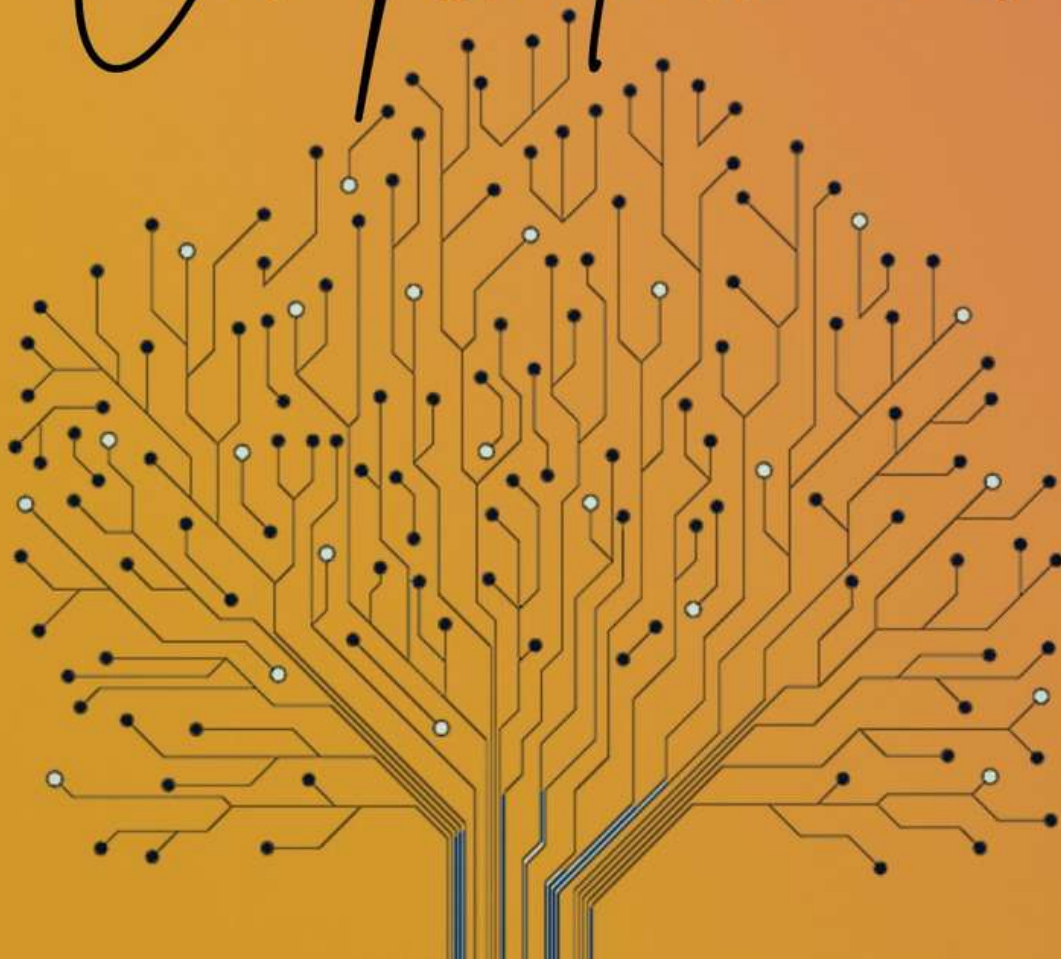


# *Compendium 5.1*





## Department of Electronics and Telecommunication Engineering

### **VISION AND MISSION OF THE DEPARTMENT**

#### **Department Vision:**

- To emerge as a leading source for Electronics and Telecommunication engineering, fostering globally proficient engineers to meet the demands of evolving industry and society.

#### **Department Mission:**

- Foster collaboration with industry to facilitate the acquisition of cutting-edge technologies and contribute to the generation of up-to-date knowledge, enhancing employability and sustainability.
- Encourage innovation, research, and development, creating an environment conducive to higher education, entrepreneurship, and lifelong learning.
- Cultivate leadership qualities infused with social and ethical values, providing a platform for their development.

# *The Apple Affect*

**Divili Sathvik**  
**IT(2018-22)**

We do very well know about the technology, branding, cost & apple ecosystem advantage that made AirPods outstanding out of all Apple wearables. Besides all these, they made a huge impact on being truly wireless and getting rid of the headphone jack.

Though Apple AirPods were not the first wireless earbuds that were ever made, it was the combination of the convenience that they brought in with the little magnetic case along with the instant pairing with iPhone that gave true meaning to the wireless AirPods. As a result of this, it became the most loved and purchased wireless earbuds in the world after its release in 2016.

