

# IMPULSE

*rising from the ashes*



MESA - SPCE

# IMPULSE TEAM



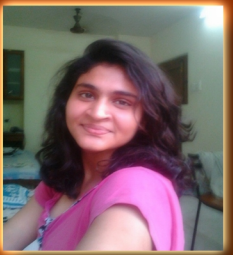
VISAJ DESAI  
MAGAZINE SECRETARY



DIVYA  
SUSEEL



SHREYAL  
SHAH



SAEE  
CHAUDHARI



PAYAL  
JAISWAL



SUDHISH  
PATIL



SHRIDHAR  
KULKARNI



Background phoenix  
designed by  
RUCHA PAGARIYA

# MENTOR'S NOTE

PROF. RAJESH BUKTAAR  
Head of Department, Mechanical



It gives me great pride to be witness of the revival of the MESA Magazine Impulse. In the very true sense it is 'Rising from the ashes'.

This magazine will so forth be the unified voice of Mechanical Engineering students bred by SPCE. Their voice, views and innovative ideas will have an excellent medium & platform to be heard and expressed.

The department in its continuous quest to excellence has always supported student activities as that is what defines an institution. Baja, Supra, Robocon, ISHRAE, Torque Tech fest-with its scintillating and enthralling inaugural performances- along with activities in social interest such as Blood Donation Drive and Bone marrow sampling are excellent examples of what Mechanical Department has achieved in this calendar year.

The reverie and nostalgia of the technical atmosphere and festival Torque was in true spirit realised this year. This year marks the rejuvenation of technical fest and spirit and this magazine makes a bold statement of that.

Impulse definitely has re-started the tradition and so forth will gloss upon the attitudes, activities,, hard work and zeal that students possess.

I wish the best to all students. My benediction and benevolence is always with them.

# EDITORIAL

It brings immense pleasure to finally bear fruits of the tremendous work put behind organising various activities in MESA. This magazine is in a way written form of lauding it. Representing the Mechanical Department- its professors and its students, I have tried to make it a tool of mass communication.

Beginning with the first meeting of the magazine team members everyone was a little unsure of what to expect including me. Coming after a span of 5 years there really wasn't any precedent to live up to. It had to be done from scratch and had to live up to people's expectations, on that note I hope the readers like this magazine. For this year especially the theme is apt and perfect. After a little deliberation we decided to move ahead with 'Rising from the Ashes'. The phoenix's rebirth from ashes is the underlying allusion. With our own technical festival Torque being planned up the name of the magazine quite easily was chosen to be 'Impulse', which was well received by all.

This magazine has tried to reach the mechanical junta by giving them a platform to express their views and share technical or non-technical ideas. It is a potpourri of articles with a collage to sum up MESA activities. Great thanks to professors and all authors without which this would not be possible.

I have tried to deliver to my peers a variety of articles and glimpses into people's feelings and thoughts. I do hope this magazine is refreshing and am glad to have restarted this tradition. Juniors you have got to take it from here in the ensuing years :D.

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# ACHIEVEMENTS

- >SPCE celebrated its Golden Jubilee year in 2012
- >Team SPCE Robocon ranked 13th in the All India Robocon Competition held at Pune, 2013
- >Team SPCE Racing Baja participated in the SAE Baja competition held in Indore. Their car Delta was the 5th fastest car, 2013
- >Siddharth Iyer, Devanjan Roy, Pranav Suvarna and Nilay Saraf of BE Mechanical with Dr. Roshini Easow being the mentor stood 1st in the National Student Design Competition 2012-2013. It is an annual design competition conducted by ISHRAE.
- >Sushil Ghuge and Dhawal Vartak of TE stood third in National Level Technical Paper Presentation competition held at IIT Bombay, 2013
- >SUPRA won the overall third prize in Chennai, 2011.
- >Baja won the Technology Innovation Award, 2nd Prize in 2010.
- >Department has also organised workshops in the areas like PLM and Reverse Engineering promoting Industry-Institute-Interaction(III) culture.
- >Seven Students also received the Narotam Sekhsaria Foundation scholarship.
- >Torque Technical Festival was organised after a span of 5 years.

## MESA SPORTS SCOREBOARD

	FE	SE	TE	BE
CRICKET	20	20	120	70
FOOTBALL	20	20	120	70
VOLLEYBALL	20	20	70	120
CHESS	20	20	70	120
CARROM	20	20	70	120
TABLE TENNIS	20	20	70	120
THROWBALL	70	20	0	120
BADMINTON	0	0	125	25
RINK FOOTBALL(G)	120	20	20	70

# GONE IN 6 SECONDS

JOVIN D'SA



Yes, you read the title right. And this is no remake of the famous Nicolas Cage classic. We may not have a beauty like the 'Eleanor 1967 Mustang Shelby GT500' but we do have our rugged and durable 'Delta'. We may not have had L.A.P.D following our trail but we did have 91 cars trying to catch up with us all the time. But yes all we needed was just 6.98 seconds (not 60 :P) to finish our job (our best acceleration time at the competition).

On that hot and dusty day at the track we were left awestruck with some breathtaking moments, some nail biting turns and some confident overtaking. At the end there were some dejected and disappointed and there were some rejoicing and victorious, but ain't that a part of life? But overall Its been a journey to remember and I find myself extremely fortunate to be a part of Team SPCE Racing. Having an excellent track record and having built a strong reputation in the competition over the last three years, we participated in the 2013 event with a lot of zeal and hope to do well this year.

For all those who are clueless until now, Baja (pronounced as baha) is an ATV (All Terrain Vehicle) fabrication and racing event for the students of the undergraduate level. It involves complex designing, meticulous planning, fabrication as well as marketing.

The 2013 edition of the competition saw 270 colleges all over India register for the event. The first stage of the competition is the virtual event in which teams are expected to present their designs and only the best 120 teams are selected. The final event is held at Pithampur (near Indore) at the Nat-Trip facility in which a special track is built to push each vehicle to its limit. Considering the overwhelming enthusiasm demonstrated by students of SPCE Mechanical, one can only imagine how painstaking the selection process must be since the number of members in each team has to be limited to 25.

After careful scrutinising and selecting the team we begin with the designing of the car using various Computer aided design, analysis and simulation softwares. 'Design is all about Iterations', well this is how Sameer Kolte(2012 Team Captain, now working at Mahindra Rise) puts it and I guess I

couldn't agree more. The amount of planning, analysis and changes required almost everyday during the design phase will surely leave your head spinning. But we always begin the designing phase well in advance and we cleared the virtual event which is held in Bangalore with a lot of appreciation from the judges.

The manufacturing phase is a gruesome & challenging task & it requires utmost dedication. The competition is incomplete without the greased clothes, the bruised hands and long hours. By the end of the competition you will realize that you have spent more time in the workshop than at home. After we build the vehicle, it has to be tested for over a month to make sure that there is no failure in any of the components and luckily our college ground provides us a good platform for it.

At the main event in Feb we had 3 successful days where we successfully completed the technical inspection, the Static Evaluation and The Dynamic events. We were unable to complete the final endurance event but making the fifth fastest car, one of the most compact and light weighed car and to be among the top 16 designs in the country is a commendable achievement.

After the final event there is also an HR meet for all the participating students where some of the big names in the automobile industry such as Mahindra Rise, ARAI, Cummins, General Motors offer lucrative jobs to some of the aspiring students.

We are now a part of the legacy which began with Uday-Vishals award winning innovative team in 2010 and 2011, followed by the 2012 team under the genius Sameer and then the 2013 team under our very humble and efficient Jaykishan. We strive to do better and to raise the bar with each passing year and we hope to achieve laurels in the 2014 edition of the competition. We hope that the newly recruited juniors will realise the importance of Baja and what it meant for all our seniors who sacrificed soo much to get their hands on the trophy. We have been consistent and good but not quite been able to come 1st and we hope we will change that this year. We hope our juniors will provide us with the cutting edge to conquer BAJA 2014 and hopefully this time it will be our car which will cruise past the waving chequered flag.

*"Light travels faster than sound. This is why some people appear bright until they speak."*  
— Steven Wright

# BE PROJECT EXPERIENCE

PRATIK BALDOTA



The final year project is crucial for every engineering aspirant. And there are several reasons for it. Firstly, it gives a hands-on opportunity to implement their technical know-how and the theoretical knowledge acquired over the years on some pragmatic engineering problems. Secondly, it implicitly defines the area of interest of the fellow project members which, at times, turns into area of specialization in future. Thirdly and most importantly, it's a training process which helps the students to develop and hone numerous skills such as team-work, researching, analyzing, scheduling and presenting. Also, it's needless to say, about the innumerable benefits that one reaps while working under the guidance of an experienced and consummate professor. Personally speaking, I had strong affinity towards designing right through the start of my engineering. In my first year of engineering, I have designed a robot for an inter-college robotic competition, called 'Vertical Limits'. After that, I participated as a Design team member for Baja SAE India 2011-12 and 2012-13. So, selecting a topic on design optimization was quite natural to me. I, along with my fellow members Jaykishan and Priyank, decided to undergo my final year project on Design Optimization of Ship under the guidance and support of our veteran faculty advisor Mr. D.N Jadhav. When the ship sails, it has to overcome the gruesome hydrodynamic resistance produced by the interaction of the hull (the water tight body of the ship) with the flow of the water. As a result, the function of the hull structure is to have the robustness to sustain the internal and external loads of ship. Also, it has to balance the weight of the ship and the buoyancy force exerted by the water on which it floats. Hence, to develop a robust a ship, its design optimization is vital. We did that by undergoing two types of analysis, the Strength analysis and the Computational fluid dynamic analysis.

