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FACULTY CORNER

***EDUCATIONAL SKILL DEVELOPMENT***

***5TH GENERATION WIRELESS SYSTEMS***

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ON CREATIVE DESK

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# *Educational Skill Development*

The purpose of Education is to develop a complete human being – by developing the various skills. There are hard skills and soft skills. Hard skills are core skills which are required for innovation, creation and production in various disciplines, where as soft skills are needed for everyday transactions that are required for people to relate each other. To be smart at hard skills IQ is measured and for soft skills EQ is considered. In career and professional life we require hard and soft skills in different combinations. Careers can be classified into three categories: careers that need hard skills and less soft skills, both hard and soft skills, mostly soft skills and less hard skills.

Hard and soft skills are often referred to when entering into and living a profession. While hard skills are essential to enter, it is the soft skills that facilitate professional ethics and aesthetics. To be a good personality fit for any profession we need to be quality producers, humanistic communicators and civilized and scientific consumers. The molding for this has

to happen during education period. For this skill inclusive, skill integrated and skill evolving Education is very much needed.

The different domains of educational skills are:- Self development skills, social skills, life skills, communication skills, emotional skills, critical thinking skills, research skills, systems thinking skills, information age skills, leadership and management skills, spiritual development skills, yoga skills, holistic development skills and so on. Various skills are to be integrated in education.

All the skills are essential to lead the life. Some skills are inborn, whereas some are acquired and mastered. Skills are developed through practice and experience. Skills should be properly used, timely adopted when and wherever required to achieve our life objectives. Different kind of skills can make a person happy, healthy, interactive, cooperative, friendly and global. To be successful in our profession and life 'lifelong learning' of various skills are required.



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# 5TH GENERATION WIRELESS SYSTEMS

**5G Technology** stands for **5th Generation Mobile technology**. **5G mobile technology** has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology. Nowadays mobile users have much awareness of the cell phone (mobile) technology. The **5G technologies** include all type of advanced **features** which makes 5G mobile technology most powerful and in huge demand in near future.

## *Features of 5G Technology*

- 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping.
  - The advanced billing interfaces of 5G technology makes it more attractive and effective.
  - 5G technology also providing subscriber supervision tools for fast action.
  - The high quality services of 5G technology based on Policy to avoid error.
- 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.
  - 5G technology offer transporter class gateway with unparalleled consistency.
  - The traffic statistics by 5G technology makes it more accurate.
  - Through remote management offered by 5G technology a user can get better and fast solution.
  - The remote diagnostics also a great feature of 5G technology.
  - The 5G technology is providing up to 25 Mbps connectivity speed.
  - The 5G technology also support virtual private network.
  - The new 5G technology will take all delivery service out of business prospect
  - The uploading and downloading speed of 5G technology touching the peak.
  - The 5G technology network offering enhanced and available connectivity just about the world.



## Other 5G concepts

There are many new concepts that are being investigated and developed for the new 5th generation mobile system. Some of these include:

- **Pervasive networks :** This technology being considered for 5G cellular systems is where a user can concurrently be connected to several wireless access technologies and seamlessly move between them.
- **Group cooperative relay:** This is a technique that is being considered to make the high data rates available over a wider area of the cell. Currently data rates fall towards the cell edge where interference levels are higher and signal levels lower.
- **Cognitive radio technology:** If cognitive radio technology was used for 5th generation, 5G cellular systems,



then it would enable the user equipment / handset to look at the radio landscape in which it is located and choose the optimum radio access network, modulation scheme and other parameters to configure itself to gain the best connection and optimum performance.

- **Wireless mesh networking and dynamic ad-hoc networking:** With the variety of different access schemes it will be possible to link to others nearby to provide ad-hoc wireless networks for much speedier data flows.
- **Smart antennas:** Another major element of any 5G cellular system will be that of smart antennas. Using these it will be possible to alter the beam direction to enable more direct communications and limit interference and increase overall cell capacity.

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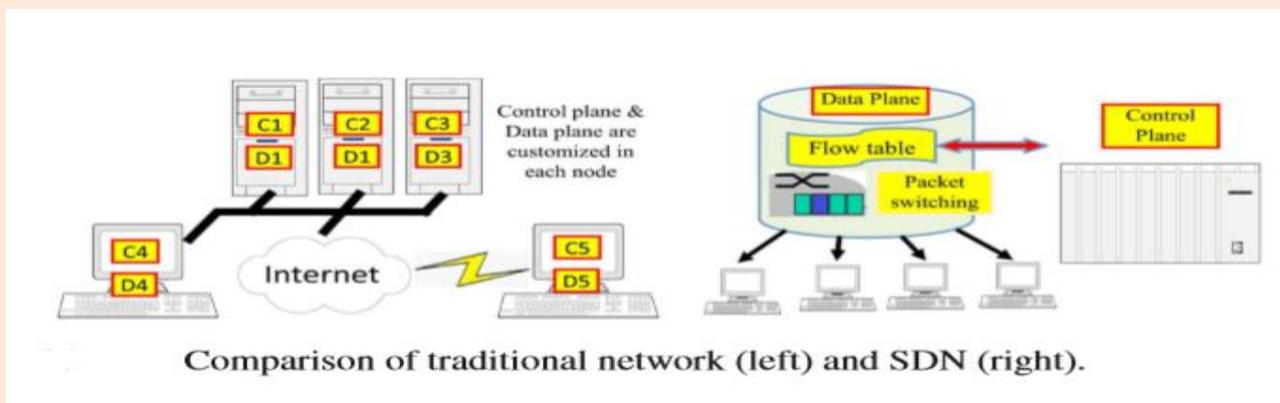
# SOFTWARE DEFINED NETWORK

Software-defined network (SDN) has become one of the most important architectures for the management of large-scale complex networks, which may require repolicing or reconfigurations from time to time.