Apart from the fact that it brought a great reach and caught attention among the public, there is an interesting impact that it made among its other competitors as well i.e., getting rid of the headphone jack. In 2016 Apple had announced the launch of the iPhone 7 that has no headphone jack which was a courageous step towards their vision of complete wireless technology and in the same event, they announced the first-ever AirPods as a solution to the problem which they had created just 30 minutes earlier from which they are now making tons of money. The brilliant business trick, right?

If we carefully observe, a similar approach is being followed by its competitors since then. For example, Google pixel also got rid of the headphone jack a year later, when it launched its next Pixel Smartphone and Pixel Buds came into existence. Even Oneplus was also found to be heading towards the same winds, as they also started adapting this idea 2 years later in 2018, for its Oneplus 6T and launched wireless bullets as a solution and now they sell Oneplus Buds too. The same goes on with Huawei, Razers, and Samsung Smartphones. Even MNC firms like Amazon and Microsoft have now started selling their echo buds and surface earbuds now and almost every company has its own wireless EarPods now which are surprisingly in a similar model to that of AirPods.

So, this idea of being truly wireless, the magnetic case for wireless EarPods in a compact size and getting rid of the headphone jack is well appreciated by the people and hence the other companies are adopting similar paths to gain that advantage which clearly shows us the impact it created in the global market..

With all the AirPods1, AirPods2, and the latest AirPods Pro, Apple is making heavy sales and it made 8 billion dollars as of 2019. Yes, you read it right 8 BILLION DOLLARS! and is expected to increase even more in 2020 & 2021.

The Fun fact is that, if we list the sale of these AirPods alone, it would make the company stand among Fortune 500 companies.

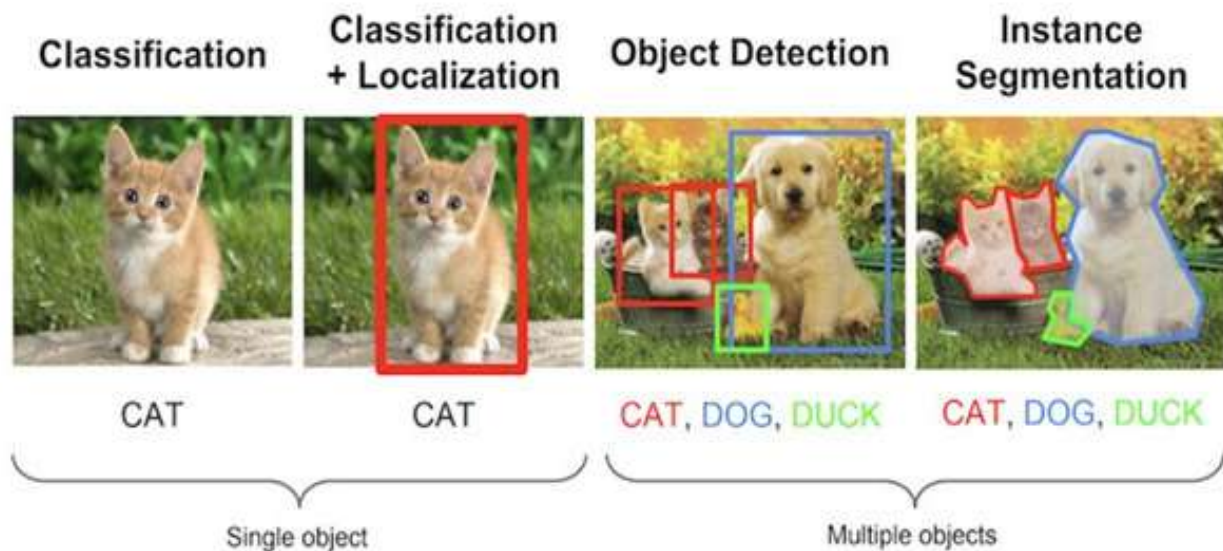
A similar thing happened when Apple got rid of in-box chargers in its latest iPhone 12 release by providing Wireless charging support, to reduce the e-waste & global carbon footprint. Many of its competitors including few companies like Samsung took advantage of this situation and mocked Apple. But later, Samsung itself removed the in-box charger in its latest release Galaxy S21. Xiaomi also followed the same in its latest Mi 11 Smartphone which also supports wireless charging. Headphone jack or in-box charger, Apple has always been path-breaking, revolutionary, and pioneer towards the truly wireless future leaving a remarkable mark in the industry and on its competitors as well. So, it's good to call it "THE APPLE AFFECT"

# OBJECT DETECTION WITH DEEP LEARNING A BEGINNER'S APPROACH

**Tanay Tripathi**  
**E&TC (2018-22)**

## What is Object Detection?

A computer vision technique that includes classification and localization. In layman's terms, it is the process of detecting whether a given object is present in an image or not, and if the object is present in the image where is it exactly. A bounded box or simply a rectangle is drawn around the object to clearly specify its location. It is a complex task when there are multiple objects of different classes and different sizes.