Strength analysis of ship makes sure that the ship will sustain transverse and longitudinal bending, racking stresses, and stresses due to water pressure. This was done on Ansys Static Structural software. Also, we verified the results by solving the same problem analytically, using the standard formulas of Strength of Materials and some empirical relations. This was followed by CFD analysis of the ship. Computational fluid dynamics (CFD) are becoming increasingly popular in analyzing flow problems in almost all branches of engineering, especially in resistance prediction of ships where complex fluid flow exists. CFD analysis was carried out by testing various designed hull in the simulated environment of Ansys Fluid Fluent software. Convergence of solution was achieved by giving appropriate boundary conditions. Thus, we have successfully optimized the design of the hull having minimum wave and viscous drag coefficient along with minimum weight. Therefore, the ship requires minimum propulsive force to sail.

*War doesn't determine who's right. War determines who's left.*

# PREPARATION FOR GATE

SAGAR JOSHI



GATE- One of most competitive post graduation entrance exams in the world. The syllabus includes most of the subjects from our 4 years of our graduation. One day, one exam, three hours, 65 questions - the entire future depending heavily on it!!! The pressure, the anxiety, the phases of depression, and so much more!!! If you are not intimidated by now, then you are not serious about giving it.

Okay, so now we know that GATE is a very tough and competitive exam, yes. But it is also not impossible to crack it. First of all, before even starting for preparation, one needs to understand why is he giving GATE in the first place.

If your goal is to get into IISc, then let me warn you, IISc accepts only the par-excellent candidates. If you are trying for PSUs then there is a wide range of marks that have a chance, depending on the company, its vacancies, etc. among others. If your goal is getting admission in the IITs (like me) then again, you have to get a good rank. Again, it depends on what and where you are applying. All the other colleges also accept GATE score for admission post graduate courses.

To sum up in terms of cutoffs, to my best knowledge, below are approx. cutoffs for various options. IISc- 50 to 100

IITs- 50 to 800 (IITD, IITB, IITK, IITM, IITKH, IITR, IITG in ascending order of cutoff rank)

NITs and BITS or other colleges- 1000 to even 10,000

PSUs- wide range, from 100 to even 5000 or 6000

Getting into a good college or a PSU is not enough. Getting admission or a job in something you are good at is what matters most.

Now, once the goal is decided, one should plan his study. It is essential to find out which subjects one likes and dislikes and plan accordingly. A sincere 3 months of preparation is sufficient for getting a good score. Our winter vacations serve as the ideal time for this. Still, in the earlier time, i.e., in May vacations, and during the semesters, one has the leisure of referring many books and spending time on individual subjects. I recommend that if possible, basics of all subjects should be made clear in this time only. One good book for every subject is sufficient. Only if you don't understand some part, you should touch another one. A good reference book

should be used for study. This is because in some textbooks, there might be mistakes. If textbooks seem boring, never hesitate to ask our professors. Searching on google or youtube can also help a lot. I remember studying some parts of Production Process and even Maths on youtube. There should not be a single word or term whose meaning you don't know. For formulas, focus on understanding rather than mugging them.

Group study can be very effective, but it depends on the group and the people in it. A Facebook or Whatsapp account, is also a good idea in which difficult concepts can be discussed, and relevant information can be shared. Google can be the most resourceful and fastest source here.

About classes, the best thing about them is that your topics get revised and you get a push (only if you need it). I myself had joined Vidyalankar. While some professors were really good, some were not so impressive. Only if you feel that you cannot study without someone constantly pushing or reminding you to, should you join classes. Finally, it's all up to how you study.

So, in your 6th and 7th semesters, and May vacations, clear basic concepts. After your 7th semester exams are finished, take a small break if needed, and then start studying seriously. This is the time to solve MCQs. Before this, there is not much point in solving them. Here's something no one else would tell you. Don't solve previous years' questions of individual subjects. Keep previous years papers in the end. To get an idea, about GATE difficulty level, you can browse through a few but not more. Solving a previous GATE paper at the end gives you a very good idea about your preparation. So, solve from other sources, such as GK publications, or some class's MCQ set. Solve as many MCQs as possible. The problem here is that there may be many MCQs which are too difficult (For GATE level), or out of syllabus, or plain wrong. Here's where group interaction will certainly help. There are approx. 4 days per subject. So that gives you a track of your current speed. Plan the sequence of your study. Favourite subjects should be attempted first. It is okay to skip 2 or 3 subjects, if less MCQs are asked from them; e.g. operations research or some Maths topic.

*"Hard work spotlights the character of people: some turn up their sleeves, some turn up their noses & some don't turn up at all"*

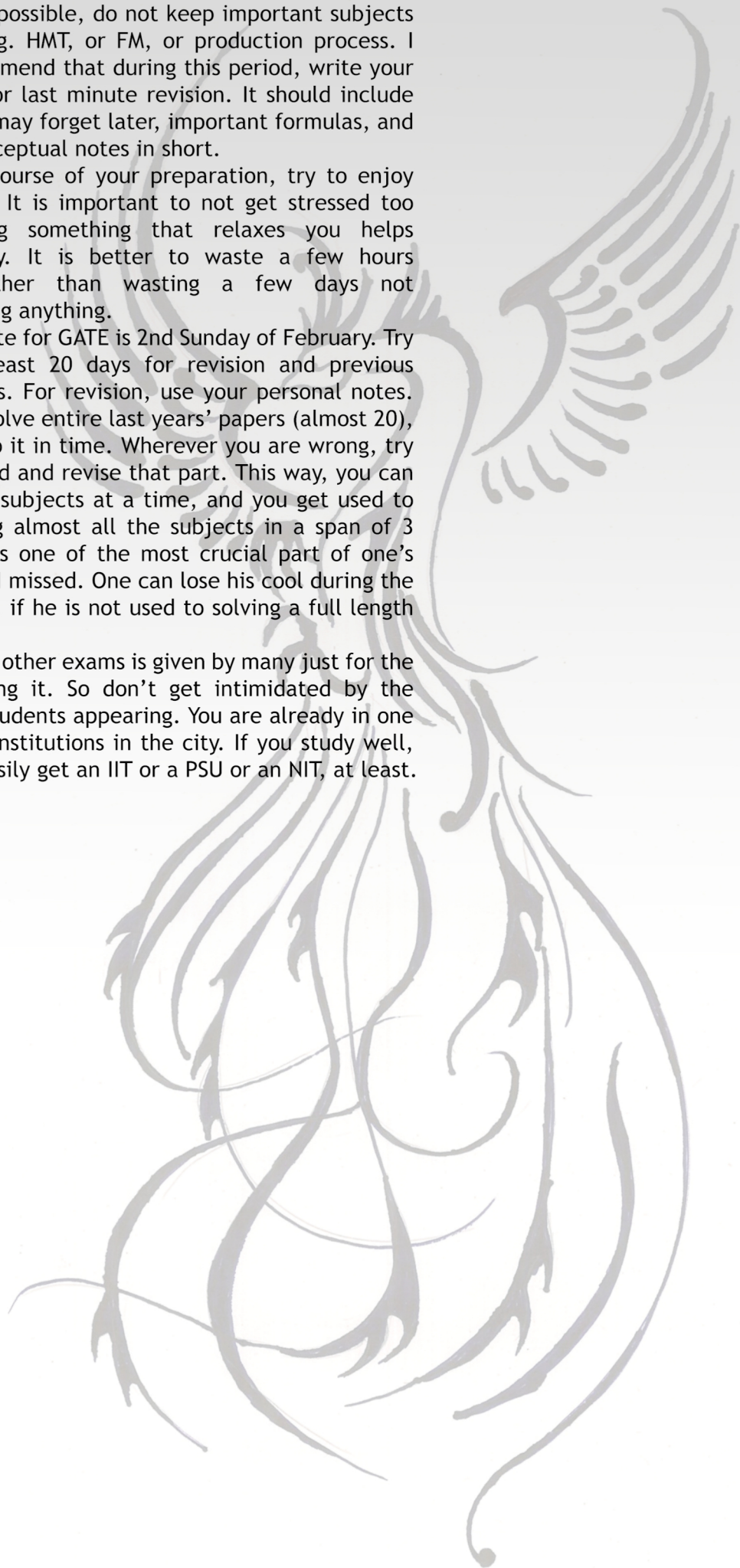
— Sam Ewing

As much as possible, do not keep important subjects as option e.g. HMT, or FM, or production process. I highly recommend that during this period, write your own notes for last minute revision. It should include all that you may forget later, important formulas, and difficult conceptual notes in short.

During the course of your preparation, try to enjoy the journey. It is important to not get stressed too much. Doing something that relaxes you helps tremendously. It is better to waste a few hours relaxing rather than wasting a few days not understanding anything.

The usual date for GATE is 2nd Sunday of February. Try to keep atleast 20 days for revision and previous years' papers. For revision, use your personal notes. After that, solve entire last years' papers (almost 20), and try to do it in time. Wherever you are wrong, try to understand and revise that part. This way, you can revise many subjects at a time, and you get used to remembering almost all the subjects in a span of 3 hours. This is one of the most crucial part of one's study which I missed. One can lose his cool during the actual exam, if he is not used to solving a full length GATE paper.

GATE, unlike other exams is given by many just for the sake of giving it. So don't get intimidated by the number of students appearing. You are already in one of the best institutions in the city. If you study well, you could easily get an IIT or a PSU or an NIT, at least.



# To Do Or Not To Do, That Is The Question

SIDDHARTH NISHAR



*"Twenty years from now you will more disappointed by the things that you didn't do than by the ones you did do. So throw off the bowlines. Sail away from the safe harbor. Catch the trade winds in your sails. Explore. Dream. Discover."*

- Mark Twain

There are few who can dare challenge this timeless truism. Poets have in their deceptively simple words often captured the ephemeral nature of life and the magnified value of each second in the light of this knowledge. It should then be folly to question the wisdom bequeathed to us by the learned, who not only have weathered many a storm but have given us this insight that itself has endured a hundred more!

