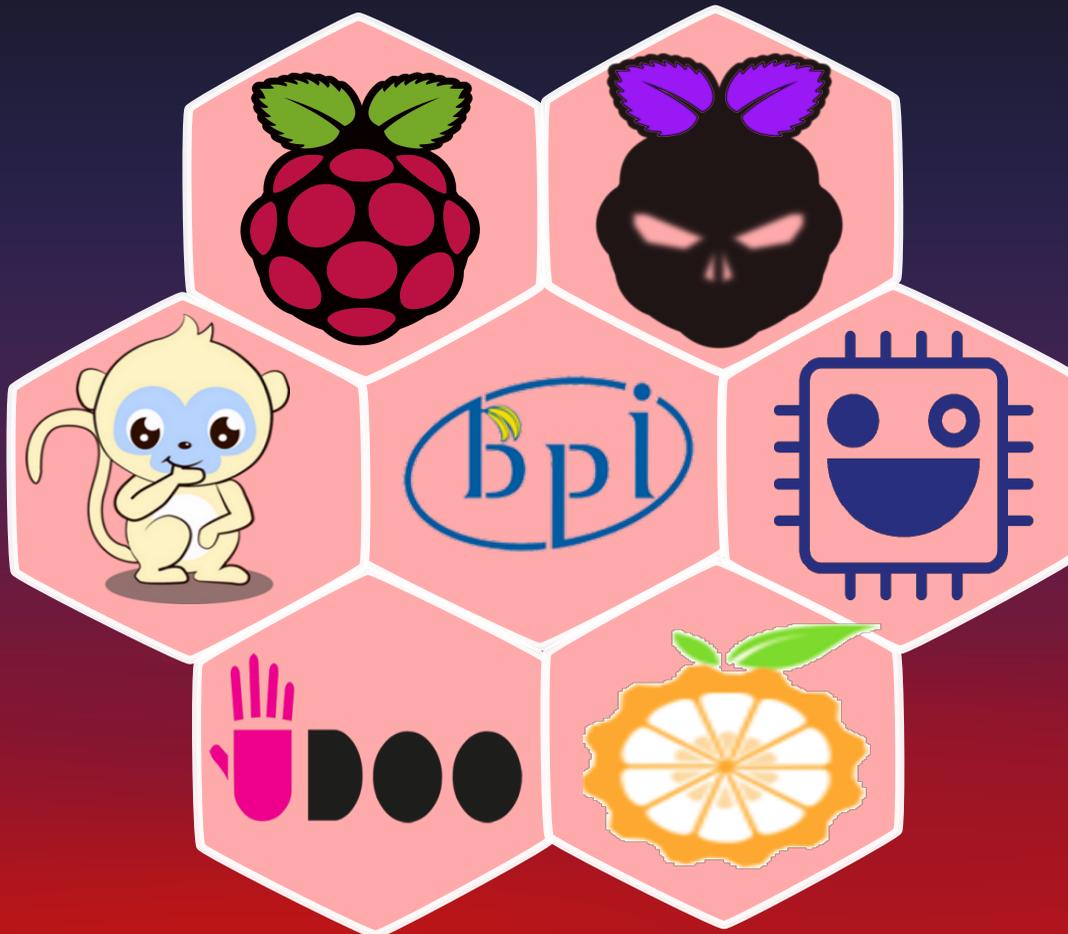


## *Single Board Computers*





## Message From Dean, FCAIT

**R. P. Soni**



In the last issue, we discussed few projects which used Arduino platform in embedded systems. Continuing the focus on mini hardware systems as building blocks for larger projects, the editorial committee is now presenting to you the contributions of students on "Single Board Computers".

Raspberry Pi first came out with single board computer in 2012. Since then several other companies have also placed single board computers using different microprocessors as CPU in the market, which are being used for a variety of applications in IoT, Communication, Robotics, Gaming, Kiosks, Embedded Controllers, PCs etc.

Single board computer is a handy tool for computer hobbyists who would like to connect devices of his choice and tune it for the specific application through programming.