**Fig: Few Prominent Image Processing Problems**

**Source: Image taken from Stanford's CS231n Course Slide (Lecture8).**

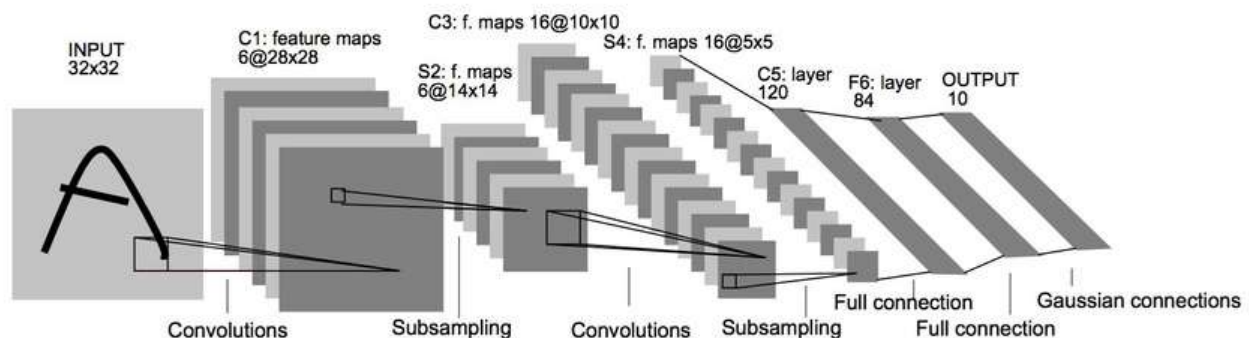
## Why Object Detection?

It is an extremely efficient way to analyze images and videos for a variety of different purposes. From autonomous cars to real-time face recognition the possibilities are endless. During the COVID-19 pandemic, object detection has played a major role in monitoring public places, face masks, and social distancing detection. National Football League (NFL) uses Amazon's Recognition for identifying the players as well as tracking the ball. Object Detection is also linked to

semantic segmentation i.e., instead of drawing a rectangle which is roughly where the object is present, each pixel containing the object is separated to mark it

### How is Object Detection done using Deep Learning?

The problem of object detection can be simply solved using two basic concepts of ML (Machine Learning) i.e., classification and regression. Classifying whether or what is the object present. Regression is used to predict the coordinates of the bounding boxes. Both these tasks have to be performed by the same model. For beginners, this may be a little tricky as most of us start with TensorFlow's Sequential API which allows single input and output. Although this can be easily performed using the Functional API of TensorFlow which allows a lot of customization for the model architecture. A very basic object detection model comprises a bunch of Convolutional and Pooling layers which take the input and are followed by a Flattening and Dense layer. The output of the model will have two heads for classification and regression. For training the model the dataset should contain images as well as the coordinates of the boxes (xmin, xmax, ymin, ymax).



*Fig: Architecture*

*Source: Jeremy Jordan - Common architectures in convolutional neural networks*

The above-described model architecture sounds good in theory and should be sufficient to build an object detection model, but it is not sufficient to do the job. As the size and location of the objects vary from image to image it becomes difficult. Also, there is a case of overlapping objects. This creates a need for different algorithms to optimize this process.

After Alex Net (Krizhevsky et al. 2012) won the ImageNet Competition this led to a revolution not only in computer vision but also put deep learning on the map strongly. Object detection was not unaffected by this and a lot of different architectures have been proposed and are improving in terms of accuracy and speed.

The Benchmark dataset for Object Detection is MS COCO (Common Objects in Context). It contains 330K images with 91 different classes. Another benchmark dataset is PASCAL VOC. The difference is annotations, a file containing the classes and coordinates of bounding boxes for COCO is json and PASCAL VOC is xml.

The metric used for the evaluation of an Object Detection model is mAP (mean Average Precision) calculated using two metrics, Precision and IOU. Precision is how accurate the predictions are calculated by the formula  $\frac{\text{True Positives}}{\text{True Positives} + \text{False Positives}}$ . IoU or Intersection over Union is used to calculate the overlap of predicted boxes and ground truth boxes. IoU is calculated by the formula  $\frac{\text{Area of Overlap}}{\text{Area of Union}}$ . According to the IoU threshold, True Positives and False Positives are calculated. The mean Average Precision or mAP score is calculated by taking the mean AP over all classes and/or overall IoU thresholds.

As mentioned earlier the object detection task is complex and requires a lot of data to be trained. It is always a good idea to use transfer learning. A pre-trained model should be used not only as a feature extractor but also to aid localization. Models like YOLO, SSD and RCNN, etc are examples of such pre-trained models. Here is the link to the Collab notebook by TensorFlow to try these models for object detection.