I take up this gauntlet today, keeping in mind that fortune favors the pragmatic and that Mansa Musa of the Malinese Empire did not fill his coffers without setting his gold to 'catch the trade winds', nor do I forget the lesson learnt by the Ottomans only a few decades too late in their unwillingness to act upon the new trade routes which eventually stagnated their economy. I do not contest the fact that there is melancholy in the war that you never fought and the child you never bore. Neither do I criticize the countless champions, named and unnamed, throughout history who have by their actions made the pursuit of happiness a pursuit of action. Was it not Tagore who called work joy? Then what is my contention?

My contention is that this philosophy is unguarded and unchecked by caution and foresight. It has not yet been purged by the experience of an entire society which will seek to fine-tune it and make it a fitting and more importantly, a safe school of thought! The realization that there is so much more to life than just the routine errands that sustain us, brings with it the enormous ambition to experience all that the mind can offer. Ask a neurologist and he can perhaps attempt to gauge the temerity of this notion in light of the fact that the human brain is the most complex object in the known universe. This affords us a guess at the function of art and culture in our civilization and by extension, the oft-repeated truisms of similar forms as that of Mark Twain's.

The road to hell is paved with good intentions and lest we should wear ourselves away on a misguided quest, it is imperative to know that it does not do to want it all. In fact, Eastern Philosophy preaches quite the contrary and advises one to forsake worldly desires and ambition, branding them as the agents of strife!

One might ask as to why I label the pursuit of fulfillment with such gross names. To understand this, we must first understand that mankind stands on a precipice the like of which he has never seen before. Millennia of evolution have lent him luxury of sorts that even kings and emperors of old would envy. What the Age of Exploration gifted cartographers in Europe, the cultural and spiritual awakening of the last few centuries has gifted the global citizen today! He looks inwards and finds no walls, no ceiling and definitely no floor! His spectrum of experiences has exploded and he finds that even as the smallest speck in a universe this vivacious, he bears the mental devices to divine far larger constructs and thus is seduced by the desire to have it all. A perverted greed for happiness of a rare sort injects a fervor in him that threatens to diminish anything he has achieved, starkly contrasted against the multifarious permutations that my pen cannot express with fidelity.

What then will be the state of he who has tasted the ambrosia that even the Greeks could not give their Gods! The affliction has manifested itself everywhere. The average man's twenty-four hours are not only contested by his filial duties and vocational ambitions but also by this Succubus of desire that refuses to leave him, tagging along with him, and in the rare eventuality that he rids himself of her, the 21st century media barrages his mental ramparts with images of fulfilled wishes and a glimpse of manufactured euphoria that would make the heavens blush! How can he, robbed of perspective, dare walk to his daily life and see in it the same colors he saw before being blinded by the sheer immensity of what he can achieve? His ambition paradoxically chains him down and bereaves him of direction, stealing the sense of measure from his gait, so he

*"I value the friend who for me finds time on his calendar, but I cherish friend who for me does not consult his calendar."*

— Robert Brault

may walk about in odd strides that end up leaving him nowhere. When did the destination become more important than the journey?

One starts wondering if regret is the second side of ambition itself. If man dares to risk it all and chase the stars, should he not be prepared to fall from a nine-folded height? And if he desires to optimize his time, can he really commit an error as grievous as depending upon half-knowledge, conceived from profound quotations alone and not borne by experience? The flurry that an average 21st century individual finds himself in can justly be attributed in part to this campaign against Time itself! Instead of seeking meaning in the few experiences his time can afford him, he dogs all that his heart can fancy, the long-lived whims of an enlightened mind that end up making a ghoul of a healthy human being.

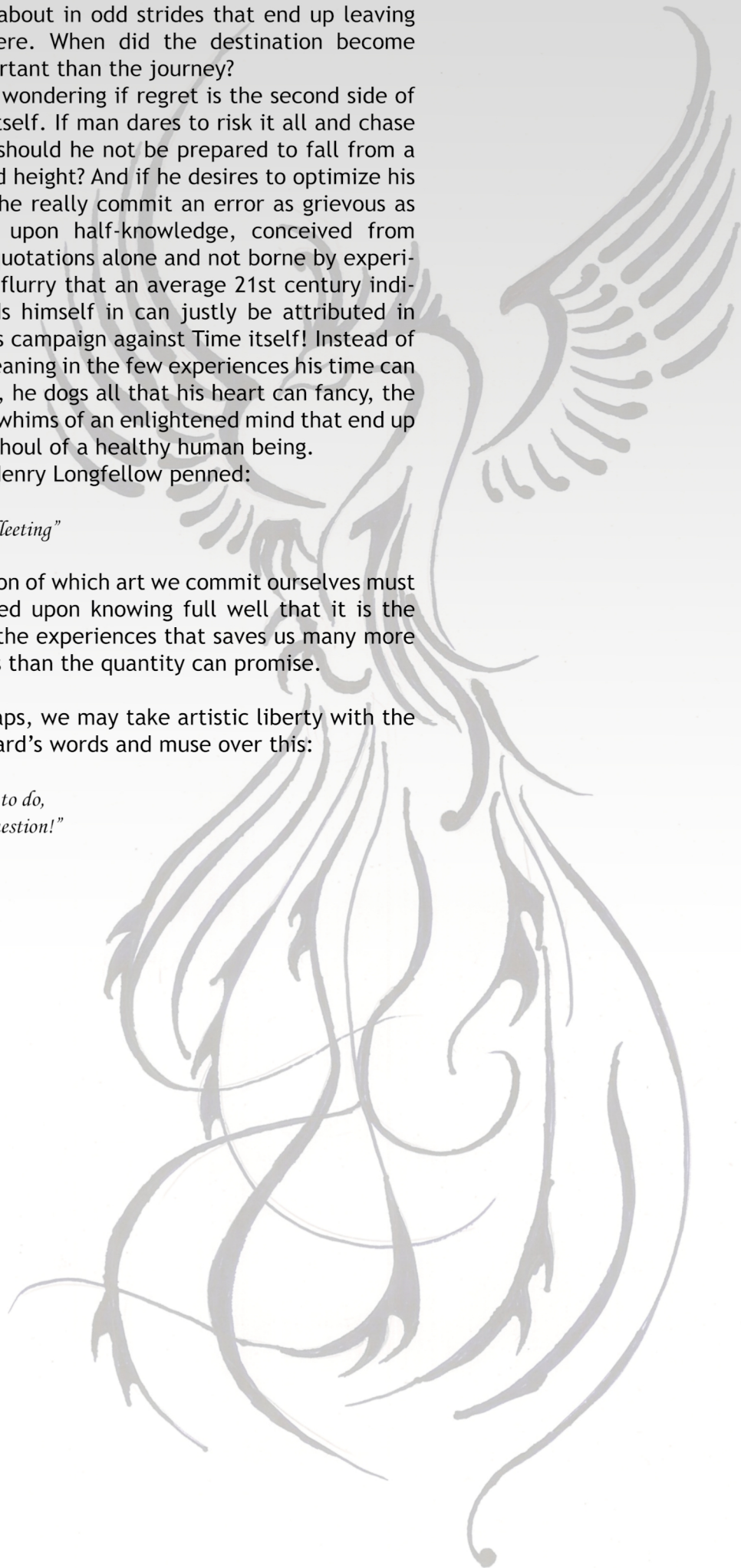
Truly has Henry Longfellow penned:

*"Art is long,  
And Time is fleeting"*

The question of which art we commit ourselves must be answered upon knowing full well that it is the quality of the experiences that saves us many more heartaches than the quantity can promise.

Here perhaps, we may take artistic liberty with the timeless Bard's words and muse over this:

*"To do or not to do,  
That is the question!"*



# A WORKSHOP ON REVERSE ENGINEERING

SUSHIL GHUGE



A workshop was organized on eve of technology day in mechanical engineering department by Ask me engineer's group one of the leading groups dealing with reverse engineering and rapid prototyping.

It received an enthusiastic response from students of mechanical engineering department which was the ultimate goal of entire program to make students aware of latest developments in field of product development and design.

## REVERSE ENGINEERING:

Reverse engineering is the process of discovering the technological principles of a device, object, or system through analysis of its structure, function, and operation. It often involves taking something (a mechanical device, electronic component, computer program, or biological, chemical, or organic matter) apart and analyzing its workings in detail to be used in maintenance, or to try to make a new device or program that does the same thing without using or simply duplicating (without understanding) the original. Reverse engineering has its origins in the analysis of hardware for commercial or military advantage. The purpose is to deduce design decisions from end products with little or no additional knowledge about the procedures involved in the original production.

## WHY REVERSE ENGINEERING:

Commercial and military systems may contain a mix of legacy and state-of-the-art equipment. With time, the older legacy equipment becomes difficult to support, due to increasing costs of spare parts and/or non-existent procurement sources. The technical documentation needed to re-manufacture replacement parts is often insufficient or non-existent, and valuable systems may be retired early as a result. In such cases, rapid prototyping and reverse engineering helps to reproduce same. Difference between Reverse Engineering and Forward Engineering is that the previous Can be performed 10 to 100 times faster than forward engineering years of time is being reduced and cut down into an span of few days.

## KEY PROCESSES INVOLVED:

### • 3D Scanning:

A 3D scanner is a device that analyzes a real-world object or environment to collect data on its shape

and possibly its appearance (i.e. color). Many different technologies can be used to build these 3D scanning devices; each technology comes with its own limitations, advantages and costs.

### Functionality:

The purpose of a 3D scanner is usually to create a point cloud of geometric samples on the surface of the subject. These points can then be used to extrapolate the shape of the subject (a process called reconstruction). If color information is collected at each point, then the colors on the surface of the subject can also be determined. 3D scanners share several traits with cameras. Like cameras, they have a cone-like field of view, and like cameras, they can only collect information about surfaces that are not obscured. While a camera collects color information about surfaces within its field of view, a 3D scanner collects distance information about surfaces within its field of view. The "picture" produced by a 3D scanner describes the distance to a surface at each point in the picture.

