Tools Used

The team used the Intel XDK IDE and Phone Gap to build their web app. The languages used are: HTML, CSS and Javascript.

## Use the App

[goo.gl/WhECf1](http://goo.gl/WhECf1)

# Operating Systems—Linux and the Like

• doscoOS team

Team: Aditya Oberai, Arjun Wakade, Karan Wakade, Kautilya Podagatlapalli, Aakar Gupta, Amogh Tiwari  
The team began its work on researching about various Operating Systems (OS) about three to four weeks prior to the exhibition. We used online resources to conduct our research. Initially, Wikipedia served as our main source of information. It gave us a lot of detailed and new information which we were unaware of. But that was unnecessary. It didn't work, as we found that the right kind of information we were looking for was missing. We decided to reference the official sites maintained by the creators and developers of various operating systems.

The official sites were informative. They also gave us information about their features, as they were also trying to sell their operating system on their downloads pages.

We faced issues with getting very limited useful information. We got information which the general masses would not understand. So, we decided to reduce the amount of jargon, only to realise that there was too less remaining content. We then thought of using blogs, and collected interesting facts.

## The Process

None of us understood the concept of kernels, distributions and versions. We decided to seek help from Aditya, after which we researched together.

A kernel is the main part of an operating system that controls the OS, CPU and memory. Linux creates and distributes kernels to people to create operating systems. Then there is a main OS created and many distributions or versions below it.

We then researched on the inventors. Linus Torvalds, the creator of Linux itself; Ian Murdock, the creator of Debian; Mark Shuttleworth the creator of Ubuntu, were some big names.

Each minor distribution is generally based on another OS. For instance, Ubuntu is based on Debian. Each OS also has a kernel. However, it is not necessary to have a Linux kernel.

Another important aspect of operating systems are their package managers. One of the main package managers are the Debian package manager and the Pacman package manager. These package managers help to transport cookies and information to servers or other computers.

We added features that the OS provided. For example, Ubuntu provides users with a large variety of apps, which the creators made themselves. It also provides cloud storage and server space to users.



## **doscoOS – Aditya Oberai**

doscoOS is an operating system based on the Linux kernel that has been custom built for The Doon School. It has been built to be used as live operating system, i.e. a complete bootable computer installation including an operating system which runs directly from an external storage device onto a computer's memory, rather being loaded from a hard disk drive. There are two versions of doscoOS that are currently being built. The first one, currently a work-in-progress, is based on Arch Linux. It will run the XFCE desktop environment. The second one is based on openSUSE Leap 42.1 (Malachite). It runs the JeOS desktop, and

has been using a tool provided by the company Novell known as SUSEStudio. Both the operating systems contain office suites, audio and video players, a web browser and an image manipulator.

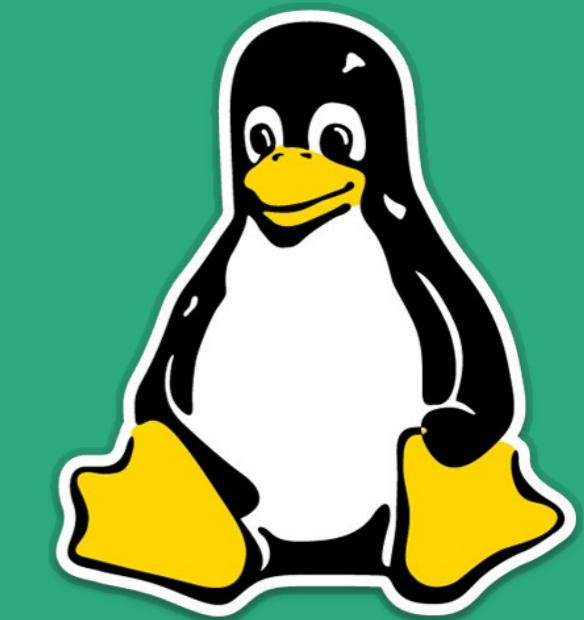
Both operating systems will also contain a custom branded GRUB screen that will display the official doscoOS logo.

