Department of Mechatronics

MECHANICS

ELECTRONICS

MATHEMATICS

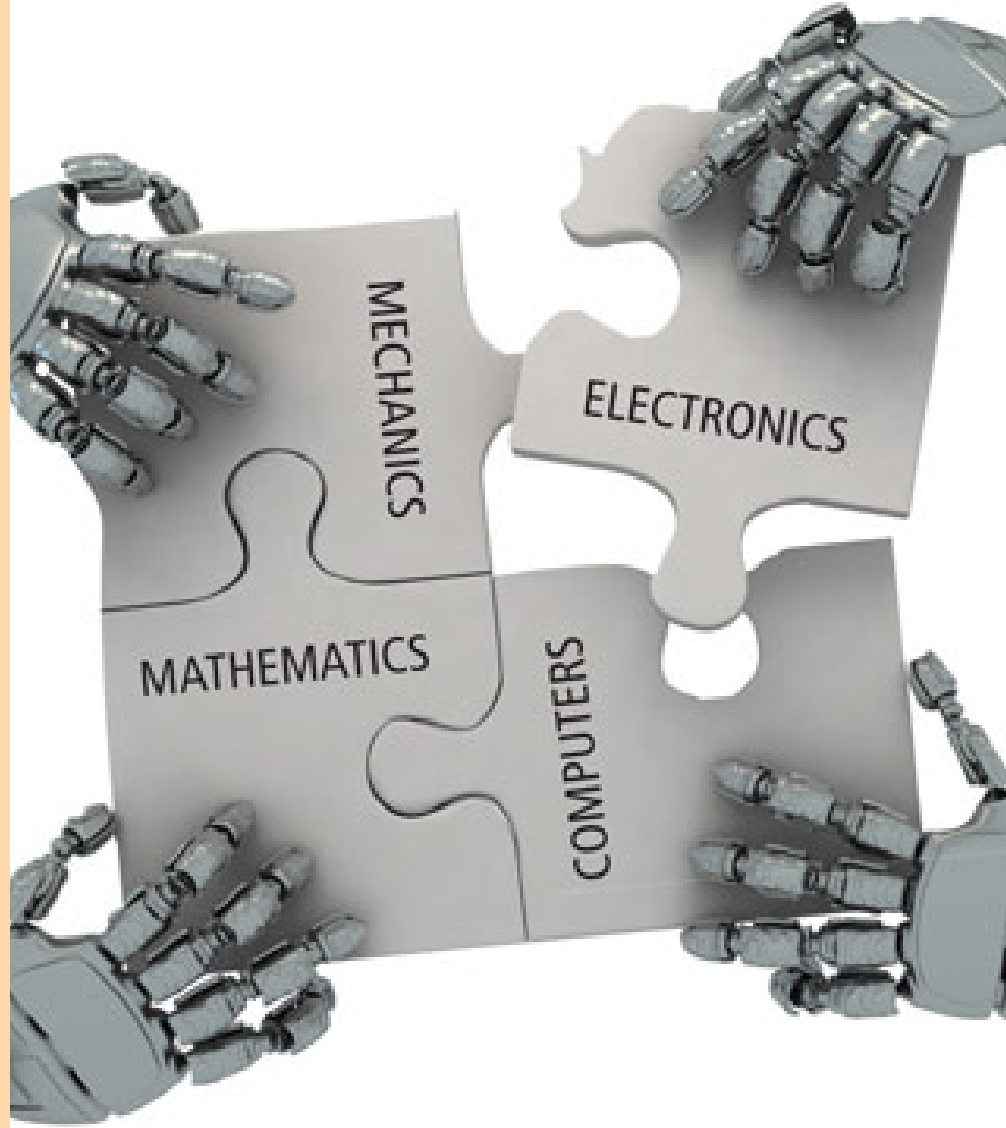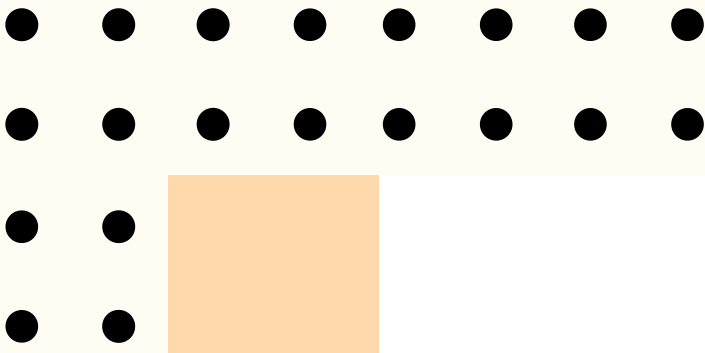COMPUTERS

FUSION

MAGAZINE 2020

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI - 625015

FUSION TEAM

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DEPARTMENT OF MECHATRONICS ENGINEERING

VISION:

"Be a globally renowned school of engineering in Mechatronics"

MISSION:

As a department, we are committed to

- Develop ethical and competent engineers by synergizing world class teaching, learning and research.
- Establish state-of-art laboratories and to provide consultancy services to fulfill the expectations of industry and needs of the society.
- Inculcate entrepreneurial qualities for creating, developing and managing global engineering ventures.
- Motivate the students to pursue higher studies and research.