Conventional networks utilize special algorithms implemented on hardware components to control and monitor the data flow in the network, managing routing paths and determining how different devices are interconnected in the network. A problem posed by this methodology is the limitation of the current network devices under high network traffic, which poses severe limitations on network performance.

management of the forwarding hardware in a network. SDN exploits the ability to split the data plane from the control plane in routers and switches. The control plane can send commands down to the data planes of the hardware. This paradigm provides a view of the entire network, and helps to make changes globally without a device-centric configuration on each hardware unit.

By using SDN, the administrators have the ability to control the data flow as well as to alter the characteristics of the switching devices in the network from a central location. This gives the network administrators the ability to arbitrarily change routing tables



A possible solution to this problem is the implementation of the data handling rules as software modules rather than embedding them in hardware. This method enables the network administrators to have more control over the network traffic and therefore has a great potential to greatly improve the performance of the network in terms of efficient use of network resources. Such an idea is defined in an innovative technology, called Software-Defined Networking (SDN).

Its concept was originally proposed by Nicira Networks based on their earlier development at UCB, Stanford, CMU, Princeton. The goal of SDN is to provide open, user-controlled

in network routing devices.

A number of protocol standards exist on the use of SDN in real applications. One of the most popular protocol standards is called OpenFlow. OpenFlow is a protocol that enables the implementation of the SDN concept in both hardware and software. The OpenFlow protocol enables a user to arbitrarily create slices/slivers without being aware of the physical network infrastructure. No matter the infrastructure is wireless or wired system.

## SDN Applications

- Internet Research: Updating the Internet brings many challenges as it is constantly being used; SDN technologies provide a means for testing ideas for a future Internet without changing the current network.
- Rural Connections: SDN simplifies complex data centre and enterprise networks; it can further be utilized to simplify rural Wi-Fi networks.
- Date Centres Upgrading: Data centres are an integral part of many companies.SDN allows companies to save money in setting up and configuring networks since it allows switches to be managed from a central location.
- Mobile Device Offloading: Privacy is important for business applications because people often work on data that needs to be kept secure. SDN ensuring that applications with additional security requirements are only offloaded on approved machines.
- Wireless Virtual Machines:SDN eliminates the need of manually reconfiguring the network settings after removing the virtual machine.



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# FOG COMPUTING

As the technology is increasing day by day, different type of devices are coming into the market, each with its own specifications and capabilities. The development of wearable computing, smart metering, smart home/city, connected vehicles and large-scale wireless sensor network, the Internet of Things (IoT) has received attentions for years and considered as the future of Internet. However, due to the limited computation power and storage on smart devices, cloud computing is considered as a promising computing environment that provides elastic resources to applications running on those devices. Despite the increasing usage of cloud computing, there are still issues unsolved due to the inherent problem of cloud computing such as unreliable latency, lack of mobility support and location-awareness. To overcome these limitations, another computing environment was introduced, named as Fog Computing.

Fog computing also known as Fog networking or fogging, is a concept introduced by Cisco, which refers to extending the cloud computing to the edge of an enterprise's network. It facilitates the operation of compute, storage and networking services between end-devices and cloud computing data centres. Fog computing is proposed to enable computing directly at the edge of the network, which can deliver new applications and services especially for the future of Internet. For example, commercial edge routers are advertising processor speed, number of cores and built-in network storage. Those routers have the potential to become new servers.

In other words fog computing is defined as a scenario where a huge number of heterogeneous (wireless and sometimes autonomous) ubiquitous and decentralised

devices communicate and potentially cooperate among them and with the network to perform storage and processing tasks without the intervention of third parties. These tasks can be for supporting basic network functions or new services and applications that run in a sandboxed environment.

The different fields where fog computing finds its application include :

## 1. Augmented Reality (AR) and Real-time video analytic

Augment reality applications are popular on smart phone, tablet and smart glasses by allowing the real world to view on the device display system. Recent popular products or projects include Google Glass, Sony Smart Eyeglass and Microsoft HoloLens. AR applications usually need high computation power to process video streaming and high bandwidth for data transmission. For example, a normal AR application needs to process real time video frame using computer vision algorithm and at the same time process other inputs such as voice, sensor and finally output timely informational content on displays. However, human are very sensitive to delays in a series of consecutive interactions. A processing delay of more than tens of milliseconds will ruin the user experience and leads to negative user feedback. AR system supported by fog computing can maximize throughput and reduce latency in both processing and transmission.

## 2. Content Delivery and Caching

Traditional web content delivery technologies cannot adapt to the requests from the users after the web performance is optimized at server side. However, some knowledge known only at the client side or near the client's network such as local network conditions or traffic statistics, which can be

leveraged to optimize the web performance. The fog server can provide dynamic customizable optimization based on client devices and local network conditions. Moreover, since fog server is in client's vicinity, it can gather client side knowledge and user experience, to optimize the rendering of web page. Similarly, caching technique implemented within the fog nodes to further save the bandwidth and reduce latency for content delivery.

### 3. Mobile Big Data Analytics

Fog computing can provide elastic resources to large-scale data process system without suffering from the drawback of cloud, high latency. In



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cloud computing paradigm, event or data will be transmitted to the data centre inside core network and result will be sent back to end user after a series of processing. However, a combination of cloud and fog can be used to improve the overall efficiency of processing the big data. For example, in a large scale environment monitoring system, local and regional data can be aggregated and mined at fog nodes providing timely feedback especially for emergency case such as toxic pollution alert. While detailed and thorough analysis as computational-intensive tasks can be scheduled in the cloud side.