[https://colab.research.google.com/github/tensorflow/models/blob/master/research/object\\_detection/colab\\_tutorials/eager\\_few\\_shot\\_od\\_training\\_tf2\\_colab.ipynb](https://colab.research.google.com/github/tensorflow/models/blob/master/research/object_detection/colab_tutorials/eager_few_shot_od_training_tf2_colab.ipynb)

Different Model Architectures for Object Detection to check out:

### **1.R-CNN Family:**

Comprises of models like RCNN, Fast RCNN, and Faster RCNN, etc. These are based on the Region proposal network which gives the most probable locations of the objects. This reduces the computations and makes the predictions faster.

<https://arxiv.org/abs/1311.2524>

### **2.SSD (Single-shot Detector):**

A computationally efficient method, SSD predictions are very fast and since the size of the model is small it is widely used in mobile devices. But the drawback is that the model is not very accurate.

<https://arxiv.org/abs/1512.02325>

### **3.YOLO (You Only Look Once):**

YOLO outperforms the above-mentioned algorithms and is also quite fast in giving predictions up to 45 frames per second when considering the base model. Different versions of YOLO like yolov3, yolov4, and yolov5 are quite popular when it comes to object detection. But the drawback of YOLO is that it does not perform well when it comes to objects of small sizes in the images.

<https://arxiv.org/abs/1506.02640>

### **4.Retina Net:**

It is a two-stage detector that uses feature pyramid networks and ResNet for feature extraction and Focal Loss a combination of different losses to give better predictions. Here is a link to the original paper for further study.

<https://arxiv.org/abs/1708.02002>

### **5.Efficient Det:**

Recently, the Google Brain team released their own ConvNet model called EfficientNet. EfficientNet forms the backbone of the EfficientDet architecture. The model is currently state of the art but there is a constant flux as different fine-tuned versions of YOLOv4 and v5 are coming up.

<https://arxiv.org/abs/1911.09070>

### **Conclusion:**

I hope this article provided you some basic insight into object detection. It is a vast field that is currently used and will be used in future technologies. There is always room for improvement and new models will come up, bringing different algorithms. Trying the Collab notebook will be beneficial as it will not only allow you to test different models but also give you a better idea for pre-processing of the data.

# Expect the Exceptional

**Sharmishtha Tongia,  
Shreya Puthran,  
Sannidhya Kokje  
E&TC (2019-23)**



We have recently launched the website [www.solutionfounderssss.com](http://www.solutionfounderssss.com) which aims to help students prepare for competitive exams but with a healthy mindset. We all know the reality of competitive exams, the stress of achieving could be a lot for some students to handle. Lakhs of people give exams each year and the competition amongst the students could be very discouraging, our website gives students a chance to feel at peace with every information being at their fingertips.

*Fig: Snapshot of the website.* While most of our ideas have been covered some of these are still in

progress.

## **Aptitude Test**

There is a lot of pressure on students in India for choosing a traditional career even without their choice. They do not understand the usage of the skill sets they possess and whether it could be made into a successful career. As a solution, we offer an aptitude test that can show students their hidden gems of talent while showcasing them the most suitable professions. We also offer website suggestions according to the preferences of our users, which helps them save their precious time.

## **Anonymity**

This website aims to give students anonymity in their doubts and we want them to feel comfortable in the space we provide, with no judgments towards their mindset. Short techniques are the most important part of any competitive exam and we aim at giving our users the best tricks to help them save time and energy by coming to a quick solution.

## **The right guidance with the right books**

Finding the right affordable books for your preparation is a tough situation, we realize this need of students and aim on providing them the best pdfs available out there.

The fun part of our website is its horoscope area where users can engage in fun conversations with other horoscope enthusiasts!

In conclusion, we are trying to make an all-in-one website which aims on providing students a quick solution to all their student problems.

## **Inspiration**



*Fig: Snapshot of the website.*

*Source: The Exceptional Website*

After going through the competitive exams phase ourselves, we realized the importance of time management in these exams and wished to provide that platform to students. We also realized that a lot of students are afraid of going to the teachers with their doubts and wanted to give them a chance of figuring it out on their

## **Technology used in making websites**

We used hosting at an affordable price, which can give us a good domain range, high-speed servers, unlimited storage, SSL certificate, and wide bandwidth. We also researched SEO friendliness in terms of our domain name, customized the site using Html, CSS, and Java. We chose a widely used CMR so our users don't face any issues while navigating through the website, we also plan on adding our own notes and reference materials if the site becomes a success in the future.

# *Product development and PLM*

**Pranit Panse**  
**Mechanical (2017-21)**

Have you ever wondered that a simple mouse, pen drive, a light bulb goes through how many complex development processes? As the world is advancing at the speed of a supersonic fighter jet, so are our needs and desires to be in the family of the latest products. Let's talk about this development briefly, what is product development? how is it achieved? And what is the industry-leading technique that is helping achieve this goal?