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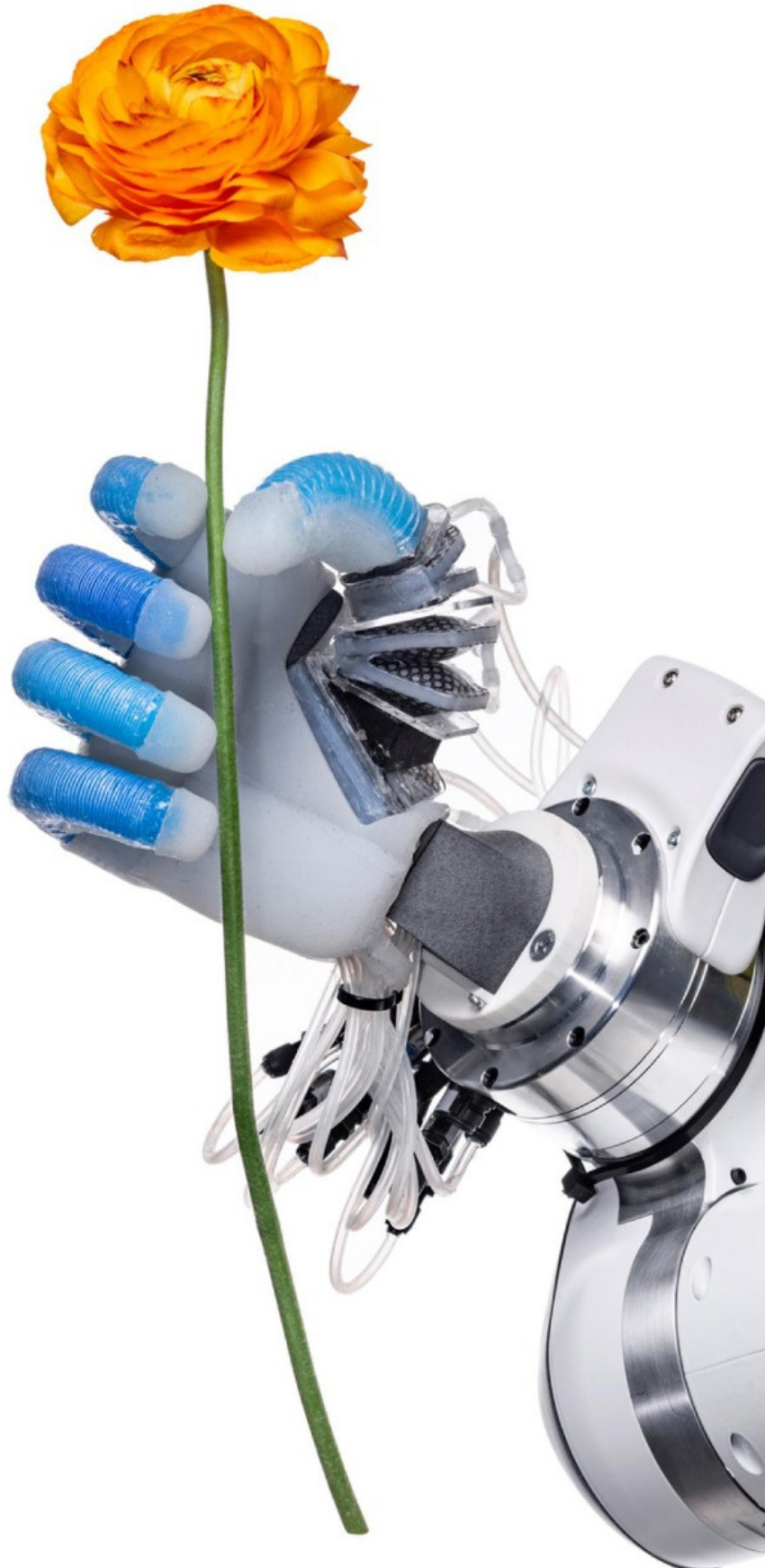**JOINT SECRETARY:**

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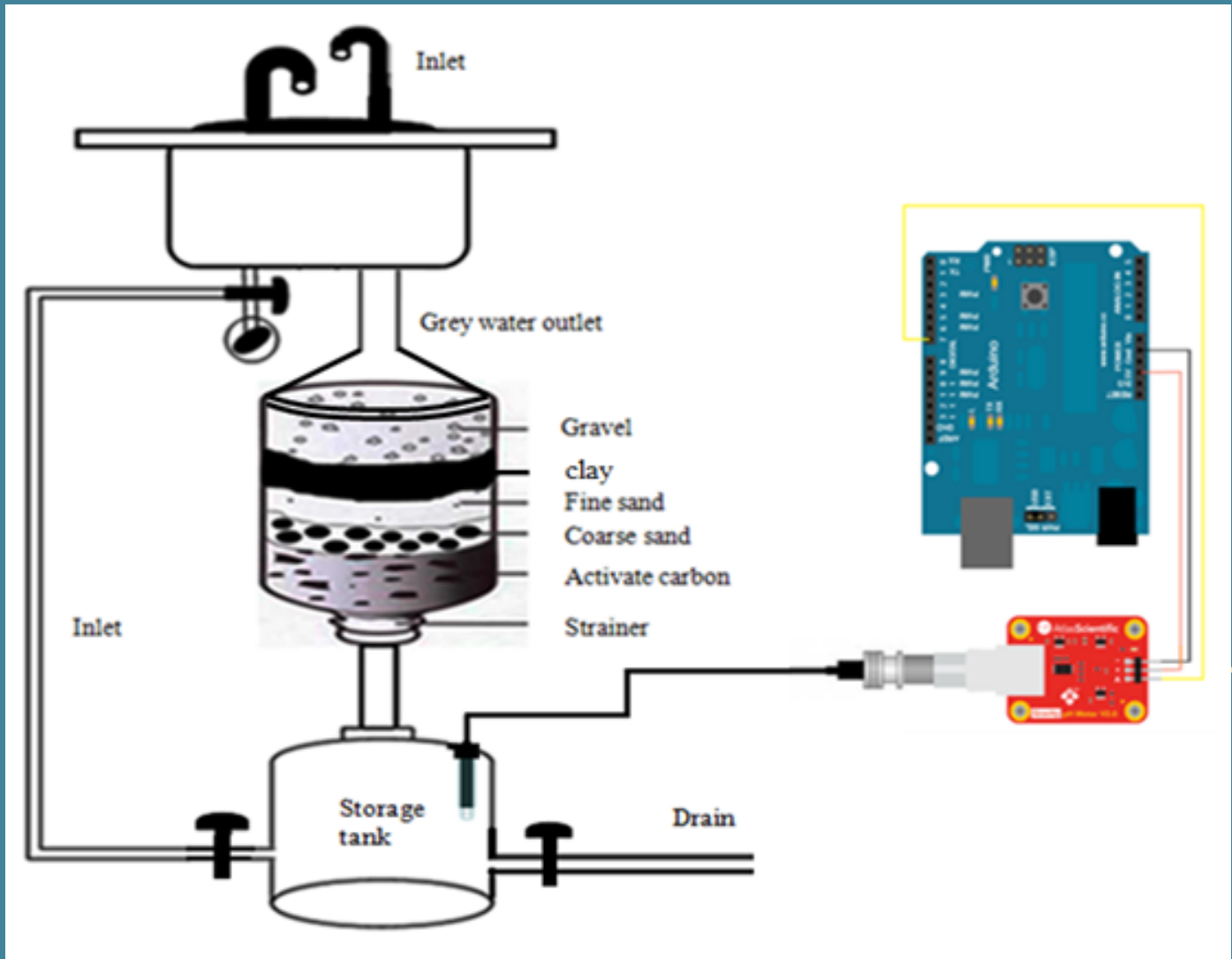
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Grey water outlet