You may follow this link for more information about recent single board computers that came to market during 2017.

[https://www.eetimes.com/document.asp?doc\\_id=1332763](https://www.eetimes.com/document.asp?doc_id=1332763)

Besides single board computers, you will also find in this issue more information on the activities pertaining to industrial visits, CSI seminars and workshops, ISR, CWDC etc., where you have participated.

Please do not forget to send your feedback on the contents of your favourite D-KOS magazine to the editorial team.



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**Prof. Poonam Dang  
Prof. Bharti Shah**

"Learning gives creativity, Creativity leads to thinking, Thinking provides knowledge, Knowledge makes you great" - Abdul Kalam

With this inspiration, we are glad to bring you the next vivid issue of D-Kosmos. For many years, single board computers (SBC) has meant different things to different people in technology world. The current issue brings to you a brief idea about single board computers through students' articles.

This issue also gives glance of events in various co-curricular activities, educational tours, industrial visits and other spontaneous reflection supplemented by a galaxy of colorful photographs taken in various events.

Though we have taken every effort to keep the magazine as per the expectations of our readers but at the same time we request them to give suggestions or feedbacks for us at [dkosmos@glsica.org](mailto:dkosmos@glsica.org).

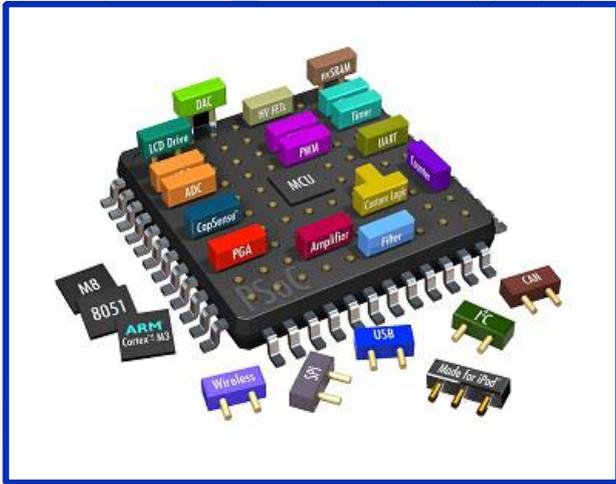
Happy Reading!!!!

**Editorial Desk**

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## Single Board Computers

With the advent of technology in the consumer electronics domain, single board computers have become quite popular among both consumers and developers. These days everyone has virtually become so much “wired” that they cannot live without these so called - gadgets. Right from the mobile phone in your pockets to high end gaming consoles, including tablets, PCs, iPod, etc., everything is basically a single board computer.



### What is it?

It means a computer in a single board. We are familiar with our computer systems and laptops. They contain separate components that are connected by wires to a central circuit board.

But in a single board computer as its name implies it contains necessary components like storage, microprocessor and memory on a single circuit board. SBC have slots for other peripherals like HDMI/AV port, Ethernet port, USB port, LCD monitor and many more.

Hence one board is enough to perform all operations which are done by PCs or laptops. Single board computers are embedded in various larger devices to provide control and interfacing.

Small size and portability are major features of SBC. Hence we can carry in our pocket. They consume less power compare to full fledged PC. One another major feature is cost effective. It has low cost compare to traditional computers. Hence they are suitable for development of new apps, hardware development, hacking, testing and many more.

All the electronic gadgets that you see around - smartphones, tablets, etc. have one such single board computer inside them - their motherboard. Most of them will run Android and iOS (an OS just like Windows, Linux, Mac OSx, etc.).

### Applications for Single Board Computers:

Single board computers are found embedded in larger various devices including:

- ATM machines
- Industrial computers
- Medical equipment
- Automation equipment

### Examples of Single board Computers:

There are various types of single board computers. They have various designs with different architectures, different expansion slots for interfacing, etc. Some single boards are popular and widely used by developers, learners, educational organizations to learn embedded systems and hobbyist like Raspberry Pi, Orange pi, ODROID-X, ASUS Tinker Board etc.