## Linux Distributions

As of 2015, there were more than 500 active Linux distributions.

Some leading distributions include Android, Debian, Fedora, and openSUSE.

Source: Lwn.net.



## Free Software

Free software means the users have the freedom to run, copy, distribute, study, change and improve the software.

This means that users must have the *four essential freedoms*:

- The freedom to run the program the user wishes, for any purpose (freedom 0).
- The freedom to study how the program works, and adapt it to the user's needs (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so the user can help their neighbor (freedom 2).
- The freedom to improve the program, and release the improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.

Source: "The GNU Operating System And The Free Software Movement." Gnu.org.

# Creating Music Using Sonic Pi

Sonic Pi team

It is our belief, that there should be music in everyone's life. What if in this digital world, some more effort goes in to creating music? What if we could be digitalized musicians? What if we could code our music? Sonic Pi is one such software that we can use to suffice our needs and achieve the dream we wanted.

Sonic Pi provides us with a variety of options to make our song OUR OWN. Its user-friendly interface is way too easy to use for any beginner to say, "This is too complicated" or "I can't do this". Even if you do forget the proper function name, the software has a pop out display that shows a list of options that may be needed. You don't really need to be a professional to code music. In Sonic Pi, you can learn to operate the simple software using the omnipresent reference section. No wonder Sam Aaron took convenience as a serious issue, after all who doesn't like productive work that is fun!

## Our Journey Using Sonic Pi

With the exciting idea in our minds, we began gathering people who were willing to display the goodness and the efficiency of the software via displaying their art pieces.

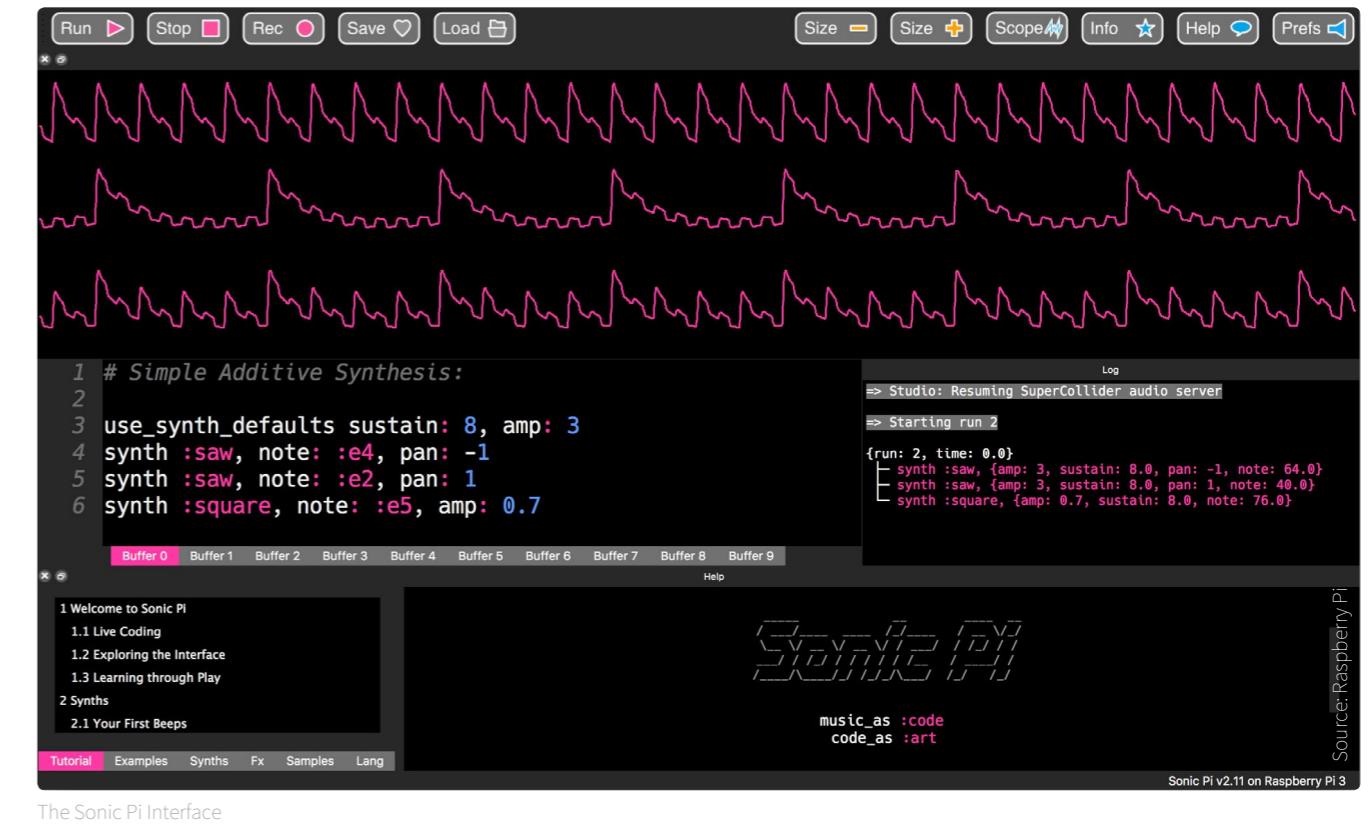
A few announcements were more than enough to find all the willing candidates and a few sessions were more than enough to figure out the devoted candidates. Our team was finally narrowed down to 10 or 12 people. It was time for us all to start working. The special day was nearing and with that we had started disappearing from the houses and being found toiling hard in the ITC. For most