Gravel
clay
Fine sand
Coarse sand
Activate carbon
Strainer

Inlet

Storage
tank

Drain

As a part of our design thinking course, we started to explore the environmental problems in and around our locality, which made us realize the role of engineers in solving the problem. As student engineers we took a problem and tried to solve it. One of the crucial problems faced by us in the current scenario is water scarcity. So, we looked forward a way to recycle the waste water so that we can cope up with the present-day issues.

Smart Waste Water Recycling System

In a household about 40% of the waste water is from kitchen, so we chose to recycle the kitchen waste water from the sinks. We might have come across many such ideas before which use the recycled water for secondary activities. But we thought of using it again in kitchen ensuring that it harms the user in no way. With this idea we started our design. Firstly we looked for a filter, and there are many chemical filters available that are expensive. So, we thought of the natural conventional filter for filtration. You may ask, is the filtration sufficient to recycle the water? Definitely yes, but this is assured based on the filtering materials that we have in our filter. Since the kitchen waste water contains impurities like food remains, oil contents, dissolved soap we designed the filter with a strainer, clay, gravel and coal. These filter materials can make the water free from the impurities. We just tried it and got satisfying results. But with this we can assure that it would be safe for use.

The deciding parameter we considered is a pH value of the recycled water. The water with the pH value of range 6.5 to 7.5 is safer to use. As we are in the modernizing world, we would look for a smart, automated and affordable solution, taking all these factors into consideration we tried of a design.

Finalists

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| Team Name	Team Leader	Problem Statement
DRIFTERS	SURYA KUMAR K	Sewage tank automated blockage cleaning removal
PERPLEX ANNHILATORS	JEYSAKTHI R	Reduce, Reuse & Recycle the Water used in Urban Homes & Apartments
CODEBLOODED	D.B.SURYA	Effective use of Food remains in hotels, Restaurants, Food shops, Functions, Hostels & Houses

TCE- HBTU 36 Hours Hackathon

Perplex Annihilators

We got a chance to hands on this idea of us through, TCE-HBTU 36 HOURS HACKATHON. Thiagarajar College of Engineering, Madurai, Tamil Nadu and Harcourt Butler Technical University, Kanpur, Uttar Pradesh conducted 36 hours hackathon between 27-Dec-2019 and 28-Dec-2019. The aim of this event was to motivate young talents from both colleges to create interesting solutions for one of the important social needs today - Waste Management in Urban Areas. Participants have to come up with innovative solutions under any one of the themes. We took the problem statement 'REDUCE, REUSE & RECYCLE THE WATER USED IN URBAN HOMES & APARTMENTS' and attempted for solution. We submitted the same idea and got chance to participate in the hackathon. Finally, we prototyped our idea into a working model. On the day of hackathon, we got many inputs from the juries and we are still working on to make it a product that would help the mankind.
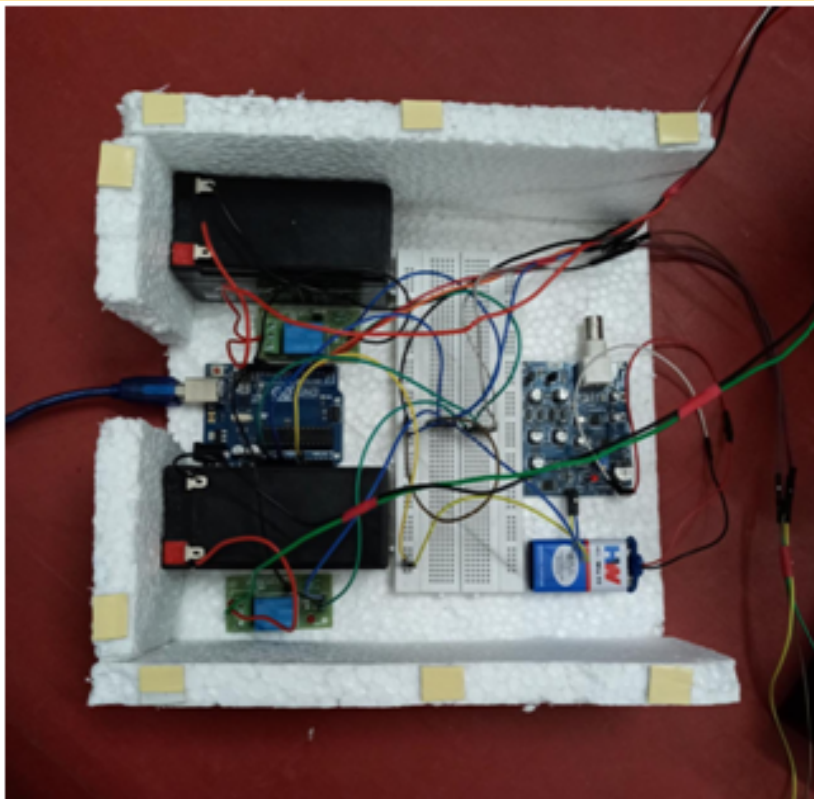
Jeyasakthi R, 2nd year, Mechatronics
Reshma K K, 2nd Year, Mechatronics