Editorial Team

## Raspberry Pi

Raspberry Pi was created by Eben Upton, Rob Mullins, Jack Labay and Alan Mycroft at University of Cambridge. Then after they established the 'Raspberry Pi Foundation' collaborating with Pete Lomas and David Braben. It was created to provide inexpensive programming machines to youth. The Raspberry Pi use Linux-kernel based operating systems.

### ARCHITECTURE:

There are two models created, namely Model A and Model B.

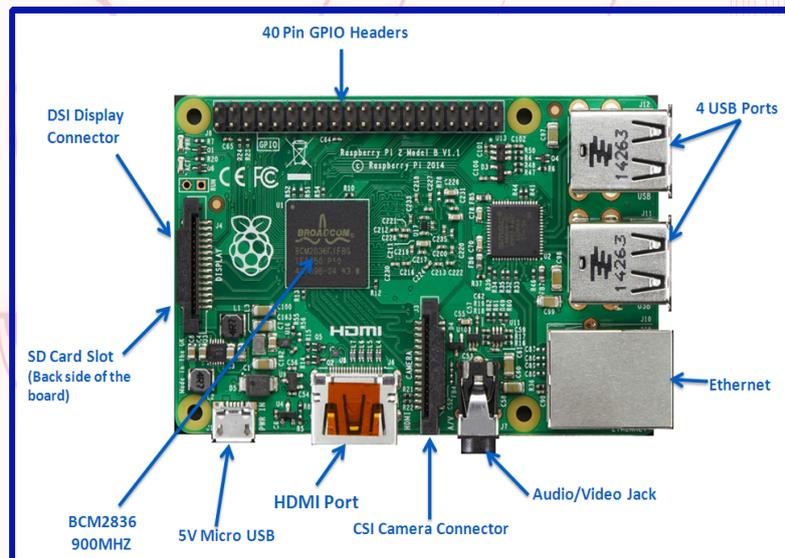
#### Model A architecture:-

The design of Model A is based around a Broadcom BCM2835 SoC, which includes an ARM1176JZF-S 700 MHz processor, VideoCore IV GPU and 256 Megabytes of RAM. It has one USB port and no Ethernet controller.

#### Model B architecture:-

The design of Model B is mostly similar to Model A with some changes like, 512 Megabytes of RAM, two USB ports and 10/100 Ethernet controllers.

Both models have HDMI, SD Card slot and Micro USB for power. Recently Model A and Model B have been replaced by Model A+ and B+ respectively, with some added features.



### Raspberry Pi Operating System:

The Raspberry Pi software is Linux - Raspbian and it supports programming languages including Python, BBC Basic, C and Perl.

The architecture for the Model A+, Model B1+ and Pi Zero is based around version 6 of the ARM architecture, which may not be supported by some more recent distributions, and that will limit available options.

There's no such problem for the Pi 2 - its Broadcom BCM2836 processor is based on version 7 of ARM, allowing it to run the full range of ARM/GNU Linux distributions as well as Windows 10 IoT Core, a special version of Windows for low-powered devices.

### Some projects on Raspberry Pi are:

A Weather Station, A Photo Booth, A Home Surveillance System, A DIY Arcade Stick, A Completely Portable Digital eBook Library, A Go-Anywhere Wearable Camera, A Whole-Network Ad Blocker, A Call-Home VPN Streaming Internet Radio, A DIY Amazon Echo, A retro gaming console.

Prem Raval - TYBCA

## Banana Pi

Banana Pi is an open source, credit-card sized SBC (Single Board Computers) based on concept of low-cost development of inner softwares and hardwares. It's hardware design is influenced by Raspberry Pi and provides twice as much memory and a faster processor.

The Banana Pi platform is an open source Single-Board Computer (SBC) based on the Allwinner System-on-a-Chip (SoC) architecture, which is capable of running Android, Lubuntu, Debian, Bananian or even Raspbian. The GPIO expansion interface is pin compatible with the Raspberry Pi.

It is produced by chinese company Shenzhen SINOVOIP Co. Ltd and can run on Linux and Android, making it perfect for DIY (Do It Yourself) projects. It is useful in making things which run through Internet Of Things.