# HADOOP AND R PROGRAMMING

Apache Hadoop is a framework of open-source software for large-scale and storage processing on sets of data involving commodity hardware clusters. R is an open source software platform for statistical data analysis. The R project began in 1993 as a project by two statisticians in New Zealand, Ross Ihaka and Robert Gentleman, to create a new platform for research in statistical computing. Since then the project leadership has grown to include more than 20 leading statisticians and computer scientists from around the world. It has strong graphical capabilities, and is highly extensible with object-oriented features.

Largely because of its open source nature, R was rapidly adopted by statistics departments in universities around the world, attracted by its extensible nature as a platform for academic research. Being free in cost certainly played a role as well. And it wasn't long before researchers in statistics, data science, and machine learning started to publish papers in academic journals along with R code implementing their new methods. R makes this process very easy: anyone can publish an R package to CRAN (the "Comprehensive R Archive Network") and make it available to everyone. Thousands of R users have contributed more than 6,100 packages to CRAN, extending R's capabilities in fields as diverse as econometrics, clinical trials analysis, social sciences, and web-based data. And one can easily search for R applications by topic or keyword at MRAN.

If you are into predictive modelling or statistics, R offers a ton of benefits. In terms of the amount of package availabilities for applied statistics, R is basically unrivaled. R

can also handle some tasks you used to need to do using other code languages. This is especially true for those who regularly use a different language to code and are using R for the first time. At its heart, R comes with a command line interpreter and is an interpreted language available for Mac, Windows and Linux machines. Over the last 20 years, statisticians all over the world have contributed their innovations to open source R. These contributions mean that developers have access to a large library of cutting-edge scientific algorithms that make it possible to rapidly build intelligent analytics applications.

Hadoop and R are a natural match and are quite complementary in terms of visualization and analytics of big data. There are four different ways of using Hadoop and R together:

1. **Hadoop Streaming:** Developed by David Rosenberg, Hadoop streaming are utilities available as R scripts that make it easy to use for R users.
2. **ORCH:** Can be used on the non-Oracle Hadoop clusters or on the Oracle Big Data Appliance. As a matter of fact, ORCH is a Hadoop Oracle R connector.
3. **RHIPE:** Techniques designed for analyzing large sets of data, RHIPE stands for R and Hadoop Integrated Programming Environment.
4. **RHadoop:** Provided by Revolution Analytics, RHadoop is a great solution for open source hadoop and R. RHadoop is bundles with 4 primary packages of R to analyze and manage Hadoop framework data.

Sensing a growing interest in big data-style analysis, software provider Revolution Analytics has updated its flagship package of R statistical functions so it can be run with the Hadoop data processing platform.

Revolution R Enterprise 7 (RRE 7), features the ability to run R within Teradata databases as well. The R language provides a way to run common statistical tests—such as linear and nonlinear modelling, time-series analysis, classification, and clustering—on a set of data, often portraying the results in graphical form. R is becoming increasingly popular for sophisticated data analysis that goes beyond what can be offered by more standard business intelligence (BI) packages. Revolution Analytics has estimated that over 2 million people use R worldwide. RRE7 includes a library of R algorithms that can be run in parallel across multiple nodes, which is how Hadoop manages large data sets. RRE 7 can be added to the Cloudera CDH3 and CDH4 Hadoop distributions as well as Hortonworks Data Platform 1.3. The new R library includes the most commonly used statistical and predictive analytics algorithms for tasks such as data processing, data sampling, descriptive statistics, statistical tests, data visualization, simulation, machine learning and predictive models. By analyzing the data within the node in which it resides, rather than moving it somewhere else to be analyzed, R-based data analysis can be done more quickly, according to Revolution Analytics. It also allows an entire set of data to be analyzed, rather than a subset



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or summary of the data, which is the approach typically taken with enterprise data warehouses (EDWs). Revolution Analytics hopes the incorporation of R within Hadoop and the Teradata databases will also broaden the use of the language to line-of-business managers. The company has designed a new workflow interface that does not require knowledge of how to implement specific R algorithms. This eliminates the hassle of coding R with Java, or some other language, in order to have it run on the Hadoop platform. With R's widespread use in the academic sector, it wasn't long before it started being used in the commercial sector as well. A front-page article in The New York Times technology section in January 2009 spurred a lot of new interest, and Revolution Analytics has been very active, offering technical support, services, and big-data capabilities. Today, R is ranked as the 9th most popular language by IEEE Spectrum, and it is consistently ranked the most popular language for data science and thousands of companies are using R for data science applications. R's open source nature also gives companies a boost when it comes to innovation. This is incredibly important in today's data-centric world, where even a tiny edge in being able to predict customer needs or financial returns better than your competitors can mean the difference between success and failure. Because most cutting-edge research in statistics and machine learning is done in R, the latest techniques are usually available first as a package for R, years and sometimes decades before they appear in proprietary systems.

# CRYPTOCURRENCY



A cryptocurrency is a medium of exchange like *normal* currencies such as USD, but designed for the purpose of exchanging digital information through a process made possible by certain principles of cryptography. Cryptography is used to secure the transactions and to control the creation of new *coins*. The first cryptocurrency to be created was Bitcoin back in 2009. Today there are hundreds of other cryptocurrencies, often referred to as Altcoins. Put another way, cryptocurrency is electricity converted into lines of code with monetary value. In the simplest of forms, cryptocurrency is digital currency. Unlike centralized banking, like the Federal Reserve System, where governments control the value of a currency like USD through the process of printing fiat money, government has no control over

## **Cryptocurrency Hash**

Cryptocurrency mining power is rated on a scale of hashes per seconds. A rig with a computing power of 1kH/s is mining at a rate of 1,000 hashes a second, 1MH/s is a million

cryptocurrencies as they are fully decentralized.