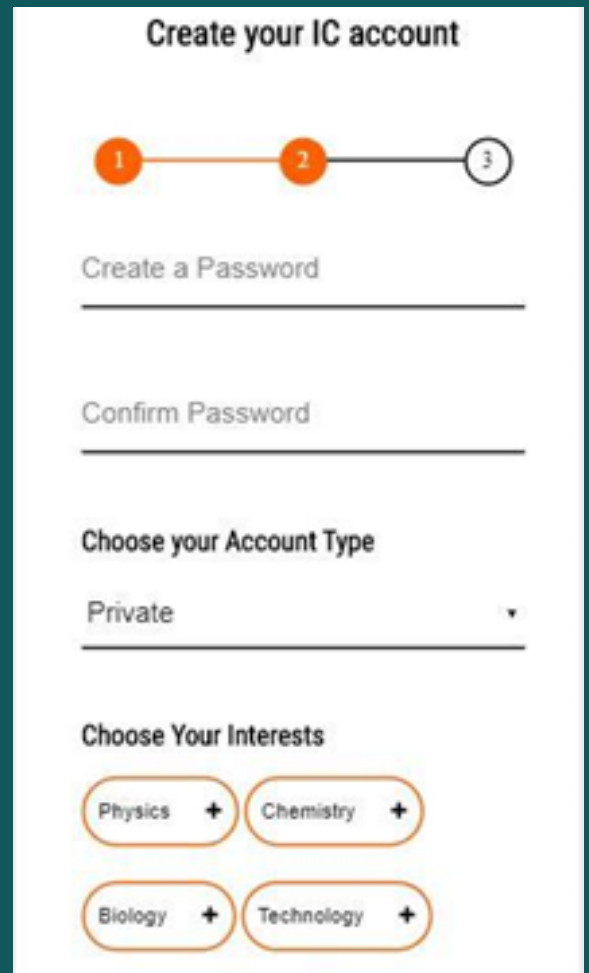# *CREDITS*

SOCIAL NETWORKING

Social Networking has evolved as a new trend in our society. We can safely say that most of us are adopting it as an integral part of our life. It has the potential to transform our world into a completely connected environment. Despite these advantages, it also has its own set of drawbacks.

Social Networking can be highly addicting. When we enter these platforms, we find ourselves sucked into a digital black hole of information called our personal feed. Sometimes, this can be so addicting that we end up scrolling our feed for hours without any use. So, we thought of creating a social networking platform that only provides useful information. This article explains the venture we had while pursuing this idea of creating a Social Network for Science and Technology.
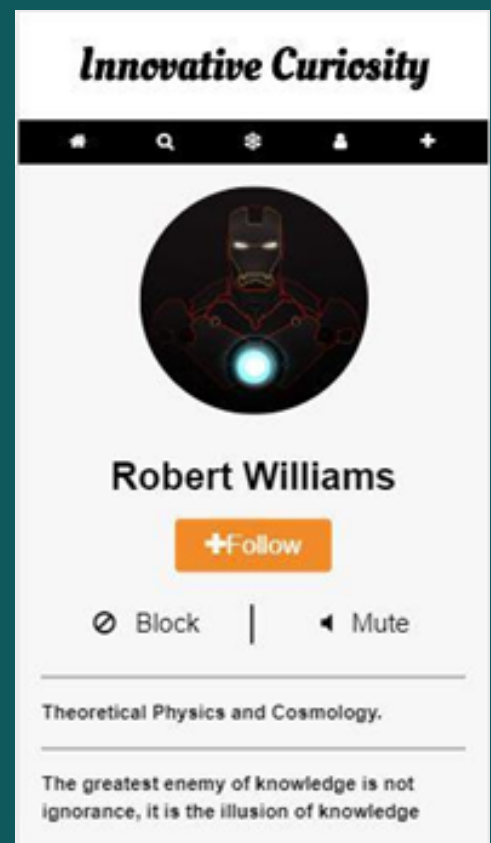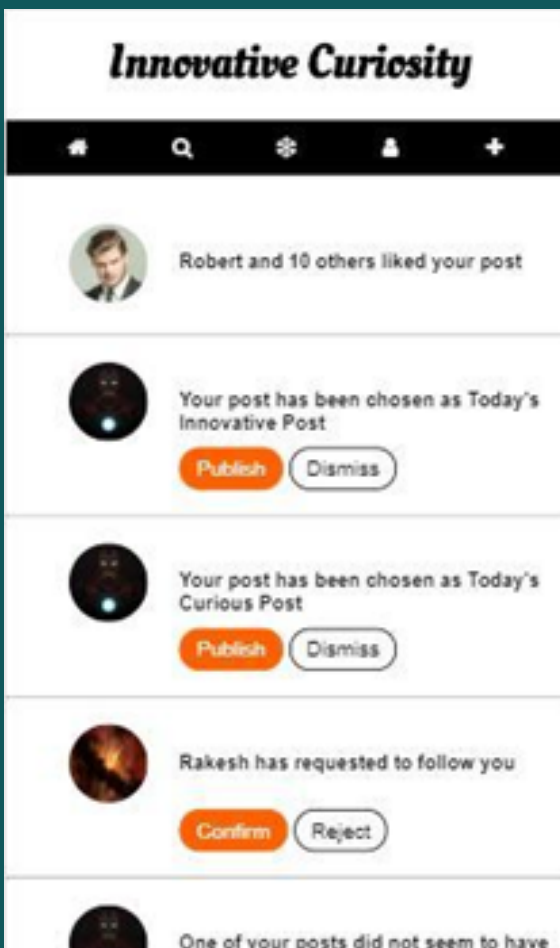
We decided to leverage the advantages of conventional social networking platforms by adapting most of its features like chat, followers, likes, hashtags, public or private profiles, etc. But we modified the way of uploading contents into the platform. The platform only accepted contents related to science and technology. We made it mandatory for a post to have one of these two hashtags #Science or #Technology. We planned to tailor the newsfeed and recommendations for each individual based on their area of interest. The platform also had two new ways of reactions to a post: Innovative and Curious based on which the Innovative and Curious Post of the day were decided and published. The front-end framework of this web application was created using HTML, CSS and JavaScript with the help of libraries like jQuery. The back end framework was deployed using PHP as the back end language and MySQL as the database management system. An asynchronous connection was made between these two frameworks by using XML HTTP Request Object or AJAX. We had fun exploring and creating new features for this Social Networking application.

We named the platform as "Innovative Curiosity". A beta version was released and was hosted in the following URL: https://www.innovativecuriosity.com (Not available now) for a day. We had planned to launch the application by collecting funds from an Indegogo campaign. Though the campaign was not a success and despite the fact that we never managed to launch the full application, we had a great time working on it. As a famous saying goes, "Better an oops than a what if", this endeavour which ended in "oops" made us realize that

FINAL FRUIT MAY BE BITTER OR SWEET, IT IS THE EXPERIENCE THAT MATTERS.