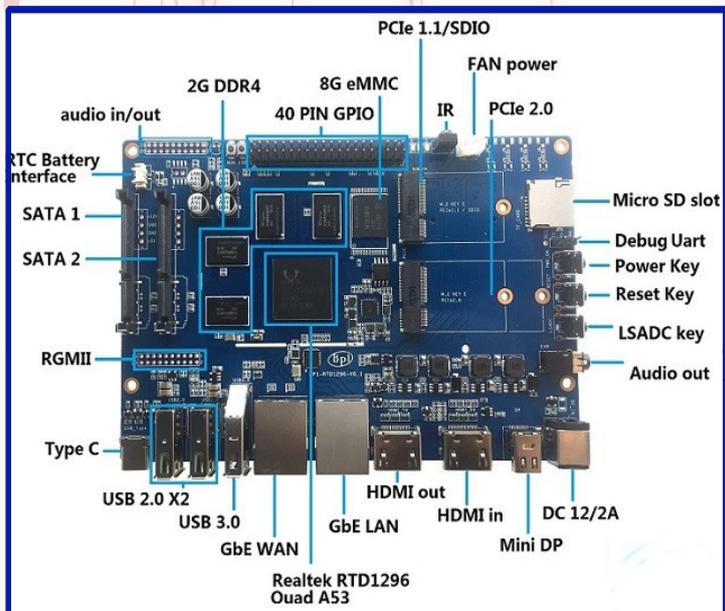
### Features of Banana Pi :

It contain more pins compared to Rasberry Pi for more compatibility with devices. It intended to work better than rasberry pi in the performance, with more RAM and fast processor. Banana Pi offers two cores clocked at 1GHz. Also the performance highly depends on the software used with Banana Pi.

The Banana Pi is attached with a SATA port that allows a faster, more permanent option for connecting mass storage devices like hard drives while raspberries differs in this by MicroSD and USB for storage.

The Banana Pi also comes with 1GB of RAM and built-in Ethernet that can handle up to 1Gbps (Gigabit per second). That's ten-times as fast as the Raspberry Pi. This brand-new SBC also includes a SATA port and a micro-USB port. It's also, at 92 x 60mm, a trifle larger than the 85 x 56mm Raspberry Pi.

Banana Pi have ethernet ports for wired connectivity and it also supports Wi-Fi with 802 in pro versions of Banana Pi.



### Use Of Banana Pi:

- Banana Pi based webcam
- Game Emulators
- Softwares can be programmed on Banana Pi
- Cluster of Servers on Banana Pi runs faster than normal servers
- LEDs based on Banana Pi
- Remote Controlled Banana Pi music alarm Clock

Mohit Tanwani & Vishal Tanwani- TYBCA

## PERALLELLA

The Parallella computer is an open source, energy efficient, high performance, credit card sized computer based on the Epiphany multi-core chips from Adapteva. This affordable platform is designed for developing and implementing high performance, parallel processing applications developed to take advantage of the on-board Epiphany chip. The Parallella can be used as a standalone computer, an embedded device or as a component in a scaled out parallel server cluster.

### Highlights:

- Credit - card sized computer
- low cost, low power multicore platform
- HDMI, Ethernet, USB and 48 GPIO pins
- Dual core ARM and 16-core RISC processors on board
- ANSI C/C++ and OpenCL programmable

### Benifits:

- Accessible solution with Open Source hardware and software
- Simple and low-cost integration due to implementation flexibility and resource availability
- Powerful platform with Dual-Core ARM Processor
- Programmable FPGA
- Epiphany 16-core parallel processor



### Features:

- 18-core credit card sized computer
- #1 in energy efficiency @ 5W
- 16-core Epiphany RISC SOC
- Zynq SOC (FPGA + ARM A9)
- Gigabit Ethernet
- 1GB SDRAM
- Micro-SD storage
- Up to 48 GPIO pins
- HDMI, USB (optional)
- Open source design files, Runs Linux