The journey starts with identifying the need. Finding a problem, living with the problem, and understanding the problem. Examples of this can be found everywhere in your neighborhood. It can be as simple as deducing what the temples do with the flower waste? , why can dharmashalas not be a comfortable place of stay? Products are meant to solve problems. This generally starts with talking to potential customers, surveys, and the individuals who are affected by the identified problem. Quantifying the opportunity- It's very important to understand the viability of the product. Will the end-user pay 'x' amount for this concept? The solution has to be financially strong, ethically in line and it should always eliminate a problem and not cause a few more.

Building a roadmap of the product, developing MSPs and MVPs and identification of clear goals are steps that you need to take to create a portfolio of the product. An initial version of the product should be sent out to the market and a deep survey should be conducted to understand how the beta testing is functioning altering the MVPs of the product.

Many software help achieve the individual attain this development. This is broadly classified as **PRODUCT LIFECYCLE MANAGEMENT (PLM)**.

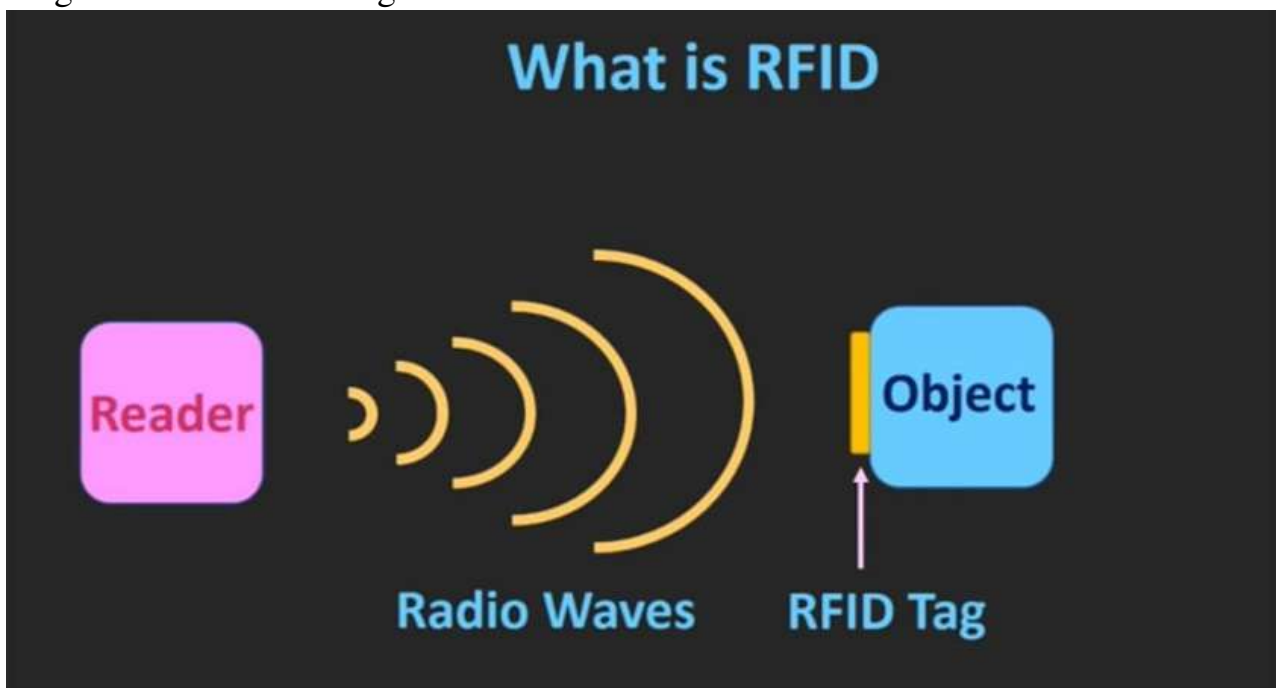
PLM systems help organizations cope with the increasing complexity and engineering challenges of developing new products. They can be considered one of the four cornerstones of a manufacturing corporation's information technology structure.

# *RFID Technology for Streets*

**Vinayak Sharma**  
**E&TC (2019-23)**

We are all aware of FASTag which is unleashing a revolutionary way to pay our tolls, reduce congestion and even save fuel !!

This technology uses Radio Frequency Identification (nicknamed RFID) it's basically sending and receiving electromagnetic pulse in-case of FASTag they are passive tags that send data to the receiver when triggered with radio wave, the second type of tags that use a power source to transmit data and hence have longer range are called active tags.