Create your IC account

1 —— 2 —— 3

Create a Password

Confirm Password

Choose your Account Type

Private ▾

Choose Your Interests

Physics +   Chemistry +

Biology +   Technology +

Showcase of the design and the front-end framework of our application:

Innovative Curiosity

Robert and 10 others liked your post

Your post has been chosen as Today's Innovative Post
Publish Dismiss

Your post has been chosen as Today's Curious Post
Publish Dismiss

Rakesh has requested to follow you
Confirm Reject

One of your posts did not seem to have

Innovative Curiosity

Robert Williams

+Follow

⊘ Block | ◀ Mute

Theoretical Physics and Cosmology.

The greatest enemy of knowledge is not ignorance, it is the illusion of knowledge

Metalheads In Healthcare

Jeyasakthi R, 2nd year, Mechatronics

Robotics experts have set their sights on the medical field. A medical robot is a robot used in the medical sciences. Many believe that an autonomous robot could soon be a regular member of any hospital's medical staff, performing duties from taking a patient's pulse and scanning vital signs, to reading case notes or even performing surgery!

Is this the beginning of a robot apocalypse? No.
Can these robots make us immortal? No.

But what this does is that the medical field is on the brink of sweeping changes that could mean better diagnostics, safer less invasive surgery, shorter waiting times, reduced infection rates, and increased long-term survival rates for everyone. And that is definitely something to be excited about.

1. RIBA (Robot for Interactive Body Assistance)

- A number of companies have explored the idea of humanoid robots as future home-helpers for elderly people. The latest experiment from Japan is distinctly more bear-shaped, though. Meet **Robear**, an experimental nursing-care robot developed by the RIKEN-SRK Collaboration Centre for Human-Interactive Robot Research and Sumitomo Riko Company.

Standing about 4½ feet tall and weighing roughly 400 pounds, RIBA appears rather imposing. Yet it moves delicately, if slowly, on its omnidirectional, four-wheeled base. Lifting patients out of bed and depositing them in a wheelchair is RIBA's most impressive feature. Indeed, RIBA is billed as the first robot that can pick people up from beds and wheelchairs or set them down, and it does this with all the gentleness of a Florence Nightingale. RIBA is scheduled for release in the near future. For nursing homes, some of whom will require intensive care, there seems to be a ready market for RTC's big robot bear.
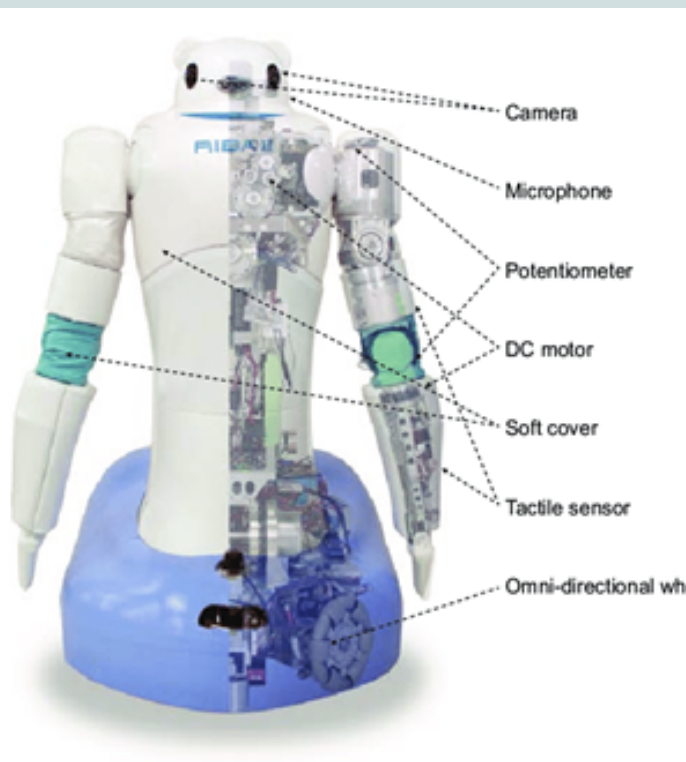
2. Orthoses (AKA Exoskeletons)

We all want to be Iron Man at least a little bit, but robotic exoskeletons have more medical applications than superhero ones. For starters, they are being used to help paralyzed people walk again, which is nothing sort of a miracle. They can also be useful for correcting malformations or for rehabilitation after a brain or spinal cord injury by providing weak muscles with the extra help they need to perform movements and begin healing the damage.

Most of these exoskeletons work through a combination of user input and pre-set movements, but with advancements in neural interfaces, it is only a matter of time before a directly mind-controlled exoskeleton is widely available. The first exoskeletons were focused on enabling paraplegics, amputees, and others to walk. Innovations in this segment continue to make huge differences in patients' life.

Small and big, smiley and faceless, surgical and pharma dispensing ones: robotics moves in all shapes and forms with big leaps into healthcare. That might be scary for many, but they have the potential to do good: to bring medical care to regions where there is none to be found; to make the production and distribution of pharmaceuticals cheaper and more efficient; to lighten the load of medical professionals; to help people walk again.