### Target Application consumer:

- Smartphones and tablet app acceleration
- High-end audio
- Computational photography
- Speech Recognition Face detection/recognition

### Computing Infrastructure:

- Super Computers Big Data Analytics Software Defined Networking
- Data-center Appliances High-Frequency Trading Communication
- Communication test-bed Software defined radio Adaptive
- Pre-distortion Medical: Ultrasound CT Mil/Aero: Radar Communication
- Jamming Military Radios Munitions/Guidance Industrial/

### Instrumentation:

- Machine Vision Autonomous Robots/Navigation Automotive Safety
- High-Speed Data Acquisition/Generation

### Other:

- Compression
- Security Cameras
- Video Transcoding

Chetan Mahajan - TYBCA

# Beyond Academics

## Industrial Visit

An industrial tour was organized on 19<sup>th</sup> July, 2017 to **108 Emergency Services**, Ahmedabad. Around 100 students of iMSc(IT) and BCA, participated in tour. The aim of the tour was to make students aware of the actual functioning of the 108 services for serving the emergencies.



FY-BCA, students visited **Divya Bhaskar**, a leading gujarati newspaper on 19<sup>th</sup> July, 2017. The visit developed clear idea about the working and maintenance of the plant and technology. It also highlighted the working of various departments under which this industry has made a remarkable status in the market.



An industrial tour was organized on 17<sup>th</sup> November, 2017 in which 101 students of iMSc(IT), went to the butter manufacturing plant of **AMUL** at Anand. The tour was organised to enable students understand the manufacturing, packaging and distribution process of Amul products.



An industrial tour at **BISAG - Bhaskaracharya Institute For Space Applications and Geo-Informatics** was organised for the students of iMSc(IT) and PGDCA. The visit educated students the basic concept of Remote Sensing Technique. The students also learnt different ways in which the remote sensed data is represented graphically, how the data is stored and accessed in database. Further students also saw live recording and technicalities of how educational lectures series are recorded at the BISAG studio. The visit helped students to explore various facets of remote sensing, storage and data analytics of the graphical data.



## Educational Tour

BCA students went on an educational trip to **Patan and Modhera Sun Temple** on 25<sup>th</sup> November, 2017 as a part of interdisciplinary subjects. The purpose of the visit was to educate the students to the rich and varied heritage and culture of Gujarat.



Gujarat government launched "**Smart Gujarat for New India Hackathon**" on 26<sup>th</sup> September, 2017 at Mahatma Mandir, Gandhinagar. Hackathon has list of 206 problems, which will be solved by the youth through their own intellectual skills. BCA students registered in the first phase of this event to work on some of the problem areas.



## CSI Activities

A seminar on **“Open Source UML Diagram Software”** was organised on 12<sup>th</sup> August, 2017. The resource person for the event was Prof. Rinkal Shah, FCAIT.

The aim of this seminar was to provide the basic idea about how to draw UML Diagrams using Open Source Software “Dia”.



A seminar on **“Machine Learning”** was organised on 19<sup>th</sup> August, 2017. The resource person for the event was Prof. Tripti Dodiya, FCAIT.

The aim of this seminar was to provide the basic idea about Machine Learning and Artificial Intelligence.



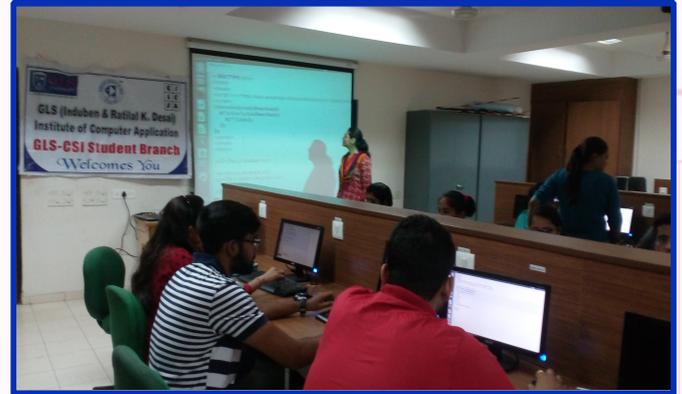
A seminar on **“Apache Cassandra”** was organised on 24<sup>th</sup> August, 2017. The resource person for the event was Prof. Nirav Suthar, FCAIT.