of us, sitting at one place, working non-stop, was a challenging task. Implementing our musical knowledge turned out to be a tiresome job too. We worked on a variety of songs from both the East and the West. To name a few, we made classical music, rock music and even love songs. In short, we were in everything. Some of our songs were *Zindagi Ek Safar*, *Raabta*, *Sun Raha Ha Na Tu*, *Faded* and *Hall of Fame*.

## How did we actually make music?

It turns out that simply learning the basic functions wasn't enough. There was a lot of practical implementation of the knowledge involved in it. We began with figuring out the notes and dynamics of the song using our 'music sense' and then coding each note to sound the way it is. This meant listening to the same song repeatedly. One challenge we faced at this point of time was getting exhausted way too soon to keep going. Another challenge was figuring out how to present certain musical symbols the way they are in real life. For instance, we were once brainstorming on how to create silence in the middle of a song (a rest).

Sonic Pi was a wonderful journey that not only enabled us to let our creativity fly but also let us make some good friends. One thing we never ever will lose is the knowledge we gained through this journey. We learnt that there was no such thing as an unsolvable puzzle. Hope in ourselves enabled us to achieve what we had never dreamt of achieving. We shall never ever lose the knowledge we gained through this journey.



The Sonic Pi Interface

Source:Raspberry Pi



## Games Made in Kodu Game Lab

• Kodu Games team

As Mark Zuckerberg once rightly said, “In fifteen years we’ll be teaching programming just like reading and writing... and wondering why we didn’t do it sooner.” This just shows how important the skill of coding and programming in this generation has become! That is why ‘Kodu’ is an amazing platform to start learning programming.

Kodu lets users create games on the PC and Xbox via a simple visual programming language. Kodu can be used to teach creativity, problem solving, storytelling, as well as programming. Anyone can use Kodu to make a game--young children as well as adults--with no design or programming skills. One of the best things about Kodu is that it is free! At the Founder’s Day Exhibition this year, we have a wide variety of games--from fast-paced action games to old-classics like hide and seek. We are showcasing the following games (Creator-Game-Description):

- Abhyuday Singh (180-K) - Hide and Catch + War land + The Race - The first game is just like the old classic, but with a twist to it. Instead of simply

trying to find the “hider”, the seeker has to catch him as well.

The second game, Warland, is entirely the opposite. Fast-paced and action filled, it is perfect for all age groups.