This allows the three dimensional position of each point in the picture to be identified. For most situations, a single scan will not produce a complete model of the subject. Multiple scans, even hundreds, from many different directions are usually required to obtain information about all sides of the subject. These scans have to be brought in a common reference system, a process that is usually called alignment or registration, and then merged to create a complete model. This whole process, going from the single range map to the whole model, is usually known as the 3D scanning pipeline. Two main types are contact and non contact type.

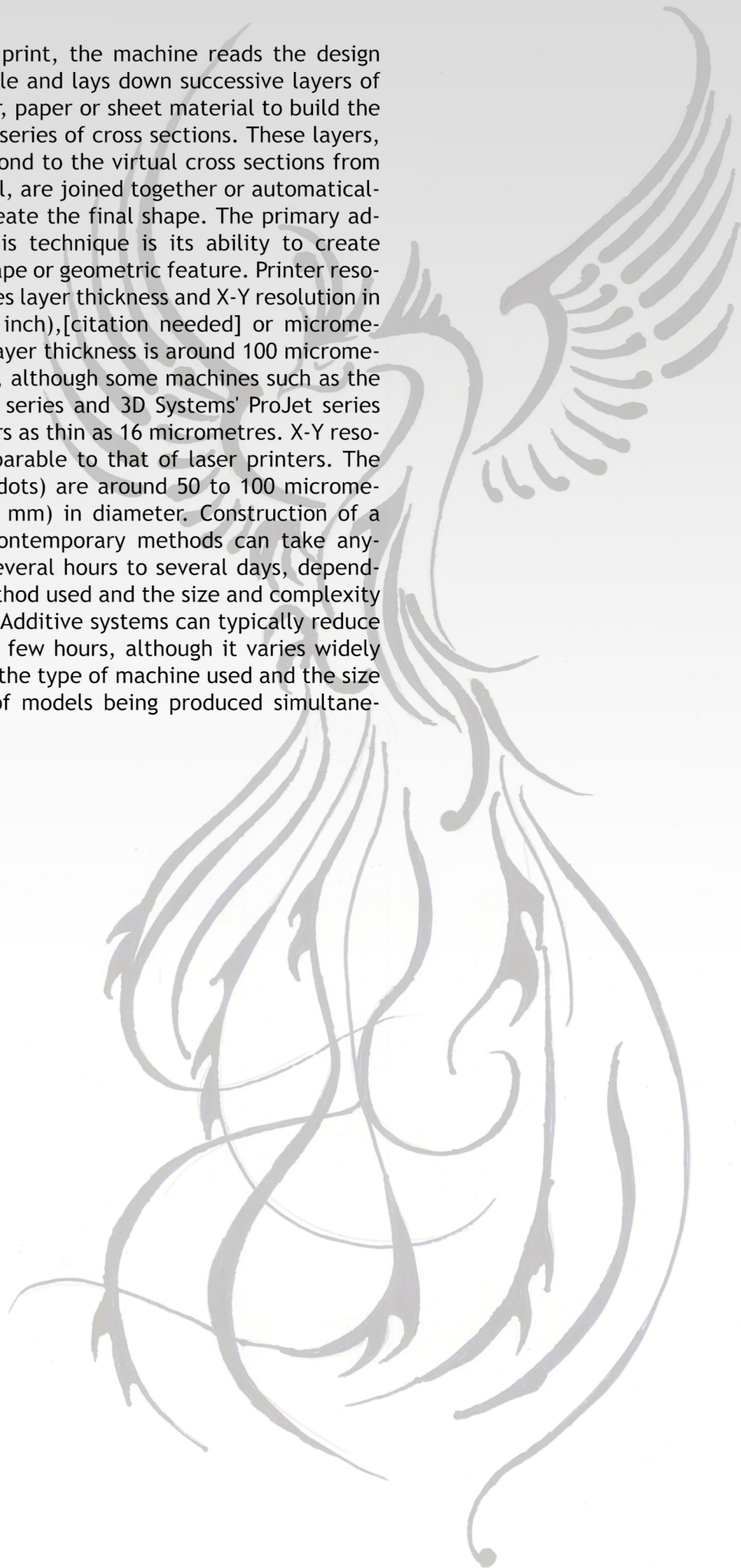
Computer-aided design: The output of scanning process is fed to cad packages.

(CAD) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD output is often in the form of electronic files for print, machining, or other manufacturing operations.

*"It's amazing that the amount of news that happens in the world every day always just exactly fits the newspaper"*  
— Jerry Seinfeld

## PRINTING:

To perform a print, the machine reads the design from an .stl file and lays down successive layers of liquid, powder, paper or sheet material to build the model from a series of cross sections. These layers, which correspond to the virtual cross sections from the CAD model, are joined together or automatically fused to create the final shape. The primary advantage of this technique is its ability to create almost any shape or geometric feature. Printer resolution describes layer thickness and X-Y resolution in dpi (dots per inch), [citation needed] or micrometres. Typical layer thickness is around 100 micrometres (0.1 mm), although some machines such as the Objet Connex series and 3D Systems' ProJet series can print layers as thin as 16 micrometres. X-Y resolution is comparable to that of laser printers. The particles (3D dots) are around 50 to 100 micrometers (0.05-0.1 mm) in diameter. Construction of a model with contemporary methods can take anywhere from several hours to several days, depending on the method used and the size and complexity of the model. Additive systems can typically reduce this time to a few hours, although it varies widely depending on the type of machine used and the size and number of models being produced simultaneously.



# ROBOCON

TANVY LIMAYE



Robocon 2012 had been a disappointing journey in spite of all the efforts put in by the team. SPCE Robocon had witnessed crises and design failures to such an extent that any team could have been shattered beyond repair. But the team held itself together not letting the failure flag down their enthusiasm and will, and decided to construct a strong foundation using the lessons of failure as building blocks.

New team members were recruited to take the place of the seniors who passed out and a team was carefully built. Work started even before the 2013 theme was released. The seniors updated their own knowledge and passed on the teachings of their experience to the juniors. Experimentation was carried out to test the feasibility of new technology.

From our past experience we had become conscious of the need to promote robotics in our college and hence at the beginning of the academic year we started SPARK (Sardar Patel Automation and Robotics Klub). Through SPARK we taught students of our own college (mainly our juniors) the basics of robotics by designing simple mechanisms which they could build. This gave them hands on experience and an insight into our world of robotics.

Sometime in August the 2013 theme was released and it brought with it a wave of surprises. In addition to picking and dropping the theme expected the robots to be equipped to throw an object.

The rulebook once made available was studied in depth by the entire team, for it was essential to first absorb all the rules and clauses stated implicitly and explicitly to design a machine within the stringent constraints laid down by the organizers.

By September we were ready with our first designs of the manual and automatic robots and had the funds required for starting production. The designs underwent several rounds of modifications and improvisations. At times we had to even discard mechanisms after they had been constructed because they violated certain newly added clauses in the FAQ's section updated by the organizers from time to time. We worked hard throughout the year, till very late in the evenings and also on weekends. Room no. 10 on the ground floor of SPCE became our abode for at times more than 12 hours a day.

Just two weeks before the final competition we made a decision. We decided that we would implement only 80% of the task in the final competition but we would do it well. We decided to go for perfection rather than trying to complete the entire task.

5th March we reached our destination, cutting edge technology greeted us. The best use of pneumatics was on display on the practice arena as teams utilized their practice slots to perfect their robots. We soon realized that we were among the very few colleges among the 81 participating teams that had not used pneumatics at all.

The creations of some teams left us awed and baffled on the first day...

Our first match was scheduled on the afternoon of the 7th of March but it got delayed by a couple of hours. When we finally walked on to the main arena the euphoria surrounding it possessed us. And our first match began...

We scored a total of 110 points which put us in the top ten. Our jubilation had reached new heights. But there was one more round of matches to go.

In our next match our luck did not favour us and we could score only 90 points. We ended with a total of 200 points. This tally of points gave us no clear indication about our chances of being among the top 12 teams to compete for the title. We kept waiting...

The results were declared. We were tied at 12th position with MIT, Manipal. However they were awarded the 12th place by comparing certain sub-criteria and we were declared 13th. Our journey in Robocon 2013 ended.

We sure were slightly disappointed. But the joy of being 13th in India and surpassing all past results ever produced by SPCE overpowered the disappointment.

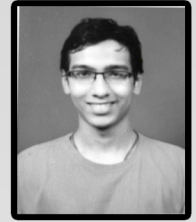
We left Pune with experiences that had greatly enriched our technical knowledge and a promise to come back with bigger dreams to fulfil next year.

*"Don't cry because it's over, smile because it happened."*

— Dr. Seuss

# NATIONAL STUDENT DESIGN COMPETITION

DEVANJAN ROY



Sardar Patel College of Engineering bagged the first prize in the National Student Design Competition 2012-2013. It is an annual design competition conducted by ISHRAE (Indian Society for Heating Refrigerating and Air Conditioning Engineers) in which students from all around India present their system design for the given theme. The theme for this year was “Design of Low Energy Cooling System for Sustainable Residential Buildings”.

Our college was represented by the team of Siddharth Iyer, Devanjan Roy, Pranav Suvarna and Nilay Saraf of BE Mechanical with Dr. Roshini Easow being the mentor/project guide.

Highlights of the design includes a modified green roof, extracting energy from condenser heat and condensate cooling capacity and a cooling load of less than 2 tons per thousand square feet of conditioned space. The design provides low energy cooling solution with high level of safety that is best suited for India's urban areas.

The award was presented in the recently conducted Acrex 2013 during the Award for Excellence night.