The aim of this seminar was to provide the basic idea about Apache Cassandra - an open source, distributed, massively scalable NoSQL database.



A workshop on **“Jquery”** was organised on 28<sup>th</sup> October, 2017. The Resource person for the event was Prof. Jainin Vakil, FCAIT and Prof. Nirja Shah, FCAIT.

The aim of this workshop was to provide the basic idea about Jquery which is designed to make it easier to navigate a document, select DOM (Document Object Model) elements, create animations, handle events, and develop Ajax applications.



A seminar on **“Software Testing”** was organized on 2<sup>nd</sup> November, 2017. The Resource person for the event was Prof. Garima Mishra, FCAIT.

The aim of this seminar was to provide the basic idea about Software Manual Testing, SDLC Life Cycle and Manual Software Testing Methods.



A seminar on **“Wordpress”** on 27<sup>th</sup> November, 2017. The Resource person for the event was Mr. Chetan Prajapati.

The aim of this workshop was to provide the basic idea about wordpress and also provide them practical as well as theoretical knowledge of wordpress. Topics covered in the workshop were creating menus, pages, articles in it, customization in wordpress, how to build a website.



## NSS & ISR Activities

### Blood donation Camp

It is truly said that "Blood Donation will cost you nothing but it will save a life!". Keeping this agenda in mind GLS University organized a blood donation camp on 29<sup>th</sup> August, 2017 in which 35 students donated blood from FCAIT.

The camp was successfully arranged by Indian Red Cross Blood Center.



### Tree Plantation

"Save trees, decorate the nature with green." "Tree Plantation" was organized by FCAIT on 10<sup>th</sup> August, 2017 for keeping society green and to spread awareness about importance of trees.



### Swacchta Drive

With a motto "One step towards Cleanliness", Swacchta drive was organized by FCAIT on 29<sup>th</sup> August, 2017 with the purpose to create awareness among the students regarding cleanliness and its benefits.



## CWDC Activities

### Gender Identification

Women Development Cell of GLS University in collaboration with Sauhard NGO group has organized a workshop on Gender Sensitivity at FCAIT on 26<sup>th</sup> August, 2017 by Ms. Rajvi and Ms. Bhavi, volunteers from Sauhard NGO. The workshop incorporates topics like - understanding of gender roles, privileges and bias towards genders and empathy for the opposite gender.



### Self Defence

FCAIT organized a seminar on women self defence on 9<sup>th</sup> August, 2017 by Shri Navneetbhai Patel, police personnel from Ahmedabad Police Surakhsha Setu Cell. The seminar was organized to create awareness about different women protection laws and to show the girls various tactics for self-defense against attack from unknown person.



### Paint Your Life

FCAIT organized a seminar on "Paint Your Life" which was under taken by the Colligeiate women development cell (CWDC). This seminar was held on 23<sup>th</sup> November, 2017 by Dr. Darshna Thakkar, gynecologist and motivational speaker from Sarjan Health care. The aim of this seminar was to remain happy in life and overcome stress in certain situations of our life with the mood swings. She explained that we can exchange the colors and select proper brush for creating beautiful painting of our life.



## External Technical Activity

### Rotary Club of Ahmedabad Quiz Competition

Rotary Club organised a quiz competition "Late Rotarian T. S. Nanavati" on 12<sup>th</sup> September, 2017. Vraj Mehalana and Ladla Sagar from iMsc(IT) sem-II has achieved second runner up position. They won a trophy and Rs.1500 each.

## GLSICA FLIERS!!!

### Semester-VI



From Left to right: Manisha Udhani (1<sup>st</sup> Rank), Shukla Sumit (8<sup>th</sup> Rank), Taniya Ajmeri (10<sup>th</sup> Rank)

## University Topper

I don't know if it is possible to convey in words the sense of gratitude I feel. Because all faculty members inspired me to achieve at a level higher than I thought possible. Their guidance and encouragement during my three years journey was invaluable.