- Shreyan Mittal (186-H) and Shaurya Singhania (166-K) - Cycle League + Star Rush - This game is just like football, but on a computer. It is very similar to the famous game Rocket League, but with cycles! The basic objective of it is to grab the ball and shoot towards the opponent’s goal. The first to score 10 points wins.

Star Rush is a game in which the player has to rescue a star, which is located in between castles and cannons, that will be constantly shooting at the player. The player has to take the star and place it in a factory that is in between a jungle. The game is thrilling and will certainly engross the player.

- Aditia Gondalia (167-T) - Saving Humanity-This game is situated in a land far far away, where an evil villain in the form of a machine gun has taken over the land. The players, the “guardians” of the

land, have to stop it from taking over. When the users finally defeat it, a surprise awaits the users, as it created 2 clones just like the players themselves to finish off his work. The players have to kill them in a race to prevent them from succeeding. Finally, the players have to defeat the Boss, who is very difficult to kill as he has an army of deadly cannons.

- Siddhant Agarwal (129-H) - Shooting Adventure-In this game, the player is the main character, Sputnik. The character constantly glows as it shoots blips at the enemies. The enemies will also shoot at the character. Their boss also has the same abilities as the character, and is difficult to kill. The main character is the Sputnik, the villains are the mines, and the boss is an evil machine. There are also civilians in this game, who we have to guide safely to a factory, as the mines shoot at the character. This game is full of adventure and is very intriguing.

- Sparsh Gandhi (165-T) - Bike Wars – This game is just as it sounds. A spinoff on Hunger Games on Kodu. You are a cycle and have to fight 3 other cycles to death. Beware, as they are just as good as you, and possess the same weapons.

- Veraj Goel (212-J) and Pranav Desai (160-O) - The Saviour-- Kodu is the saviour of two lands. However, those lands have been taken over by bots. Thus, Kodu must fight those bots in both lands. The first land is a grassland and the other one is full of volcanoes and magma. The bots have weapons such as blips and missiles. Kodu has the same weapons as well.

- Ruchir Pramod Agarwal (184-O) - Kodu Fighting- In this game you are the “hero Kodu” and have to kill the evil Kodus and their 5 henchmen. As you progress through the levels, your character receives upgrades and gains more powers. Your player can do high jumps, shoot missiles and blips. You only have 2 and a half minutes, so be quick!

- Krishmeet Singh Ratra (130-T) - Bombastic – In this game the player has to try and destroy the other bots. Though this might sound easy, the other bots have the same weapons as the player, and are almost identical to the player. So remember, the player might just die before the bots do! This game has two levels. The first level is easy, but the second level is tricky.

The game consists of 4 small bots who weaken the player, and must be killed. When the player defeats them, out comes the King, who is larger than the player’s character and more powerful.

- Aneesh Reddy (197-H) – Shoot n Hide – In the first level, you have to battle the computer. You have to defeat him in order to progress to the next level. In the second level, you spawn in an ice realm and have to look for four specific coloured coins which are hidden. You only have 3 minutes to find them. What makes this even more challenging is that there are cannons on each realm that stun, as well as kill you.

- Ameya Bansal (136-T) – War lands - The game is all about dodging invisible obstacles, missiles, blips etc. The main mission of the game is to kill the evil grey Kodu, who is the villain. You have got 2 minutes and a limited amount of health to kill the Kodu. If you die, you lose, and if you win, you proceed to the next level. The next level is similar, but the level of difficulty is higher. So enjoy playing and best of luck.

- Katyayan Kanodia (159-H) – Maze Battle – In this game the player has to find his way through a maze. The player has to shoot at obstacles. Upon completion of the maze, the player enters a new realm, in which he battles a gigantic turtle with a cannon by his side. The player, in this segment, must skill the turtle and destroy the cannon. The maze consists of obstacles like mines, and sputniks have to be destroyed at the earliest.

# Raspberry Pi Creations

• Raspi team

Raspberry Pi is a credit card sized computer developed in the United Kingdom by the Raspberry Foundation to promote teaching of computer science in schools. It uses Raspbian (a Linux based OS) as its operating system. The main programming languages it supports are Python and Scratch, which are easy to learn. The main difference it holds with a normal PC is its direct connectivity with sensors which makes its use very diverse. This property of Raspberry Pi also makes it slow, and hence difficult to use for robotics.