Most cryptocurrencies are designed to decrease in production over time like Bitcoin, which creates a market cap on them. That's different from fiat currencies where financial institutions can always create more, hence inflation. Bitcoin will never have more than 21 million coins in circulation. The technical system on which all cryptocurrencies are based on was created by Satoshi Nakamoto. While hundreds of different cryptocurrency specifications exist, most are derived from one of two protocols; Proof-of-work or Proof-of-stake. All cryptocurrencies are maintained by a community of cryptocurrency miners who are members of the general public that have set up their computers or ASIC machines to participate in the validation and processing of transactions.

hashes per second and a GH/s is one billion hashes per second. Every time a miner successfully solves a block, a new hash is created. A hash algorithm turns this large

amount of data into a fixed-length hash. Like a code if you know the algorithm you can solve a hash and get the original data out, but to the ordinary eye it's just a bunch of numbers crammed together and remains practically impossible to get the original data out of.

### **Cryptocurrency Security**

The security of cryptocurrencies is two parts. The first part comes from the difficulty in finding hash set intersections, a task done by miners. The second and more likely of the two cases is a "51%" attack". In this scenario, a

### **Cryptocurrency Services**

There are a host of services offering information and monitoring of cryptocurrencies. CoinMarketcap is an excellent way check on the market cap, price, available supply and volume of crypto currencies. Redditi is a great way to stay in touch with the community and follow trends and CryptoCoinCharts is full of information ranging from a list of crytocoins, exchanges, information on arbitrage opportunities and more. Our very own site offers a list of crypto currencies and their change in value in the last 24hrs, week or month.

Liteshack allows visitors to view the network hash rate of many different coins across six different hashing algorithms. They even provided a graph of the networks hash rate so you can detect trends or signs that the general public is either gaining or losing interest in a particular coin.

A hand website for miner is CoinWarz. This site can help miners determine which coin is most profitable to mine given their hash rate,

miner who has the mining power of more than 51% of the network, can take control of the global block chain ledger and generate an alternative block-chain. Even at this point the attacker is limited to what he can do. The attacker could reverse his own transactions or block other transactions. Cryptocurrencies are also less susceptible to seizure by law enforcement or having transaction holds placed on them from acquirers such as Paypal. All cryptocurrencies are pseudo-anonymous, and some coins have added features to create true anonymity.

power consumption, and the going rate of the coins when sold for bitcoins. You can even view each coins current and past difficulty.



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# HUMAN-COMPUTER CONTROLLED BY THE LIP

# INTERFACE

Everyone is familiar with how to interact with a computer with the help of the input/output devices, the way they work etc. But what if the person is paralyzed which restricts them from interacting with the computer in the usual ways. This were the assistive technologies plays an important role. Assistive technologies are nothing but the equipments or devices that individual with disabilities use. Eg: wheel chair, walkers etc.

There are many modern assistive technologies which helps the disabled people to interact with the computer. Some of them include:

- Non-invasive BCI: Head mounted hardware that works on EEG.
- Sip and puff: Works with an apparatus that measures the air pressure during inhalation and exhalation.
- Voice commands: Capture the voice and extracts information from the database.
- Eye tracking: Works based on image processing or electro-oculography.
- Chin controlled joystick: Has a socket kind of apparatus where chin can be placed and control the joystick.

## So why a Lip Controlled System (LCS)?

The above mentioned technologies have their own disadvantages which the LCS can do better on. The non-invasive BCI and the eye tracking have got strong performance variability which has to be developed more. The sip and puff has got hygienic issues since it is been controlled within the mouth. Voice commands are not adequate to be used for pointing. Chin controlled joystick is affected more by interferences like vibrations from the wheel chair also the apparatus is fixed in the wheel chair.

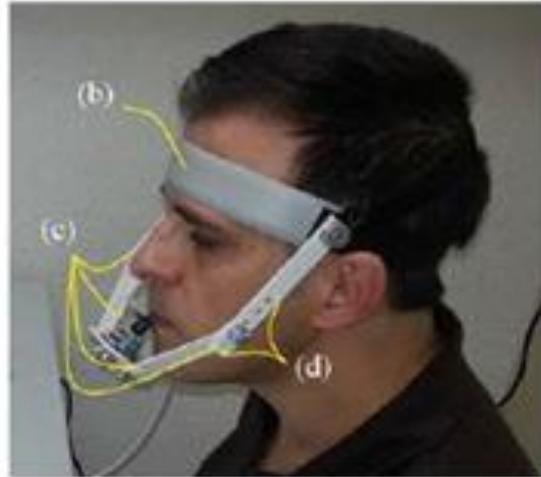
The Lip Controlled System is an innovative human-computer interface which consists of a headset and a joystick positioned just in front of the lower lip. This is specially designed for the people with tetraplegia. Tetraplegia is nothing but the paralyzed condition of the limbs and this restricts the people from using the computer in a usual way. The researches show that the lip throughput is comparable with the thumb throughput using the same input device under same conditions. That is why lip is chosen as an organ to control the input device. This device has an excellent potential which definitely can be enhanced in the future.

## Characteristics

- Controlled by the lower lip (dry area), an external part. So less hygienic issues
- Since joystick is used as the input devise it allows soft free movements in multi-directions.
- It is a personal system that can stay with the user in the wheelchair, chair, bed, etc.
- It avoids false commands deriving from wheelchair vibration or body spasms because it is head mounted.
- Can be configured as a Bluetooth mouse.