*Fig: What is RFID*

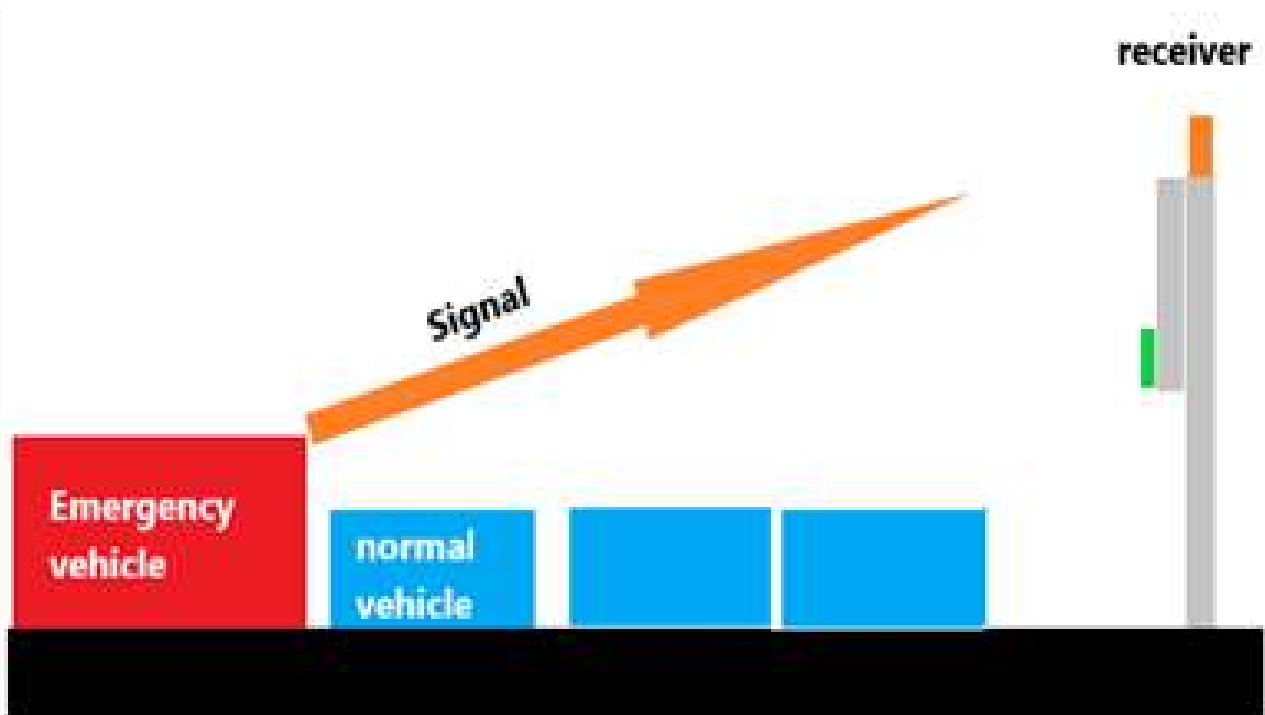
*Source: Passive-Components.eu*

Now we often see vehicles tightly packed bumper to bumper on a traffic light and the mobility greatly reduces in areas where traffic light density is more. This makes the movement of emergency vehicles such as ambulances and fire trucks difficult as the traffic ahead of them doesn't have the privilege to jump over a red traffic light. One of the solutions to the problem is to turn the lights green for the lane in which the emergency vehicle is stuck. Now one such way to do this is by RFID technology, to install a receiver near a traffic light and a transmitter inside the vehicle so when the receiver detects a signal from the vehicle it turns the light green and traffic in front of the emergency vehicle clears. This can help in building green corridors in cities much efficiently as the concept of green corridor is on its way in India, such use of RFID technology will strengthen the idea.

This was one use of RFID on roads another use of RFID is to manage smart traffic lights in which a receiver counts the number of vehicles on each lane and time the traffic lights accordingly so if the system detects crowd on one side and an empty lane on the other the timing of lights can be adjusted so the crowd doesn't have to wait longer than necessary.

The RFID technology is not expensive and not hard to maintain too, although many countries such as USA are using this similar technology for better traffic management and improve mobility, they are also using cameras and AI technology which require much more funds than just RFID.

So, these are some of the use of RFID technology, which is a good method to improve mobility, they are quite reliable and work irrespective of orientation.



**Light turns Green for the vehicle in front to pass so the red vehicles can pass**

# *WHAT IS UX?*

**Purba Saha**  
**ENTC (2018-22)**

According to the layman's term, the word UX or User Experience can be understood as the effect of use or understanding of a website or an application, and the level of ease it puts the user to.

Modifying slightly with revised terminology, UX can be understood as a concept which engulfs all the user's interaction with the company, and its services which also includes the user's emotions, attitude, and various effective human-computer interactions.