## Experience:

The making of this project wasn't an affair of a couple of months. The journey started way back in 2nd year. At a time when the glamour of SAE BAJA and ROBOCON seemed to capture all our classmates we joined ISHRAE following the advice of some of our seniors. What followed was a series of seminars, events and an internship at Voltas which slowly and steadily resulted in us forming a strong bond with the subject of RAC and HVAC industry. So when theme for this year's competition arrived we were eagerly looking forward to the challenge.

Learning the subject of RAC and actually making a project in it has a huge difference. To design a cooling system for a 4 storied building we required much more than knowledge of RAC. The initial problem was to negotiate the civil related issues like floor plan and wall material. We were fortunate enough to receive guidance from people in the industry and it started with the help of a green building architect who helped us choose cost and energy efficient insulation. This was just the beginning of the learning curve.

The project was all about innovations and smart engineering. Every little aspect had to be thought through well. The final ideas used were a result of continuously refining crude ideas. Now we required some detailed calculations and this was something our BE course had prepared us for.

Even after performing all calculations we were faced with a road block. As students our job ends with calculation of values however in real time there is one extra step, 'selection of equipment'. This was something we never did before. Thus we interacted with people in the industry one of which turned out to be alumni of SPCE, Mr. Nimesh Mehta who provided us with very useful data. Our final interaction was with the director of a New Zealand based heat exchanger company, Dr G. M. Segerfröjd who was very helpful and encouraging. Apart from this we were always under the watchful eye of our project guide Dr Roshini Easow who helped us keep our eye on the job and was always there to help us out.

The project had its ups and downs but the journey was wonderful. This is because we gelled very well together. We learned a lot of things, technical and non technical but the most important one was teamwork. Every team member is just as important and everyone contributes!

It required real hard work and commitment and it gives great satisfaction to see that bearing fruits.



*"It doesn't matter if a student looks as sour as a lemon. You get lemonade by squeezing them."*

*- Antti Allen*



**BATCH OF 2016**



**BATCH OF 2015**





**BATCH OF 2014**



**BATCH OF 2013**

# CONFLICTING CONCEPTS

KANCHAN RAILAPURKAR



Ever since I entered my final year of my engineering, I have had a lot of time, and a lot more reason to think about my future, my past, my present and everything and everyone in between. It is the season finale, the birthday I have been waiting for, the period when I will complete my studies; whether for a while or for good, I am not sure and try my luck in the real world. During all these thought provoking moments, I have come across numerous mind boggling ideas, which completely contradict each other, and yet are true in their own way. When I discussed this with my friends, I stumbled upon something that gave me a small comfort: they also have been having these confusing thoughts. Here are some of them, the ones which have been faced by the majority:

The path less travelled: They say 'Curiosity killed the cat'. But then, curiosity also gave us about a dozen elements on the periodic table. The path less travelled is feared by most, but unless someone had taken that path, we would never have been where we are today. America would not have been discovered, neither would have someone found the coconut (An individual having the urge to break open a rock only to come across sweet nectar inside, you have to agree that is one hell of a discovery). Ships would not have been built, square melons would not have been invented, organ transplant would not have saved a million lives, and chocolate would not have existed!! Since all this happened because someone have the courage and belief, doing something different must be a good thing, right? On the other hand, taking the path less travelled also led to the invention of the atom bomb. Taking bigger risks gives you a bigger reward, but it also gives a bigger downfall. Why bet on your life? Why give a chance to ruin something that you have been working for all your life? To avoid all this, shouldn't people just follow the rules already laid out for them? It has been tried and tested my many people. and tested by many people.

To love or not to love: We all have our crushes. Some of us follow our heart, some of us follow our brain, while some of us are simply too scared to do anything about it. The one important decision that seems to rattle many is what are we supposed to do,

if, by some miracle, we find our potential "the one"? Let's take an example. There is a girl. She knows a guy for a long time, say five years, they are pretty tight friends. One day, she gets an incredible job, which will let her travel the country around the same time, she realises that she is in love with the guy, not some silly infatuation nonsense, but a 'sweeps you of your feet', 'struck you with a lightning' realisation. Now what should she do? Should she tell the guy about her feelings, and leave a few months later. Or should she keep in to herself and carry the doubt in her mind all the time, of what would have happened if she did? We are in our twenties, inexperienced, moody. We change our minds and our hearts all the time. Sure, we are strong headed, but we are also hot headed, driven by emotion. Are we mature enough to understand the concept of 'love'? What if we risk most of what is important to us, for that "one", and later on, find that it was nothing more than a mistake? Worse, what if we don't take that risk, only to discover, that he or she was really "the one"?

Let's take a break: This is the most common and the most difficult decision to make, in a student's life. Should I take a break, travel the world, study for post-graduation or discover myself? Taking a year out of our lives to invest in ourselves seems like a sensible option, to most of us. But I have to counter this idea. Say you decide to apply for a job after a break, every company is going to question your break and you won't have a suitable answer. I don't mean to scare anyone, or want people to start contemplating each and everything they have and wish to have in their lives. Then why am I writing this? Well, to tell you that you are not alone. If you are reading this, you are in one of the best colleges, doing one of the most fulfilling degrees there is. And getting into SPCE is pretty difficult, as you know it. It is obvious that you have what it takes, you just have to figure out what it is that you want to take.

*"Love is that condition in which the happiness of another person is essential to your own."*

*— Robert A. Heinlein, Stranger in a Strange Land*

# 3-D PRINTING & AUTO INDUSTRY

HARSH MEHTA



3D printing has been hailed as a technology which could change the way we do manufacturing. 3D printing along with stereo-lithography and similar technologies, growing at CAGR of 26%, are expected to reach \$5.2 billion by 2020. The technology is capable of making complex metal parts, intricate mechanisms, civil construction components to even food items. The Star Trek's Replicator Device may be well around the corner. Automotive industry is a leading user and consumes 17.5% of total commercial 3D printing, second to consumer products/electronics. Present application by auto companies is limited to large size 3D printers for rapid prototyping in Product Development. However, with dropping prices (personal 3D printers costing around few thousand dollars) and maturing ecosystem (Machine builders, CAD S/W providers, Designers, Makers, Aggregators & users), 3D printing is poised to become mainstream and a game changer. Possibilities are endless for automotive industry. Let's explore some of the potential futuristic scenarios:

- DIY Personalization: Imagine a car enthusiast designing a sporty spoiler for his car. He has the attachment frame in the CAD software and builds the rest of the design on top of it. He also refers to some Off the-shelf designs for ideas. Once done, he clicks the print button and his personal 3D printer gets on to work. If his 3D printer cannot manage the dimensions, he sends the design to a nearby vendor who prints it and delivers it in few hours. This new spoiler is his third in last one year. And his next dream project is a cool dashboard. Is it possible? Yes! 3D printers are increasingly becoming affordable. Commercial paper paper printers are now manufacturing with 3D printers. One can imagine a 'Knight Rider' car or a 'Ghost Rider' bike running on the roads.

- Spares & Service: 3D printers can also be used to print spares and tools. Its not that far-fetched with similar application in the marine transportation being explored. Repair centers and even consumers can print spares & tools on demand. We also have 3D scanners which can scan a tool along with its movable parts (like an adjustable wrench) and replicate it in a 3D printer. Only a limited stock of

critical spares will be required in future.

- Crowd Sourcing Product Design: Traditional product design relies on market feedback. 3D printing will enable customers to design the product for companies. The guess work and gamble on market research will be eliminated. A company can crowd source product designs from prospective customers and adopt them. As consumers dream up new ideas and design, the product innovation will be prolific and dynamic.

3D printing will enable automotive companies to address long tail market. However, there are wider implications. For instance, 3D printing will :

- Empower auto consumers like never before: Only imagination is the limit to extent of personalization we could see. It will unleash new ways for consumers to make a personal statement through 'my ride'.

- Disrupt the automotive value chain and roles: New players like 3D part Designers & Makers will enter the value chain. Much of manufacturing activities will shift from OEM & Suppliers to the downstream Dealers & Consumers. Role of an Auto OEM will go beyond product design & manufacturing to include aggregation & orchestration.

- Throw up Socio-Legal Challenges: How does one manage IP issues, Design safety, Accountability (for injuries/damages due to faulty parts) in a democratized design and manufacturing? New policies & regulations will have to be drawn up for the same.

When and to what extent the afore mentioned scenarios will materialize, no one can predict. However, one can confidently expect that 3D printing will become mainstream. A strategic roadmap to leverage 3D printing will enable auto companies to not only stay ahead but also influence the market and the industry. As Peter Drucker said 'The best way to predict your future is to create it'.

*"For me, modern technology has ruined romance and movies-  
nobody can run upto the airplane gate anymore."*

*— Lorene Scafaria*

# STORY OF THE FIRST BENZ

SUDISH PATIL



The biggest invention in the history of transportation industry has been the invention of the automobiles. Here is the story of the first automobile in the history of mankind...! Up to the end of nineteenth century, most of the transportation was done by the horse driven buggies. There was an idea of constructing self-driven vehicle and many researchers were trying to develop the same. But the most successful attempt that gave birth to the automobile era was by Mr Carl Benz in 1885.

In the year 1885, Carl Benz developed the first car running on IC engine fuelled by gasoline. On January 29, 1886, Benz applied for the patent for his vehicle.

The first car constructed by Carl Benz was a two seater vehicle. It had a compact high-speed single cylinder four stroke engine installed horizontally at the rear, tubular steel frame, the differential and three wire spoked wheels. Interestingly, in this car, the chassis and the engine formed a single unit. The engine details included an automatic intake slide, a controlled exhaust valve, high voltage electrical vibrator ignition with spark plug and water/thermo siphon evaporation cooling.

In July 1886, for the first time; the three wheeled Benz patent motor car, model no. 1 was reported.