I most surely would have been lost at sea. I have discovered a passion for learning and exploring, for asking questions that weren't even on my radar three years ago. For that I am forever thankful to my lovely faculty members.

I also want to say thanks to my dearest friends for tolerating my idiosyncrasies and crazy habits. They helped me a lot to solve doubts and problems through this journey.

College not only prepared me for my career, but it also prepared me for life outside of my career. I gained skills that cannot be taught. College has given me a chance to sharpen my skills in my field of choice.

I also want to say my juniors that college is on the horizon and you feel the weight of every decision. It all feels so overwhelming. I understand. Truly, I do. But don't spend every dinner talking about college prep.

Set aside a day and time for college talk. Take your carrier seriously and helps ownself to identify strategies and also try to understand your own stamina to be very active.

**Manisha Udani**

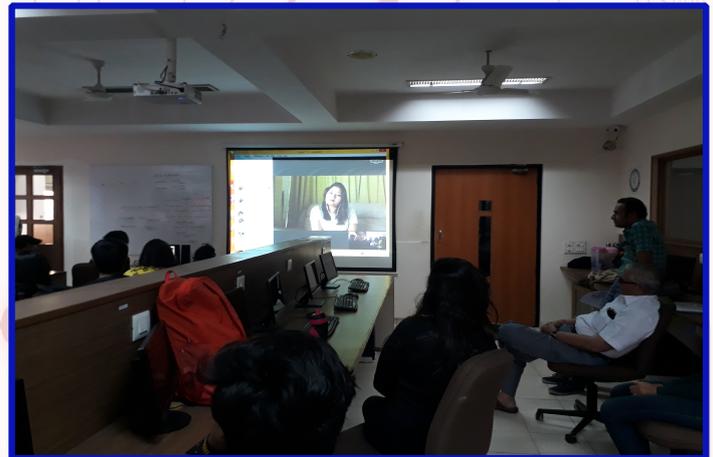
## Online Interaction with Alumni

Many of our students have gone to countries like Australia, Malaysia, Canada, United States and settled there. Every year we arrange online interaction with these alumni students using skype technology.

This time we connected with two of our Alumnis :

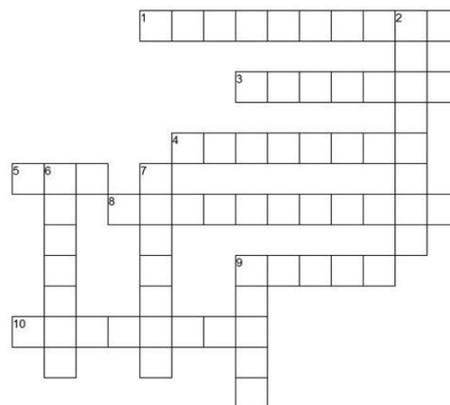
- > Ms. Ekta Vashishtha, Asst. Vice President at Astro Malaysia Holding Bhd, Kuala Lumpur, Malaysia.
- > Ms. Jheel Parikh ,Web Developer at Peeks Social Ltd., Toronto, Canada.

The interaction through skype have been found to be very interesting and fruitful by the current third year students since they gather information about the work culture, prospects and the current IT scenario in that country. Skype lectures gives the guidance to the students who wants to study and job in abroad after graduation.



## Cross Word

### Crossword Puzzle - Computer



#### ACROSS

- 1 It is a magnetic storage disk.
- 3 It is used to copy and save the files on the computer.
- 4 It is an input device often used to control video games
- 5 It is the brain of the computer.
- 8 It is the main circuit board of a computer.
- 9 It is a small device used to point and select items on computer screen.
- 10 It is used to input text in your computer.

#### DOWN

- 2 They are used to play sound.
- 6 It transfers data from a computer to a paper.
- 7 It displays information in various forms using text and graphics.
- 9 To connect the computer to internet, we need a \_\_\_\_\_