With the advancing technology, companies aim for the comfort of their users only. Hence, a user's need is of primary importance in order to keep the interaction flowing at a circadian flow. Therefore, the importance of UX lies in this one word only, "Satisfaction", and the aim is to provide a positive experience to keep the user engaged and true-hearted to the product and brand.

On a daily basis, we come across numerous products and each product claims a better experience. UX designing isn't only restricted to websites only, it has a wider prospect and can be incorporated in our daily life to null out the problems arising for the customers, or maybe better marketing of the product surpassing the need to look at the price and product as well. We exhibit UX principles in our life without us noticing them. To make my point clear I will list out a situation.

I own a dental clinic and even though I might not be in favor of investing in garnishing my clinic, I'd rather do it in order to please my customers. I rehearse being a customer in my mind and look at my clinic from the point of view of my visiting patients to understand the effect of a well-groomed clinic, the assurance which I am trying to give my patients that they are in safe hands. The fact I have kept my user's need above my comfort zone is itself an example of the UX principle.

Now being on the other end of the periphery of being a user, I think so I can number out a few UX in my life:-

1.Gone are the days when we used to sit and read through painfully long scripts. As a user, I would prefer a pictorial representation of the use of the product. Hence, choosing a product whose application is understandable and user-friendly is important.

2.Products with catchy logos, design, and shape will attract more customers. For example, if I go to the baking section, and as a baking enthusiast, if given an option of different shaped baking pans or the conventional round pans, I would go for the former. Creativity is always in a favored situation.

3.To make life simple and hassle-free is another criterion.

# ***ENLIST***

**Prakhar Agarwal**  
**Rahul Mansharamani**  
**Pratyush Jain**  
**Sudhanshu Pandey**  
**Computer Science (2019-23)**

We are Live! **ENLIST** <http://bit.ly/3aZkKUc> **WALK THROUGH VIDEO GITHUB** <https://github.com/prakhar-agarwall/enlist> ENLIST is already working in our college and students are using it since 2nd October 2020.

## **WALK THROUGH VIDEO GITHUB**

<https://github.com/prakhar-agarwall/enlist>

What's our Project? A distributive management system with basic features of a To-Do and an additional feature which allows a list of shared tasks within the class.

The Odyssey During this pandemic we faced a problem to how sync and figure out what all assignments are given by professors. We always used to miss deadlines. It was a chaotic mess. Then we found that others are facing the same problem as well. So, we came up with an idea of making a to-do list which will serve as a system to get on track of that all assignments that are pending. In ENLIST, all you have to do is add a task. It will automatically get synced in everyone's task list. So, no need to hassle around asking which assignments are due. You can simply check it on the Android app or Website.

If any user wants to keep the task to himself then (s)he can add using the **PERSONAL** feature. So, that task won't appear in other people's lists. We have made a two-fold security factor via PRN (roll call) and College ID. So, both of them should match. User can register via College ID only. Also user is granted access for only his/her respective classes. User analysis via Python. Through this we make a log sheet to track every user's activity. Our platform is easily accessible both on Website and Android App. You can perform the operations on any of the platform according to your convenience. You can directly sync your task to Google Calendar.

Hence, you will get notification , pop-up reminders and add other Google features. If any user wants to share the task to the whole team/class, then (s)he can add using the SHARED feature. Hence, it will automatically sync to everyone's list. Edit, done and delete operations on a particular task are individual for everyone and the changes made by that user won't occur in other people's list.

# *Hackathons, Techfests, Expo's, Competitions, Exhibitions, Conference?*

**Shruti Mandaokar**  
**E&TC (2017-21)**

Have you ever been to one of these?

If you didn't you should definitely Go and Attend them.

First, I would like to explain about the terms, which you may or may not have heard of.

## **1. Hackathons -**



I first heard about *Hackathons* when I was about to join my college.

Hackathons are events where programmers group together to build something in a short span of time. You can learn to create cool technology and build amazing projects.

- You are surrounded by group of enthusiasts and programmers. The best thing about hackathons is you get to build some projects that solve a real world problem.
- One can attend 24 hour Hackathon, 36 Hour Hackathon, 1 week Hackathon. People from various domains brainstorm and develop solutions for the problem statement.

*What if I don't know How To Code?*

Do not worry, there is something known as **HARDWARE HACKATHONS** too, where you need to come up with Hardware related solutions.

Why you should attend Hackathons?

- Great place to Learn and Build
- Great place to Meet New People and observe new Technologies
- These are cheap and affordable, sometimes even free.
- You get free food + goodies + some new friends + knowledge.