But, the story of the first Benz does not end here... At that time in Germany, the horse-driven vehicles were supposed to be very prestigious. Also, using a horseless vehicle was supposed to be thing to be ashamed of as well as the insult of the nation. So, Carl Benz was afraid of marketing his invention and he kept his car hidden in house. But, his wife, Bertha Benz firmly believed that he should bring his invention in front of the public and market it. Because Carl Benz was reluctant of marketing the car, she decided to market it on her own... And here, the real story of the Benz started...!

In early August, 1888, without her husband's knowledge, Bertha Benz with her two sons left her house in Mannheim and headed for her mother's house in Pforzheim, driving the newly constructed 'Patent Motorwagon No. 3'.

This was not a short journey, but a long one of about 104 km. Thus she became the first person in the history to drive a horseless vehicle for long distance. Interestingly, the first person to drive an automobile successfully for a long distance was a woman, Bertha Benz...! She left Mannheim around dawn and reached Pforzheim somewhat after dusk, notifying Carl her successful journey by telegram. They drove back to Mannheim three days later by a different itinerary and the journey was about 90km. Along the way, several people were frightened by the automobile and the trip proved to be a great deal of publicity.

The drive was helpful for Carl Benz as he was able to introduce several improvements after Bertha reported him everything that happened along the way. She also made important suggestions such as the addition of an additional gear for climbing hills. Moreover, she solved many problems on the way. She found out 'Ligroin', a solvent available only at dispensing chemists' shop to use as a fuel. Thus, the still existing Statt-Apotheke (town pharmacy) in Weisloch, some kilometres south of Heidelberg, became the world's first filling station. A blacksmith helped her to mend a chain in Bruchsal. The wooden brake linings were creating problems in braking. To solve this, she stopped at a leather shop and fixed some leather on the wooden brake linings. This proved to be more efficient for braking. Thus brake pad was invented. She used a straight heparin to clean a fuel pipe which had become blocked and also used a garter to insulate a wire.

This historic trip created a great example of marketing. Bertha Benz was bold, had great marketing skills and along with the journey, she also set an ideal for the women!

The story of the first Benz afterwards inspired many to produce cars and thus we today are able to see so many cars running on the streets...

*"The difference between stupidity and genius is that genius has its limits."*

— Albert Einstein

# USELESS INVENTIONS !

VINISHA AYYAPAN



Let's play a game. Given below is a list of weird inventions. Many amongst them don't exist. Only three of them exist. Since most of them are ridiculous, I trust you to pick the real ones out.

1. Solar Powered Flash Light (torch)(why anyone would bother with a solar powered flash light when there is plenty of sun light to go around, baffles me!)
2. Glow in the dark sunglasses (would you wear sunglasses in the dark?)
3. Inflatable Anchor (isn't an anchor supposed to be strong?)
4. Waterproof sponge(why use is it then)
5. Waterproof Teabags(maybe for someone collecting various varieties of tea)
6. AC adapter for Solar powered calculators (its solar powered for heaven's sakes!!)
7. Fireproof Cigarettes (how would you light it then?)
8. Battery powered Battery Charger(just hilarious)
9. Double sided playing cards (poker would be so much more fun now!!)
10. Ejector seats for Helicopters (frankly you'd expect the person designing ejector seats for helicopters, which for SOMEONE'S kind information are supposed to save lives) to at least be aware of the fact that a chopper has its rotating blades at the top. Imagine someone ejecting themselves with a hope of surviving with few injuries and instead being chopped into millions of pieces. Maybe that's why it is called a chopper)

Hope you had a hearty laugh reading this strange and bizarre stuff that peculiar people seem to have invented when they were bored out of their wits. Guessing that you have your answers ready, let me tell you a little secret. Not three but all the above creations are real. And guess what, there is more surprise. These even have some pretty handy uses.

1. Charge it during the day. Energy can be stored, remember?
2. Party accessories
3. They're used when the seabed is sandy and a solid anchor wouldn't take hold. Drop the anchor and as it inflates it gets stuck in the sand giving resistance. Very useful.
4. Pillows, mattresses, etc. It is a pretty useful invention...
5. To hold tea in them so they don't get wet before use.
6. To recharge batteries if there's little or no sun.
7. Fireproof cigarettes are actually real however, it is not the cigarette itself that is fireproof it is the chance to start a fire with the cigarette. For example if you throw a regular cigarette in a bunch of leaves it has the chance to catch the leaves on fire, a fireproof cigarette when thrown in leaves will not catch the leaves on fire.
8. So big batteries can charge little batteries. They exist.
9. Magic tricks
10. People do have common sense. The blades are detached first

*"Whenever you find yourself on the side of the majority, it is time to pause and reflect."*  
— Mark Twain

# GREEN BUILDINGS- SUSTAINABLE LIVING

DHAWAL VARTAK



Green building (also known as green construction or sustainable building) refers to a structure and using process that is environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. The International Energy Agency (IEA) released a publication that estimated that existing buildings are responsible for more than 40% of the world's total primary energy consumption and for 24% of global carbon dioxide emissions. These figures are sufficient enough for us to recognise the necessity of implementing green building practices. In fact the Green Building movement originated from the need and desire for more energy efficient and environmental friendly construction practices.

A study conducted by the Energy Information Administration (EIA), U.S. Department of energy indicates that there is a visible trend across the globe wherein the growth rate in total energy consumption has been greater than the population growth rate. In developed countries the energy consumption growth rate is only marginally higher as compared to the population growth rate. For example, in USA, the energy consumption is projected to grow at 1.3% while the population is projected to grow at 0.8%. In contrast; in developing countries like India population growth rate is expected to be 1.3% while the energy consumption rate is expected to grow at 4.3%. The construction industry in the country is growing at a rapid pace and the rate of growth is more than 10% as compared to the world average of 5.2%. Hence the implementation of green building practices in the building sector assumes tremendous importance.

There are a number of motives for building green, including environmental, economic, and social benefits. However, modern sustainability initiatives call for an integrated and synergistic design to both new construction and in the retrofitting of existing structures. Green building brings together a vast array of practices, techniques, and skills to reduce and ultimately eliminate the impacts of buildings

on the environment and human health. It often emphasizes taking advantage of renewable resources, e.g., using sunlight through passive solar, active solar, and photovoltaic techniques and using plants and trees through green roofs, rain gardens, and reduction of rainwater run-off.

LEED (Leadership in Energy and Environmental Design) green building rating system developed by the US Green building council is now recognised as an international rating system. The LEED rating system has been indigenized by the Indian Green Building Council (IGBC) to suit the national context and priorities. A LEED rated building consumes 30-50% less energy as compared to a conventional building. Achieving energy efficiency in buildings poses a number of challenges and at the same time presents a host of opportunities. Incorporating energy efficiency measures at design stage requires knowledge of Green building concepts. Hence there is a need of skilled and knowledgeable professionals who have a deep understanding of architecture and energy. IGBC is addressing this through a number of training and awareness programs all over the country. The government of India has launched the 'Energy Conservation Building Code' (ECBC). This code is voluntary and applicable to buildings having a connected load of 500 kW. This code addresses the minimum performance standards for energy efficiency in a building. This is an excellent initiative which will enable design of high performance buildings.

With the tremendous growth the country is witnessing, energy efficiency in buildings assumes paramount importance. The energy saving potential of green buildings can be as high as 40-50% if addressed right at the design stage. Thus the concept of Green Buildings will help us satisfy our need to progress but not at the expense of causing harm to the environment and ultimately put us on the path towards sustainability.

*"Behind every great man is a woman rolling her eyes."*

— Jim Carrey

# THE FOURTH DIMENSION

AKSHAY RUPANAWAR



What if we could go through the door without opening the door? Similarly what if we could go through the wall? Yes if we have a mountain in front and we could go through without going round? Don't you think this is some foolish stuff from some Hollywood movie..but no this is not so but the application of fourth dimension. How will these magical things happen with the 4th dimension? And what is the 4th dimension? For that let's consider a bug having zero height i.e. only 2 D animal. The bug will not be able to recognize any other dimension like a height. If we draw a circle around a bug, the bug will be like imprisoned. It may go till circle but beyond that it can't go. Now consider that we are standing in front of the bug. It would be able to see only the surface of our shoe which touches the ground. It won't understand how we are in reality. Now, if we pick up the bug in hand and brought up. i.e. taken in to 3rd dimension, moved horizontally and then again put back in its original position, surprisingly the bug will be out of the prison. So to get rid from that circular prison a bug needed as another dimension of height. Similarly, if we want go through the wall we need another dimension i.e. fourth dimension. According to 'Charles Hinton' though we are not able to see the fourth dimension, we can see its cross section or slices. Later he explained the theory of 'Hinton Cubes'. He used to call the fourth dimensional cubes as a 'Hypercube'. If we keep a cube in front of 2D bug, It will see it as a square only. If we want to form a cube we will require six cubes. As shown in fig. we will make cube by folding squares. But without making cube when all squares kept flattened on ground the 2D bug will see six squares. Again it will be able to see all joints between the squares. But when we start folding of squares he will see some squares are disappearing and when we complete the cube he will be seeing only the bottom square. Similarly imagine a man in place of bug. If anyone in the fourth dimension wants to make a Hypercube, he will require many cubes from 3D. Initially we will be able to see all the cubes. But later one by one all cubes will disappear and only one

cube will be visible when hypercube will form. Actually nobody can imagine how the hypercube looks like in originality.

Again Charles Hinton come with another theory, the theory is that the shadow of 3D object is 2D. similarly shadow of 4D object will be 3D. As we use up and down for third dimension. Hinton used the words like 'Ana' and 'Kata' for the fourth dimension. This is all about the existence of 4th dimension but now the question is what the 4th dimension is?

In 1754 'Jeo the Almbert' proposed that the time is the 4th dimension. Sir 'Albert Einstein' was also of same opinion.