## PARTS IN LCS

- HEAD SUPPORT
- JOYSTICK SUPPORT
- CALIBRATION HOLES



The head support is to provide necessary strength during the operation. The joystick support is to hold the joystick properly in place. The calibration holes are to provide the correct length and angle so that the joystick can be operated properly.

#### **Advantages**

- Multidirectional control
- Spinal cord injuries does not restrict from using the system
- Less hygienic issues
- Stays with the user
- Light weight

#### **Disadvantages**

- People with orthodontic braces cannot use the system

#### **Future Enhancements**

- Controlling power wheel chair
- Mini trackball LCS



**ANITTA PAUL S7 IT**

# EmoSPARK

**EmoSPARK** is an artificial intelligence console created in London, United Kingdom by Patrick Levy-Rosenthal. The device uses facial recognition and language analysis to evaluate human emotion and convey responsive content according to the emotion. The console measures 90 mm x 90 mm x 90 mm and is cube shaped. It operates on an "Emotional Processing Unit", a

## PRODUCT OVERVIEW



EmoSPARK was created by French inventor Patrick Levy-Rosenthal, as an emotionally intelligent artificial life unit for the home that can interact with people. It is powered by Android and can communicate with users through typed input from a computer, tablet, smartphone or TV as well as through spoken commands

Through the smartphone interface, it is able to gauge a person's emotions and is reported to have a conversational library of over 2 million sentences. The face-tracking technology

## CONNECTIVITY

EmoSPARK is able to connect to Facebook and YouTube to present users with content designed to improve their mood or to Wikipedia for collaborative knowledge that can be shared when users ask questions of

microchip that enables the system to create emotional profile graphs of its surroundings. The emotional processing unit is a patent pending technology that is said to create synthesised emotional responses in machines. EmoSPARK was funded through an Indiegogo campaign which aimed to raise \$200,000.

identifies users likes and dislikes to categorize their emotional responses to stimuli such as videos and music. The device has an emotional spectrum that is composed of eight emotions which are surprise, sadness, joy, trust, fear, disgust, anger and anticipation.

EmoSPARK monitors a person's facial expressions and emotions through images from an external camera which are then processed through an emotion text analysis and content analysis.

it. Through Android OS, EmoSPARK is able to be customized with Google Play store apps.

The cube is capable of learning the user's emotions and responses to types of music or content then uses it in the future for similar

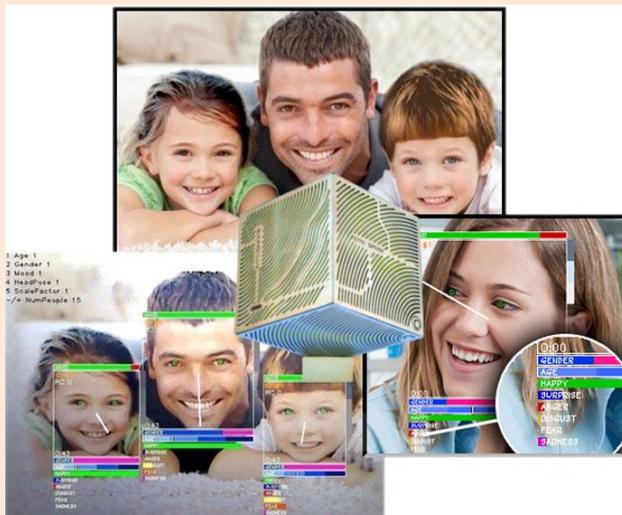
emotions. It is also able to emulate the emotions that it has observed and learned which are in the spectrum of primary

emotions. The cube is expected to develop its own personality based on the communications it has had with the people using it.

## EMOSHAPE

EmoShape is the parent company of EmoSPARK, which was also founded by Levy-Rosenthal. The company developed emotional technology with the EmoSpark cube

being their first artificial intelligence console. Patrick Levy-Rosenthal also received the IST Prize in 2005 from the European Council for Applied Science, Technology and Engineering



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# Google Cardboard

**Google Cardboard is a virtual reality (VR) platform developed by Google for use with a fold-out cardboard mount for a mobile phone. It is intended as a low-cost system to encourage interest and development in VR and VR applications. It was created by David Coz and Damien Henry, Google engineers at the Google Cultural Institute in Paris, in their 20% "Innovation Time Off", and was introduced at the Google I/O 2014 developers conference for Android devices.**

## **Assembly and operation**

Google Cardboard headsets are built out of simple, low-cost components. The headset specifications were designed by Google, but there is no official manufacturer or vendor for the device. Instead, Google made the list of parts, schematics, and assembly instructions freely available on their website, allowing people to assemble Cardboard themselves from readily available parts. These parts are a piece of cardboard cut into a precise shape, 45 mm focal length [lenses](#), [magnets](#) or capacitive tape, a hook and loop fastener (such as [Velcro](#)), a rubber band, and an optional [near field communication](#) (NFC) tag. Google provides extra recommendations for large scale manufacturing, and pre-assembled kits based on these plans are available for less than \$5 from multiple vendors, who have also created a number of Cardboard variations.

Once the kit is assembled, a smartphone is inserted in front of the lenses and held in place

by the rubber band. A Google Cardboard-compatible app splits the smartphone display image into two, one for each eye, while also applying [barrel distortion](#) to each image to counter pincushion distortion from the lenses. The lenses then create the impression of a [stereoscopic](#) 3D image with a wide field of view. The first version of Cardboard could fit phones with screens up to 5.7 inches (140 mm) and used magnets as a simple input button that required a compass sensor in the phone. An updated design released at [Google I/O 2015](#) works with phones up to 6 inches (150 mm) and replaces the magnet switch with a conductive lever button that triggers a touch event on the phone's screen for better compatibility across devices. A port of the Google Cardboard demonstration app to [Apple's iOS](#) mobile operating system was released at the same conference.