To reap the benefits and avoid the potential dangers of such a technological revolution, we need to keep ourselves informed about the strides that science makes so that we can better prepare and adapt to the not-so-distant future where medical robots play a crucial role and work closely with us.
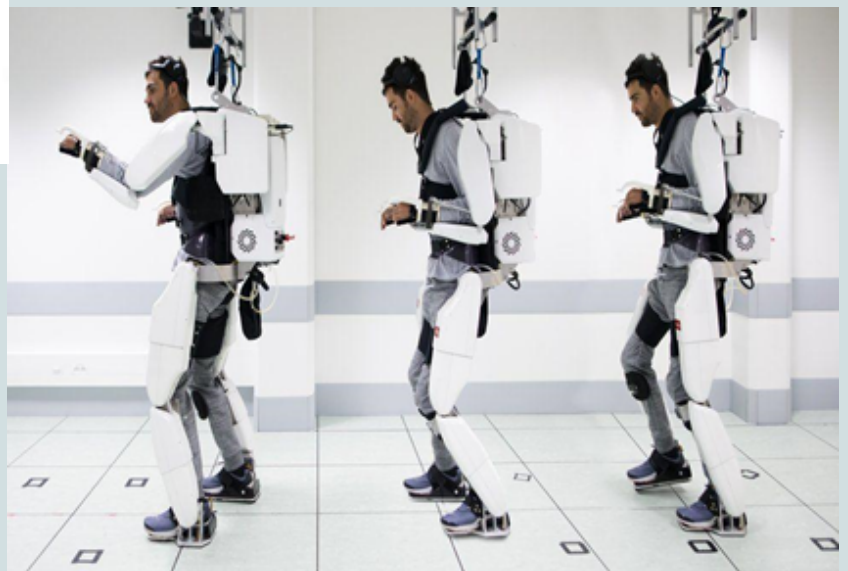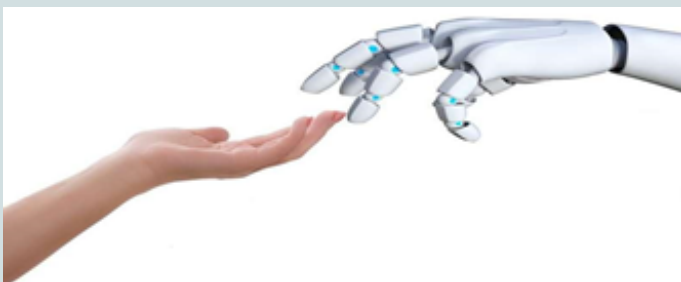
THE PATH TO THE DISCOVERY OF A NEW ELEMENT

S.R Sathyanarayana, 2nd Year
B.E., Mechatronics

Introduction:

There a number of natural and artificial accidents leading to Global Warming. But most of them are artificial accidents like in the case of 'Handling of Nuclear Wastes'. The disposal of nuclear wastes is one of the major topics of discussion amongst top scientists from all over the world and this problem is unsolved to date.

Disaster Details:

In 1986, 26th April Midnight, an explosion in one of the 4 RBMS Nuclear reactors occurred during tests conducted by a USSR Scientist Comrade Dyatlov. The explosion caused a major nuclear and radiation accident-causing excess release of nuclear radiations into the atmosphere. This nuclear disaster wiped out the entire civilization in the town of Pripyat and its neighboring areas. The radiation exposure is so high that it ionized the air around the reactors.

Solutions (Till date):

There were several solutions that were provided to control the spreading of the radiation but many scientists around the world were frightened and scared as they were mostly concerned about the after-effects of the radiation exposure. The after-effects cause death to occur slowly and cannot be cured.

The solution I've come up with:

I studied Nuclear radiation's harmful effects and the handling of nuclear wastes. I studied from multiple sources where I ended with several articles and news only about the past and present advancements made to clear the radioactive waste.

Radiation's Description:

To interact with Nuclear waste is suicide. This is because the radiation is from the U-235 atoms and every atom of uranium is like a Bullet. They can penetrate through anything on their way and destroy them. They can penetrate through the flesh and can destroy the DNA that in turn stops the regeneration of dead cells and tissues in the body. These factors are stopping nowadays scientists from solving the nuclear waste issues.
.

My Solution Idea:

As I have mentioned above, I was surfing through every article and news, every day and night, and thinking of a solution to radiated nuclear waste. Then, I thought of studying the process of Photosynthesis (absorbing sunlight and converting it to energy). So, if we can convert light to an energy why not these harmful radiations? I thought. Then I came to know about a mushroom that has mutated itself can convert the radiation to energy. I wanted to name this process and as the name implies for photosynthesis I thought of the name "Radiosynthesis". It was very much in accordance with the process.

Some of the Images related to the discussed topic:

Advantages of Radiosynthesis in real life:

We all knew that lead is now being used in handling Nuclear wastes as it can stop only a small amount of radiation from penetrating through. But if we were able to clearly study the process in radiosynthesis happening in those mushrooms and convert that to a device we will be able to discover a new elemental material that will be more powerful in the case of absorbing radiations. Not only the above way but also, the engines that run on the principle of Radiosynthesis can easily be used in the space engines which are used for long travel and also in handling of the Nuclear wastes.

MERCEDES PETRONAS AMG F1 TEAM

During every race weekend, Formula One fans will be shouting and screaming like anything to the real-life drama happening on the track and in the pit lanes. But F1 2020 season exceedingly ruled the fans, as most of the Grand Prix cancelled due to COVID-19 pandemic and the confirmation of Sebastian Vettel leaving Ferrari after 2020. Besides being a huge Tifosi(fan) of Scuderia Ferrari, I'm here to explain Mercedes's innovation, the Dual Axis Steering System. Since it is a pure engineering marvel. Mercedes Petronas AMG F1 team made all the headlines on Day 2 of Winter Testing when they revealed that they had developed a Dual Axis Steering (or DAS) system which changed not just the steering angle of the wheels but the toe angle between them. To help understand why this system is so beneficial we need to go over what toe is. (Use PICTURE 3 or 4) Toe is technically part of the suspension setup that will be adjusted for each particular track.

It describes the angle of the wheels relative to the perfect straight forward direction of the car. So, wheels with zero toe will point straight ahead. Wheels with positive toe will point inwards, towards the center line of the car. Wheels with negative toe will splay outwards. So, what are the effects of the toe? Common sense would have you think just get the wheels pointing parallel with zero toe and then get them moving left and right together as you steer the wheel. Why on earth would you point them off-centre? Well, there are quite a few things that are affected by the toe angle. The first thing affected by the toe angle is Tire Wear.

This should become quite apparent if you think about it. With zero toes, the front wheels are pointed straight ahead so as you drive the car forward the front tires are just rolling freely on their axes. If the tires are splayed out, the inside will be dragging somewhat along the track, heating and wearing the inside of the tread. Similarly, if the tires are toe-in, the outside of the tire tread will be dragging somewhat along the track causing temperature and wear issues that will need to be managed. With only a degree of toe, these problems aren't as catastrophic but they still need to be taken into account. To minimize wear, you would probably need to keep to zero toe, particularly on the straights. Again, all things being equal, zero toe will give you the best straight-line speed. If you introduce toe angle to your front wheels, they are wanting to go in a slightly different direction than straight ahead so you are essentially wasting power dragging them along the track instead of free-rolling as previously. It may only end up being a matter of a few km/h but anyone familiar with Formula 1 knows that the little things soon add up.