This year our school organized a workshop on Raspberry Pi which attracted a lot of young students and gave them an opportunity to learn programming and robotics. The facilitators taught us basics of Python and Raspberry Pi. We started with basic programs like traffic lights and by the end of the course we were able to make our own wireless camera.

For the Founder's Day Computer Science Exhibition, with the help of instructors, we made two complicated and astounding projects. One of them being a track sensing car and the other, a robotic arm. Further in this article I will be describing both the projects.

## Track detecting car

This car can sense its track and turn when it is required. It also has the ability to stop on approaching an obstacle. For this it uses the technology of Infrared sensors. It has three infrared

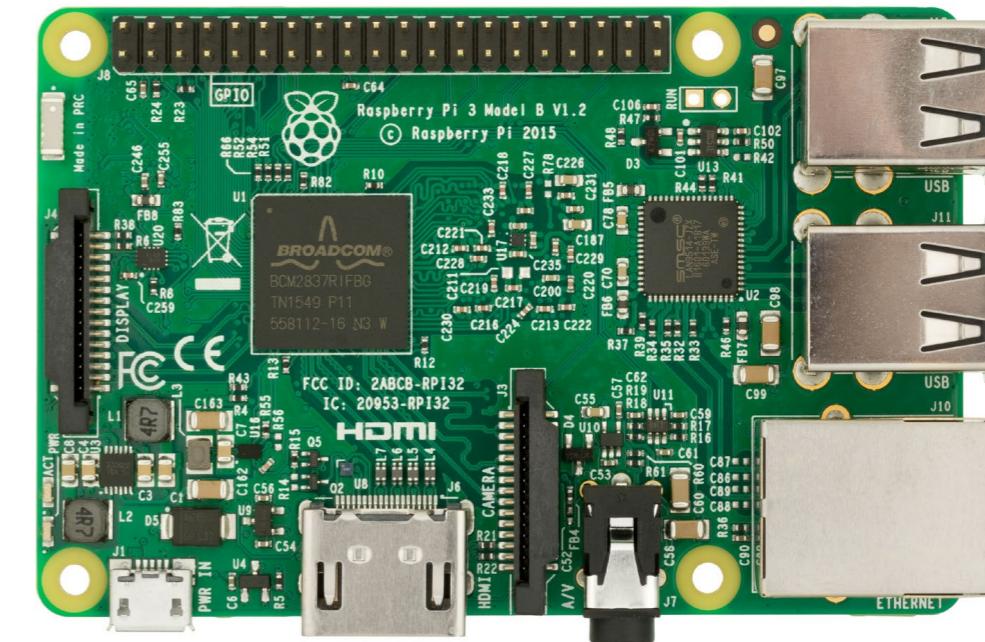
sensors installed on it – one installed on either side of the car pointing downwards (to sense the track) and one in the front pointing forward (to sense obstacles). The track is black in color so that it absorbs all the infrared rays. When the car senses IR rays it means that it has lost contact with the track and the car turns in the direction of the IR sensor which is not sensing IR rays. Something similar is used to sense an obstacle. All the objects (except black) radiate IR rays and when the car senses these IR rays using the IR red sensor pointing forward, it stops.

Though this car may look simple in its functions, in future this technology can be used in making automatic cars and other such machines.

## Robotic arm

Programmed using Raspberry PI, this arm can be commanded wirelessly using a smart phone. The phone is connected to the Raspberry Pi via Bluetooth and the commands are given using an app. As per the command the robotic arm performs the desired function. The arm can be used to pick up objects and can be very useful in industries. In the future, this can reduce the man power required, and can also replace humans where there are life risks involved.

These are not the limits of Raspberry Pi. More projects can be created using it. All it requires is a Raspberry Pi and a creative mind.



A Raspberry Pi 3.

Source: Wikimedia Commons



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