## Software

Google provides two [software development kits](#) for developing Cardboard applications, both using [OpenGL](#): one for Android using [Java](#), and one for the game engine [Unity](#) using [C#](#). After initially only supporting Android, Google announced iOS support for the Unity plugin in May 2015 at the Google I/O 2015 conference. Third-party apps with Cardboard support are available on the [Google Play](#) store and [App Store for iOS](#). In addition to native Cardboard apps, there are Google Chrome VR Experiments implemented using WebGL; phones, including Apple's, that su



port WebGL can run Google's web experiments.

## How does Google Cardboard work?

The cardboard box holds an Android smartphone in a position that's in front of your eyes, with some lenses between them. On the screen, two slightly different images are shown on the left and right sides. Each one of your eyes is looking at the image in front of it. Because the images can be made different, a 3D effect can be constructed.

But this is more than just a stationary movie screen. Because it is strapped to your face, you are free to move your head around and look all around you. Using the sensors in the phone to sense your position, the software creates a view that changes depending on where you're turning your head and looking. It feels like you're inside a 3D environment. It is difficult to show how well this interactivity works in a blog post with pictures or videos. It really has to be tried.

There are not many applications for it yet, but playing with the Google Earth demonstration is a lot of fun.

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# SAILFISH OS

## 5 reasons why Sailfish OS 2.0 should worry Apple, Google and Microsoft

### Open source with Linux smarts

At its core Sailfish uses Linux meaning it's stable, perfect for mobile and can be modified relatively easily. The fact it's open source is a huge draw. Remember when Android used to be open source? In spite of pretty basic

hardware back then people still chose it over Apple's slick iPhone interface. The same thing could happen again with Sailfish. Sailfish OS can be modified by anyone any time they like. That means apps could technically be made to change the way the entire phone works rather than just working within a framework. The potential for this is massively exciting.

### Hardware ready

The open source software means Jolla promises that adding hardware modules is also easy. So an E Ink case that uses the phone's software to display notifications can be made quite simply. Or if someone wants to replace a part that's possible too, making this a prime OS for a **modular phone**.



This combined with the start-up, crowd funded nature of Jolla means the hardware is affordable. The latest Tablet, for example, is only \$209 on Indiegogo which is about £134.

### Gesture controls and multitasking

Buttons are the past for Sailfish, using a swipe system in favour of clicks.

Much like LG's Knock, the screen can be double tapped to unlock the handset. Then swiping is all you need, a swipe up from the bezel will display notifications, wherever you are in the OS. A swipe left or right goes back to the homescreen, which is a layout of the currently open apps. A swipe down from the bezel shuts the current app, while a swipe from the top half of the screen slides you along a



top menu to take actions relating to the page.

## Button Free

Google is trying to bring in button free phones, but turning a big ship like Android is a slow process. Young, agile Jolla on the other hand has been able to create a button free OS and hardware to boot right from the get-go. As a result it truly works.

If you've got an [LG G3](#) for example and turn off the back, home and multitask buttons you'll notice this doesn't work in all apps and requires an extra swipe to access them – all so you get a bit more screen space. Jolla uses a swipe system so these kind of ideas work from the ground up. And since it's open source any tweaking can be done individually or at the source level quickly.



## **People powered**

The big phrase used by Jolla is "People powered" owing to the crowd-funding nature of the company. Since the small start-up is able to adapt and change quickly, unlike more established names, it can adapt to suit its users. The result is a community where everyone not only support each other but have a voice to create change where they feels its needed.

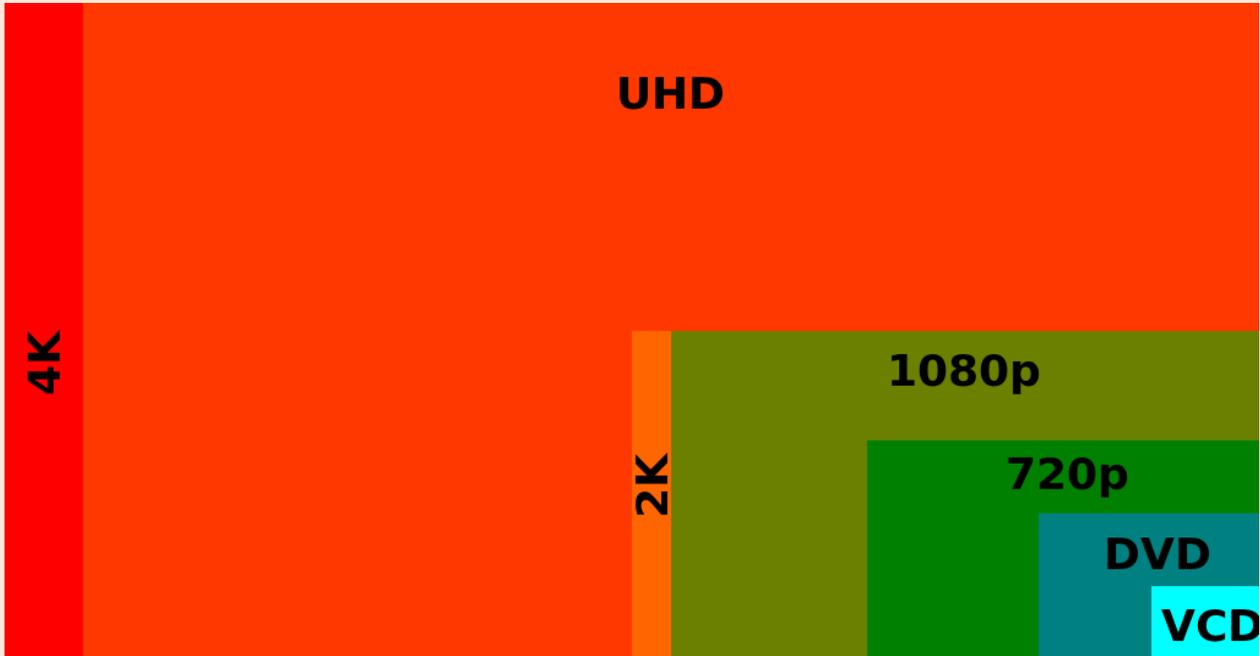
The Jolla Tablet, for example, uses the Jolla forum to find out what users want so the Sailfish OS can be adapted to deliver the best possible experience for everyone. A voting system pushes more demanded ideas to the top so they can be implemented first. And the team might be small but they work hard with over 13,000 bug fixes and 350 extra features between version one and two of the OS.