We see any object is moving in the dimension of space, but similarly it is also moving in the dimension of time. Newton was thinking that the movement in space and the movement in the time are two different things. But Einstein was thought both are co-related and are like the two sides of coin. But How?

When car is in steady state on road then the car is travelling only in the time dimension nothing else. But when car is running some movement of car is transformed from time dimension to space dimension. In the sense car moves in both form of dimension. That's why the speed of clock reduces when we are moving with certain velocity but our velocity is negligible. But the sum of movement in space and movement in time is always constant for the given time. If we go on increasing the velocity of car the clock will slowly stop working and when we will reach to the speed of light the clock will completely stop the working. Even if we again go on increasing the speed the clock will start moving in opposite direction (i.e. anticlockwise). That means we are going in the past. Actually speaking the car will be acting as a time machine.

Einstein's twin paradox model is very famous for that. So, if we want to go in the past we can go by just maintaining speed greater than light..

Don't you think this is much too easy!!

*"Intelligence without ambition is a bird without wings"*  
— Salvador Dall

# TPP ABSTRACT

## SMART SPEED BREAKER

UMESH GANESH DINDE

Man in his lifetime, uses energy in one form or the other. In fact whatever happens in nature results out of the conversion of energy in one form to the other? The extensive usage of energy has resulted in an energy crisis and there is a need to develop methods of optimal utilization which will not only ease the crisis but also preserve the environment.

“Saving is another way of gaining”. This paper attempts to show how energy can be saved by the road speed breakers. The number of vehicles passing over the speed breaker in roads is increasing day by day. There is possibility of saving the energy by neutralizing speed breaker for stipulated period of time.

My paper explains clearly, the working principal of the designed system, its advantages. Design of each component has been carried out using standard procedures; a similar model of the system has been modeled using Google Sketch-up.

**KEY WORDS:** - Speed breaker, fuel losses and physical injury

### INTRODUCTION

*What is speed bump?*

A speed bump is a traffic calming feature of road design used to slow traffic or reduce through traffic, via vertical deflection.

*Application*

The use of speed bumps is widespread around the world, and they are most commonly found where vehicle speeds are statutorily mandated to be low, usually 40 km/h (25 mph), or 8 to 16 km/h (5 to 10 mph) in car parks.

*Why we should care?*

A large amount of energy is wasted at the speed breakers through the dissipation of heat and also through friction, every time a vehicle passes over it. There is great possibility of saving this energy by neutralizing the speed-breaker. some disadvantages of traditional speed breaker as follows.

- ☒ Slow response time of emergency vehicles.
- ☒ May divert traffic to parallel residential streets.
- ☒ Can cause damage to some vehicles.
- ☒ Can increase traffic noise, especially when large goods vehicles pass by.
- ☒ Can cause discomfort for drivers and passengers.
- ☒ Drivers are distracted by the bumps, therefore ignoring other hazards such as children.
- ☒ Increase pollution as traffic travels in a lower gear using significantly more fuel per mile.

☒ Cause spinal damage or aggravate chronic backache.

*Importance of solution*

Some buildings having fixed clock in and clock out timings, for those buildings speed breakers are useful only for stipulated period of time in a day (3 hrs out of 24 hrs). But speed breaker in front of building is serving for entire day which is not required for that building. So the basic idea is to eliminate the speed breaker for unnecessary times and activate them in for required time, so that every vehicle can avoid the speed breaker during unnecessary timings and hence fuel can be saved which would have got wasted while low gear runs to pass the speed breaker.

### SCOPE OF THE PAPER

The utilization of energy is an indication of the growth of a nation. For example, the per capita energy consumption in USA is 9000 KWh (Kilo Watt hour) per year, whereas the consumption in India is 1200 KWh (Kilo Watt hour). One might conclude that India has dependent fuel economy unlike other developed countries. Hence more research and development and commercialization of technologies are needed in this field. India, unlike the top developed countries has very poor roads. Talking about a particular road itself includes a number of speed breakers. By just placing a unit like the “Smart speed breaker”, so much of energy can be saved. On other side this smart speed breaker can reduce noise due to instant breaking of heavy and light vehicles.

### WORKING PRINCIPLE

Design of speed breaker consist of a rubber bumps (rubber speed breaker). This rubber speed breaker should move about z axis. For a lifting purpose a screw jack is provided with a worm gear which is driven by motor. But here, all loads cannot be taken by screw jack for certain hours. So speed breaker provided with locking mechanism which sustain all load and screw jack will be safe from damage. Locking mechanism is provided with 38 locking bar mechanism to avoid bending stress into the speed breaker

Step by step working of smart speed breaker as follows

**STEP 1:-** Manually switch should operate when it is required to actuate speed breaker. While operating speed breaker another person should stop traffic.

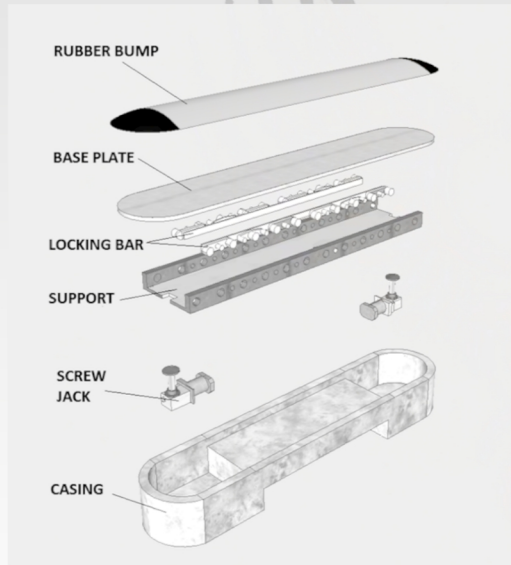
STEP 2:- As switch is operates motor will be start and it will lift the speed breaker by means of screw jack

STEP 3:- As the speed breaker reaches as ground level locking will operated by cam

STEP 4:- Locking will lock the speed breaker to the ground level

STEP 5:- Now traffic can run over the speed breaker. In retarding of speed breaker reverse procedure will be followed.

## CONSTRUCTION AND DETAIL



## CALCULATION

### DESIGN OF BASE PLATE

Here the designer considers that total weight on speed breaker is a weight of army tank (example- Arjun tank, Indian army). Wight of Arjun tank is 60 tons (60,000 kg).

Assumptions

- Consider weight is uniformly distributed over speed breaker
- Consider total weight of vehicle is on speed breaker instead of part weight of vehicle
- Total weight on rubber speed breaker is the total weight on base plate

Material specification

Structural steel ASTM A36 steel

Yield strength (Mpa) - 250

Ultimate strength (Mpa) - 400

Design stresses

$f_{td} = 80 \text{ Mpa}$ ,  $f_{shd} = 48 \text{ Mpa}$ ,  $f_{crd} = 160 \text{ Mpa}$

By standard dimension of speed breaker

Breadth (b) = 2,000 mm

Width (w) = 450mm

### DESIGN OF BASE PLATE

Considering tensile failure of base plate

$$f_{t(ind)} = W / (b \times w)$$

$$f_{t(ind)} = (5.89 \times 105) / (2000 \times 450)$$

$$f_{t(ind)} = 0.654 \text{ Mpa}$$

$$f_{t(ind)} < f_{td}$$

(A) To find out thickness of base plate

(i) Considering shear failure along breadth

$$f_{shd} = W / (b \times t)$$

$$48 = 5.89 \times 105 / (2000 \times t)$$

$$t = 6.135 \text{ mm}$$

(ii) Taking a shear failure along width

$$f_{shd} = W / (w \times t)$$

$$48 = 5.89 \times 105 / (450 \times t)$$

$$t = 27.27 \text{ mm}$$

$$t = 28 \text{ mm}$$

Tacking a bending failure of base plate

$$f_{bendingd} = \{W \times (b/2)\} / \{(t \times 4502)/6\}$$

$$80 = \{5.89 \times 105 \times 1000\} / \{(t \times 4502)/6\}$$

$$t = 35.45 \text{ mm}$$

$$t = 36 \text{ mm}$$

### DESIGN OF LOCKING BAR

(i) Shear failure of locking bar to find diameter & no.

$$f_{shd} = W / (c/s \text{ area})$$

$$48 = (5.89 \times 105) / \text{Area}$$

$$\text{Area} = 12270.833 \text{ mm}^2$$

Let's take  $d = 30 \text{ mm}$

For 1 section area

$$\text{Area} = a = (\pi / 4) \times d^2$$

$$\text{Area} = a = (\pi / 4) \times 30^2$$

$$\text{Area} = a = 706.86 \text{ mm}^2$$

Total no. of circular bar required is

$$(\text{Total Area} / \text{Area})$$

$$= (A / a)$$

$$= (12270.8 / 706.86)$$

$$\text{Total no. of circular bar required} = 17.35$$

$$\text{Total no. of circular bar required} = 18 \text{ nos}$$

(ii) Crushing failure of locking bar to find length

$$f_{crd} = W / (\phi d \times l)$$

$$f_{crd} = ((5.89 \times 105 / 18) / (30 \times l))$$

$$l = 40 \text{ mm}$$

For take care of fluctuating load additional bars of dia 50mm are provided.

So we add 20 bars to take care of fluctuating loads.

For maintenance purpose we put 30 mm bar & 50 mm bar together so assembly of bars are look like as follows. Length of bars will remain 40mm. These 3 bars are put on to a case plate.