*I have learnt more in these Hackathons, than I did in most of my college classes.*

Just Google : Upcoming Hackathons and you are good to go. :)

## 2. College TechFests -



The poster for Techfest 2017, held from December 29th to 31st, 2017, is presented by IIT Bombay. It features a central graphic of two dragons breathing fire into a glowing orb. The poster lists various competitions under the heading 'COMPETITIONS' and 'PRIZES WORTH INR 42.6 LAKHS'. The competitions are categorized into Technorion, International, and Ideate Digitalize. Sponsors include RuPay, LPI, and others. Contact information for Harsh Sharma and Himanshu Kaia is provided at the bottom.

**TECHNORION**

- Meshmerize**  
Autonomous but in the direction of prestige
- Vise Clutch**  
Cross all the hurdles and take your bet to glory
- Enigma**  
Pursued of happiness lies within your code

**INTERNATIONAL**

- Robowars**  
Gears will grind and sparks will fly as your own life-sized robot battles another for victory
- ICC**  
Battle out with the top programmers of the world in this coding challenge
- IRC**  
An international platform for robots to present their diverse robotic skills

**AEROSTRIKE**

- Op.Rahat**  
Time to get the robotics club in sync with July of Drone
- Boeing IIT National**  
Design a RC plane show off your manufacturing skills

**SPECTACLE**

- Crane-o-Mania**  
Construct a Tower crane using popcicle sticks with optimized design

**IDEATE DIGITALIZE**

In this digital age, we have opportunity to transform lives which was hard decades ago

- ELIXIR**  
A chance to transform lives through biotechnology
- INT'L SUSTAINABILITY CHALLENGE**  
Sustainable development is the need of the hour. Let's take the first few steps
- CONTRIVANCE**
- Code the Game**  
Use the power of Data analytics to build your TCS Dream team
- Full Throttle**  
Make an AC engine car to throttle your abilities
- Hiti CADathon**  
Design a approved Cutting Made using CAD softwares
- Roll cage**  
Be Hardcore mechanical! Cage the robot
- Overwatch**  
Keep a watch over machines using an App

**TATA PIONEER'S MAKERTHON**

- Automation Challenge**  
Build an mechanism to automate industrial workstation
- UAV Challenge**  
Use your UAV innovative capabilities to do the impossible

**PRIZES WORTH INR 42.6 LAKHS**

[www.techfest.org/competitions](http://www.techfest.org/competitions)

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A college technical fest is a festival organized by engineering colleges to host events related to various technical aspects.

It can be related to a branch which involves competitions and conferences related to Computer Science, Electronics, Mechanical and Civil.

Its a place where people from all colleges can compete together in a particular competitions and display their innovative skills. Competitions can be technical as well as non-technical.

Why you should attend Techfests?

- One place to know about any college's technical participation.
- A place to Show your skills and Win a Prize
- To break away from Normal College Routine
  - To see how much competition you have and where you stand currently, so you could further improve
- To have fun with friends

Just Google : Upcoming Techfests near me :)

### 3. Expo



EXPO means “Exposition, large-scale public exhibition”. These are large-scale, global events organised that serve to educate the public, share innovation, promote progress and foster cooperation. It consists of displaying industrial products or a products developed by a startup.

Why you should attend EXPO's?

Great Networking Place

Face-to-Face interaction with company and its products

Compare products and services

Learn more about Technologies

Just Google : Upcoming Expo's and book your tickets earlier.

#### 4. Conferences



Conferences are large gathering of individuals or members of one or several organizations, for discussing matters of common interest. These give you an insight into the speaker's mind and how they work, including their success and failures. You can learn about a company as well.

Why you should attend Conferences?

To network with people in the same industry domain

Discuss your ideas with people

Learn beyond your field of interest

Enhance personal and professional development

These two years have been a learning experience for me.

I had the privilege to attend all these and add more to my knowledge.

# HELLO READERS!

We're both sad and proud to inform you all that this would be the last issue of Compendium that'll be published by our team. Sad because this incredible journey of learning and interacting with creative literary minds is coming to an end; proud because our team, under the guidance of Mrs Ankita Wanchoo, has published 3 newsletters, all of which were very well received by the SIT community and saw an active participation from both students and faculty members.

This prestigious newsletter, that now encompasses the talent of the entire college, is passed down from batch to batch to the worthiest of people. The time has now come to hand it over to the 2019-23 batch. We are honored to announce the new team of Compendium!

## HEAD:

Saijal Singhal

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Sharmishtha Tongia

Sagar Krishnaraja

Hussain Sabunwala

## DESIGNING TEAM:

Pinky Sherwani

Saijal Singhal

# WE WISH THIS TEAM THE BEST OF LUCK!



**SIGNING OFF**  
**TEAM COMPENDIUM**

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**CO-HEAD: SHIVANI VAKNALLI**

**EDITING HEAD: AASHNA MIDHA**

**DESIGN HEAD: DIVYADARSHI ACHARYA**

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