With all these features the Sailfish OS is a truly exciting, trend-setting software platform that'll we'll be watching very closely.



**Sachin Narendran S5-IT**

# HIGH DEFINITION MOBILE DISPLAYS



Smartphone displays have undergone a massive change in the past few years. Starting from a modest 640x480 pixels, smartphones now have resolutions of up to Quad HD (1440x2560 pixels). Recently, SHARP, the world's second largest display manufacturer, announced a 4K display for smartphones. In simple words, 4K displays have a horizontal resolution of the order of 4000 pixels. The screen that SHARP has manufactured is a 5.5inch IGZO (Indium Gallium Zinc Oxide) screen with a resolution of 3840x2160 pixels. This is twice the resolution of a Full HD display and it amounts to a whopping pixel density of 806 pixels per inch (ppi). This display won't be up for mass production until 2016, but Chinese phone manufacturer ZTE has already announced their flagship phone, ZTE Star 3, with a 4K display. As for the display itself, it's rumored to be a TFT panel with a special crystal structure, which could help reduce power consumption while being able to withstand a fair bit of punishment. TFT panels have been criticized for offering poor viewing angles when compared to IPS displays commonly found on today's smartphones, so we will see how the Star 3 will fair.

Samsung may also start mass-producing 5.9-inch Ultra-HD (4K) Super AMOLED display boasting of a pixel density of 700ppi in August this year. In November 2014, a report had indicated the South Korean giant was planning a 5.9-inch UHD (2160x3840 pixels) display for the Galaxy Note 4 successor.

In early 2014, Samsung's Semiconductor and Display Technology Roadmap workshop had hinted that it was working on a QHD (Quad-HD) Super AMOLED mobile display panel with a massive 560ppi pixel density and have an even better display under works, to be specific, a UHD (Ultra-HD) display, with a 2160x3480 pixel (4K) resolution, along with a crazy 860ppi pixel count that would be stuffed in a sub 5-inch display size.

So, how much would a phone with such a crazy display, cost the consumers? We don't have the official pricing of a smartphone with a 4K display, but we can safely assume that it is not for the common man. Below is a list of smartphones with their resolutions and their price.

Phone	Resolution	Pixel Density	Price
LG G4	1440x2560, 5.5inch	538 ppi	Rs.48,900
IPhone 6	1334x750, 4.7inch	326 ppi	Rs.45,999
Galaxy S6	1440x2560, 5.1inch	577 ppi	Rs.39,990
HTC One M9+	1440x2560, 5.2inch	565 ppi	Rs.36,990
Lumia 930	1080x1920, 5inch	441 ppi	Rs.32,999

It is obvious from the above table that 2K and full HD displays cost almost one third to half a lakh rupees. And 4K displays are going to cost even more. Hopefully, the Chinese manufacturers will make an affordable 4K smartphone in the near future. Xiaomi, we are waiting!



**ASWIN.R S3 IT**

# **THE FORCE TOUCH TRACKPAD.**

***Press a little deeper, do a lot more.***

The new Force Touch trackpad may look like other trackpads on the surface, but underneath it's unlike anything that's existed before. Force sensors detect how much pressure you're applying, and the new Taptic Engine provides a click sensation when you press anywhere on the surface. Now the click that once was a single, mechanical function is just the start of what you can do with Force Touch. The sensory capabilities of the Force Touch trackpad allow you to tell your system what you want it to do based on subtle differences in the amount of pressure you apply. This makes it possible to perform a variety of different actions in different apps, all on the same surface. And it can respond with haptic feedback you can actually feel, making your system more usable and personal than ever before.

Traditional trackpads use a 'diving board' mechanism, which requires room underneath for the downward motion of a click and makes it harder to click the part of the surface closest to the keyboard. With the Force Touch trackpad, force sensors detect your click anywhere on the surface and move the trackpad laterally towards you, although the feel is the same familiar downward motion you're accustomed to in a trackpad. The Taptic Engine also provides haptic feedback, so instead of just seeing what's happening on the screen, you can feel it too. The trackpad sends a tangible response to your fingertip when you perform certain tasks, like aligning annotations on a PDF. In addition to the intuitive Multi-Touch gestures you may be familiar with — like scrolling, swiping, pinching and rotating — Force Touch brings a new experience. The sensitivity is customisable, allowing you to adjust how much pressure is needed to register a click. And the trackpad can even tell whether