Now we move into an area where zero toe might not be your best friend. Let's think about what happens when you turn a corner. Let's imagine you driving your F1 car into and around a right-hand turn. Your front wheels should trace out curves and what's important to realize is the inside tire is always tracing a tighter curve than the outside tire. You know as the turning radius gets tighter and tighter, so you have to steer more so ideally, you would need the inside tire to be more angled through the corner than the outside tire. This allows both tires to more closely follow their turning curves, maximizing their grip and increase your speed and stability through the corner. You can achieve this by adding angling your front wheel toe outwards. On Straight, yes, the tires look weird and splayed. But once you turn the steering to drive through a corner, the inside wheel is now more aggressively angled to take the tighter line, while the outside tire is more gently angled to take the wider outside path. Toeing your wheels inward makes the car less planted through turns as the car is more reluctant to turn as the closer you get one tire to the correct steering angle, the more you point the other away, causing drag and resistance at the front end of the car. This leads us neatly to the last major effect of the toe which is straight-line stability. Let's put our cars back on a long straight, but think about what we just said about cornering. Toe out makes the car absolutely ready to turn. As soon as you start to turn the steering, the wheels are toed so that they encourage the car to turn in, with the inside wheel angled aggressively to take the tighter line. This means that while the car will keep pointing straight as long as you hold the steering straight, the moment you make a slight adjustment away from the centre, the car is more sensitive to turning. And holding the steering perfectly centred can be difficult when the car is bumping around or one tire hits a crack in the road.

Little disturbances can make the car want to hook itself left and right. Conversely, when the front wheels are toed in, they are reluctant to turn. They respond much more lazily to steering inputs which means the car will remain stable on the straights, even if bumps and such some disturbances in the steering. Now, normally teams lock in a toe setting that's the best trade-off between tire wear, straight-line speed, cornering speed, and straight-line stability as determined by the track and other parts of the suspension design nd setup. Most setups are a matter of trade-off after all where gains in one area result in losses in others. But what Mercedes have now managed to do, without apparently breaking the rules, is give the drivers the power to adjust the toe angle while driving by pulling back and pushing forward on the steering wheel. The Dual-Axis Steering system allows the driver to pull back on the steering wheel to bring the toe-in, and push forward on the wheel to pull the toe out.

This has several ramifications. The obvious one being that they can straighten up the tires for the straights, to increase their speed, reduce wear and rising temperatures on the inside tire tread and give the car more stability, while ALSO pulling the toe out for the corners for increased handling and speed. A simplified version of all the above is zero toe good for straights, negative toe good for corners. Mercedes can handle that. But of course, the toe isn't just a matter of in and out. There are fine adjustments in between. All corners are different. If the Mercedes drivers get a good feel for the DAS they can try and get the toe as close to perfect for every different type of corner. A tighter corner would benefit from a more dramatic toe out as the relative difference between the inner and outer lines is more pronounced. On another note, I've sort of spoken about rising tire temperatures as if they're a bad thing, but getting heat into the rubber is an important part of the performance. And getting the right amount of heat across the whole tire is particularly important. As mentioned, when tires are toed out, they tend to overheat the inside rubber and vice versa with when toe-in. But the Mercedes drivers could potentially fiddle with this on straights to balance the temperatures across the tires. This is particularly useful on out laps to prepare the tires for a hot lap, but even if they're told mid-race that the outside rubber is getting a little cold, they can toe in to try and help that part of the tire get into the sweet spot.

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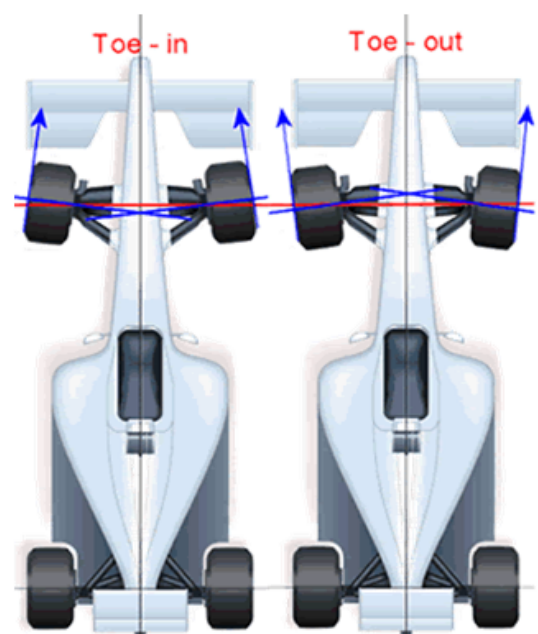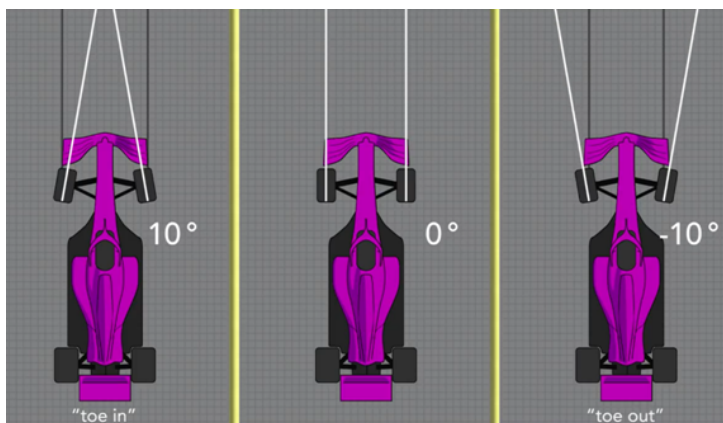
Rishwana M, 2nd Year, Mechatronics
Swathilakshmi P R K, 2nd Year, Mechatronics

GYNOIDS

INTRODUCTION

Gynoid, or fembot, is a feminine humanoid robot. Gynoids appear widely in science fiction film and art. As more realistic humanoid robot design becomes technologically possible, they are also emerging in real-life robot design. The term gynoid was first used by Gwyneth Jones in her 1985 novel Divine Endurance to describe a robot slave character in a futuristic China who is judged by her beauty. A gynoid is anything that resembles or pertains to the female human form. Though the term android refers to robotic humanoids regardless of apparent gender, the Greek prefix "and-" refers to man in the masculine gendered sense. Because of this prefix, some read Android as referring to male-styled robots. The portmanteau "fembot" (female robot) was popularized by the television series The Bionic Woman in the episode "Kill Oscar" (1976) and later used in the Austin Powers films,[8] among others. Robots is the oldest female-specific term, originating in 1921 from the same source as the term robot.