To find induced shear stress on bars

Total area will be

$$A_1 = (706.86 \times 18) + (1962.5 \times 20)$$

$$A_1 = 51973.48 \text{ mm}^2$$

$$f_{sh(ind)} = W / (\text{Total area})$$

$$f_{sh(ind)} = 5.89 \times 105 / 51973.48$$

$$f_{sh(ind)} = 11.33 \text{ Mpa}$$

$$f_{sh(ind)} < f_{shd}$$

So locking bars are safe

### DESIGN OF LOCKING PLATE

#### DIMENSIONS

Locking plate thickness = locking bar length = 40 mm

Breadth of plate is 100mm

### DESIGN OF SCREW JACK

Total load = density of steel X volume of assembly

Total load = 7750 X 0.1176

Total load = 911kg

W = 1 ton

The lifting speed depends on the use of screw jack where the control of motor speed is necessary. Electric motor drive revolutions should not exceed 1800 RPM; max linear speed is 30 mm/sec.

Loading Duty:

Static Loading: 0.5 ton ~ 100 ton

Dynamic Loading: 0.1 ton to 26 ton

Input Horsepower Ranges: 0.03 HP ~ 21.5HP.

Lifting Screw Diameters: 20 mm ~100 mm.

Lifting Screw Pitch: 5mm ~ 16 mm.

Lifting Speed: 75 mm/min ~1800 mm/min

#### **ADVANTAGES**

- Fuel loss due to low gear runs of vehicle required for crossing speed breaker will get eliminated.
- Damage to vehicle with low ground clearance will be avoided
- Traffic noise due to slow run and sudden breaking of vehicle can be avoided
- Can cause comfort for drivers and passengers.
- Pollution can be decreased as traffic travels in a higher gear using significantly less fuel per kilometer.
- Spinal damage or aggravate chronic backache can be avoided.

#### **CONCLUSION**

- This paper can help to avoid unnecessary fuel losses which are causing due to traditional speed breaker, and help to promote the effective fuel usage.
- Physical damage to human health due to traditional speed breaker can also be avoided.

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This Technical Presentation was presented by Umesh Ganesh Dinde, Department of Mechanical Engineering in the 6th semester from Rajiv Gandhi Institute of Technology, Mumbai at the TPP competition held on 7th April in the Torque TechFest.

This TPP won first place.

# MODERN TECHNOLOGY- THE REAL BRAIN DRAIN

ASHISH PATIL



Today's technology is producing a marked shift in the way we think and behave, particularly among the young.

Human identity, the idea that defines each and every one of us, could be facing an unprecedented crisis. It is the crisis that would threaten long-held notions of who we are, what we do and how we behave. The crisis could reshape how we interact with each other, alter what makes us happy, and modify our capacity for reaching the full potential as individuals. And it's caused by the simple fact; the human brain, the most sensitive of organs, is under threat from the modern world. Unless we wake up to the damage that gadget filled, pharmaceutically-enhanced 21st century is doing to our brains, we could be sleepwalking towards the future in which neuro-chip technology blurs the lines between living and non-living machines, and between our bodies and outside world. It could be a world where such devices could enhance our muscle power, or our senses, beyond the norm, and where we all take daily cocktail of drug to control our moods and performance. Already an electronic chip is being developed that could allow a paralyzed patient to move a robotic limb just by thinking about it. As for drug manipulated moods, they're already with us although so far only to a medically prescribed extent. Of course there are benefits from the technological progress but there are great dangers as well, and I believe that we are seeing some of those today.

The brain, in the other words, is malleable-not just in early childhood but right up to early adulthood, and, in certain instances, beyond. The surrounding environment has a huge impact both on the way our brain develops and how that brain is transformed into a unique human mind. Human brains have been changing, adopting and developing in response to outside stimuli for centuries. What prompted me to write this is that the pace of change in the outside environment and in the development of the new technologies has increased dramatically. This will affect our brains over next 100 years in a way we might never have imagined. our brains are under

influence of ever-expanding world of new technology; multichannel television, video games, MP3 players, the internet, wireless networks, Bluetooth links the list goes on and on. But our modern brain is also having to adopt to the 21st century intrusions, some of which, such as prescribed drugs like Ritalin and Prozac, are supposed to be benefit, and some of which, such as widely available illegal drugs like cannabis and heroin, are not.

Electronic devices and pharmaceutical drugs all have an impact on the micro-cellular structure and complex biochemistry of our brains. And that, in turn, affects our personality, our behavior and our characteristics. In short, the modern world could well be altering our human identity. Three hundred years ago, our notions of human identity were vastly simpler: we were defined by the family we born into and our position within that family. Social advancement was nigh on impossible and concept of "individuality" took a back seat. That only arrived with the industrial revolution, which for the first time offered the award for the initiative, ingenuity and ambition. Suddenly, people had their own life stories-ones which could be shaped by their own thoughts and actions. For the first time individuals had a real sense of self. But with our brains now under such a widespread attack from the modern world, there is a danger that that cherished sense of self could be diminished or even lost. Now days, huge amount of personal information now stored on the internet births, marriages, telephone numbers, credit ratings, holiday pictures and it's sometimes difficult to know where the boundaries of our individuality actually lie. Only thing is certain those boundaries are weakening.

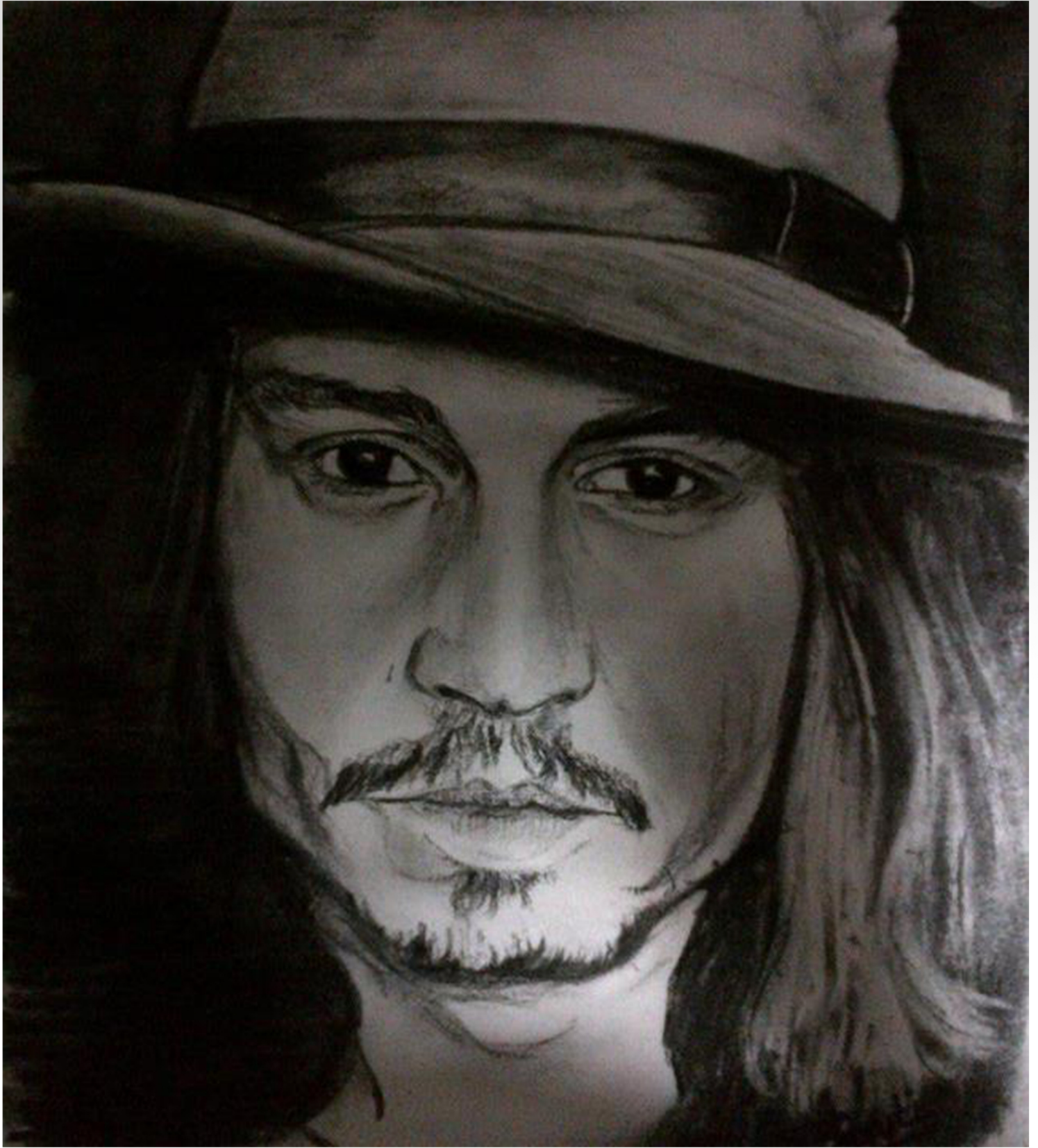
This is optimistic and excited by what future research will reveal into working of the human brain, and the extra-ordinary process by which it is translated into uniquely individual mind. And we seem to be so oblivious to the dangers that are already upon us.

*"The fool doth think he is wise, but the wise man knows himself to be a fool."*

*— William Shakespeare, As You Like It*



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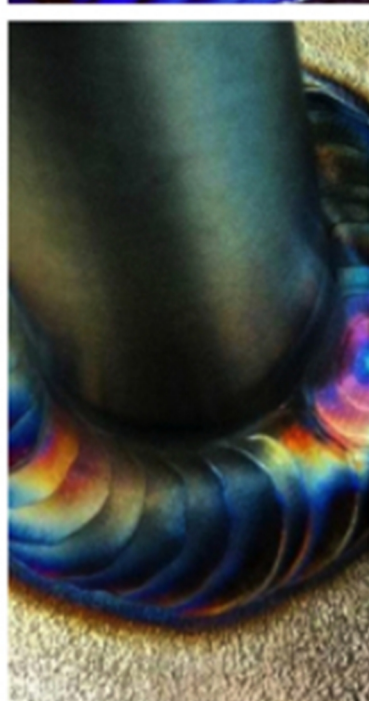
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