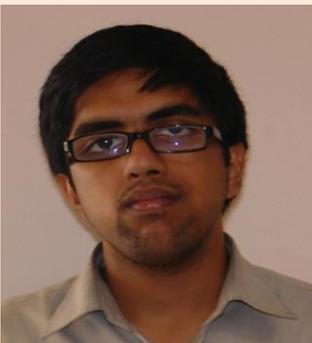
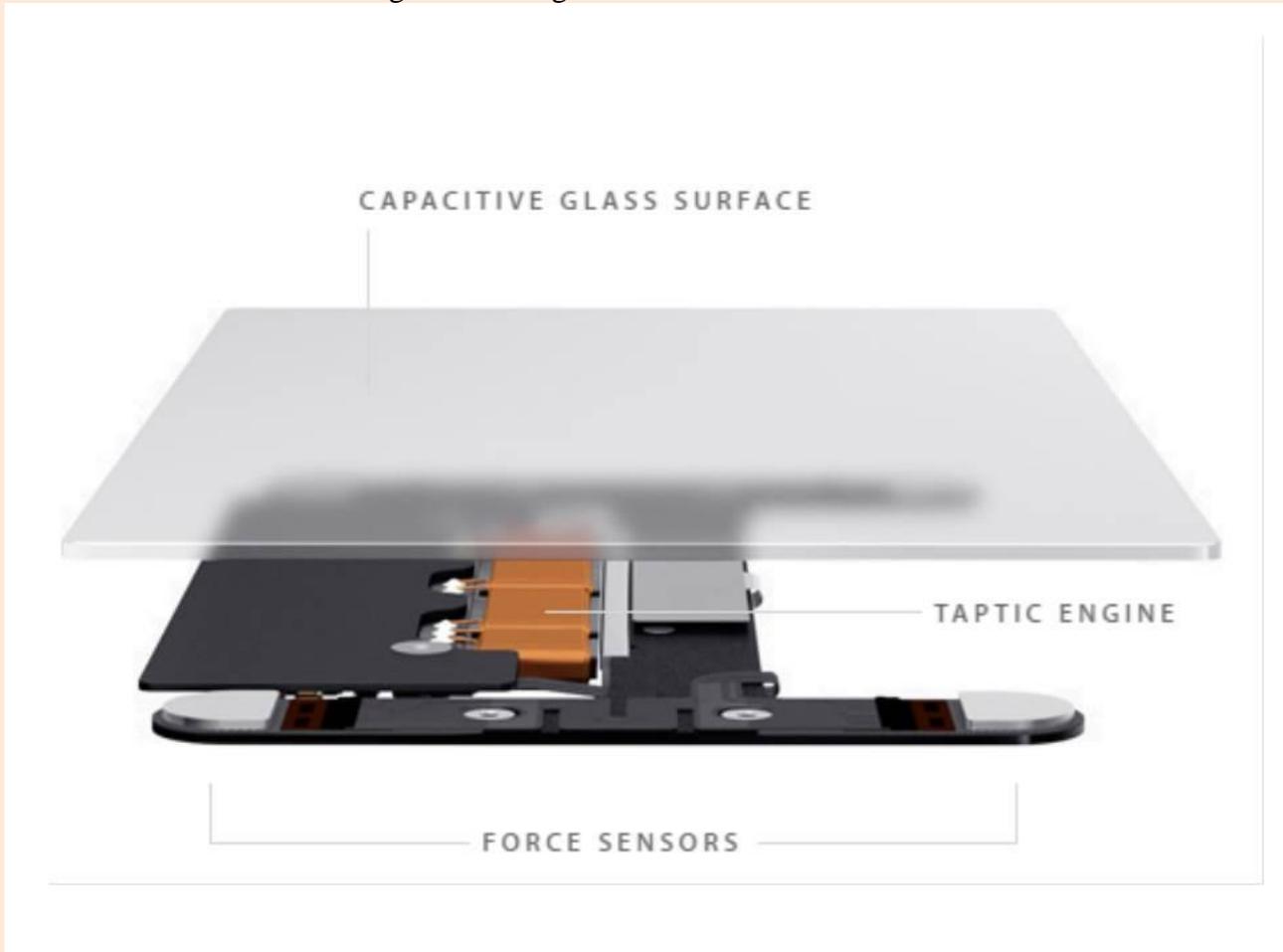
you're clicking with your thumb or another finger and automatically adjusts the sensitivity level.

## **Force Touch trackpad features**

- **QuickTime and iMovie:** You can vary the pressure you use on fast-forward and rewind buttons. This will accelerate the speed at which you fast forward or rewind.
- **Map zooming:** Press harder on a zoom button to accelerate as you zoom in and out of a map.
- **Photo arrowing:** When you arrow through Photos in an Album or a Moment, you can apply additional pressure to go faster.
- **Rotate photos:** In Photos, when you choose Crop and then rotate a photo, and you'll feel a notch when the rotation of the photo is at zero degrees.
- **GarageBand:** You'll feel feedback from your Force Touch trackpad when you do the following.
  - Move the Track Volume slider to the 0 dB position
  - Move the Track Pan knob to the center position
  - Reorder tracks to a new drop position
  - Move window borders to the point when windows appear/disappear
  - Move Track Header borders to the point when header elements appear/disappear
  - Move main application window to the point when Control Buttons appear/disappear

When you press the power key, your trackpad and keyboard become active after the startup tone. Your trackpad needs power to provide "haptic feedback" like clicking. When you turn your computer off, you turn off the trackpad too. One of the main advantages of having a

force touch trackpad is that it occupies less amount of space & also the pressure that we need to apply will be much lesser than that we require for a traditional track pad. So my dear friends let us make the technology much smoother& reliable.



**AARON OBED THOMAS S3-IT**