Examples of feminine robots

- Project Aiko, an attempt at producing a realistic-looking female android. It speaks Japanese and English.
- EEveR
- Actroid, designed by Hiroshi Ishiguro to be "a perfect secretary who smiles and flutters her eyelids"[13]
- HRP-4C
- Meinü robot
- Mark 1

FACTS

Gynoids may be "eroticized", and some examples such as Aiko include sensitivity sensors in their breasts and genitals to facilitate sexual response. The felicitation of gynoids in real life is attributed to male desires for custom-made passive women, and is compared to life-size sex dolls. However, some science fiction works depict them as femmes' fatales, fighting the establishment or are rebellious. Robot sex partners may become common place in the future. Female robots as sexual devices also appeared, with early constructions quite crude.

The first was produced by Sex Objects Ltd, a Brit company, for use as a "sex aid". It was called simply "36C", from her chest measurement, and had a 16-bit microprocessor and voice synthesizer giving primitive responses to speech and push-button inputs. In 1983, a busty female robot named "Sweetheart" was removed from a display at the Lawrence Hall of Science after a petition was presented claiming it was insulting to women. The robot's creator, Clayton Bailey, a professor of art at California State University, Hayward called this "censorship" and "next to book burning". The treatment of gynoid in fiction has been seen as a metaphor for hatred of women, as in the film Blade Runner, the three main female characters being gynoid, two of whom use their sexuality to try to manipulate or kill protagonist Rick Deckard, often using sexual imagery, such as when Pris tried to strangle him between his thighs.

Daniel Dingell writes that violence in treating gynoids represents Deckard's hatred of women. The third Gynoid, Rachel, acted as a submissive woman, even after Deckard almost raped her. Thomas Foster wrote, about the Dead Girls novel Richard Calder's work, that the body of gynoid technology portrays sexism in an unnatural context, highlights its negative effects. They also show that stereotypes and social attitudes will not always change through technological progress. The recent term introduced in science fiction genre to describe a female robot is known as gynoid. This term was introduced by Gwyneth Joned in het 1985 novel Divine Endurance to describe a robot slave character in a futuristic china, that is judged by her beauty.
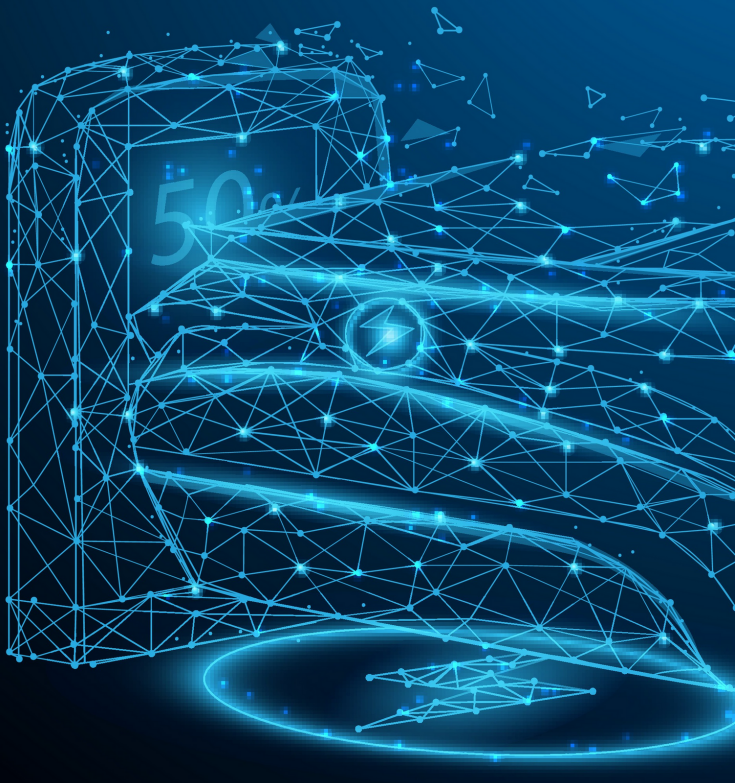
EV Charging Technology

Electric vehicles are considered the future of transportation and the deployment of EVs is strongly affected by the infrastructure in place. EVs suffer from range limitation compared to the fossil fuel powered vehicles of today due to expensive and heavy batteries and hence charging infrastructure has to be provided to increase the possible utility of them. Various studies on electric vehicles based on realistic travel behaviour have shown the necessity to have quick charge replenishment systems along with slow chargers. The quick charge replenishment (QCR) systems will help solve range anxiety among the EV owners as well as enable long distance travel by quick transfer of energy. Obvious technology options are fast charging technology, where the battery is charged with high power in short time (50-100 kW DC output power). The high power has significant effects on grid and also can decrease the lifetime of the battery. Another possible technology for QCR station is battery switching technology (also known as battery swapping), where during the serving process the whole battery is replaced by a similar type full battery.

To implement the process, standardized batteries and different ownership model of batteries are required. The number of serving units, peak power requirements and in case of battery switching, the extra number of batteries required would be calculated. DC fast charging technology can represent huge charging loads in rush hours, but with suitable grid installation conditions they could be handled. If the EV batteries of the future can handle higher charging powers, the number of serving units and time of charging can decrease while not causing additional stress on the grid. Battery switching technology, with the possibility to change the charging strategy (time of charging, rate of charging), means it is more beneficial to the grid. The battery switching method requires lesser number of serving units and does not put as much stress on the grid as fast charging. Another benefit of using battery switching is that the capacity of concentrated EV batteries could be used for grid regulation. The extra number of batteries required is directly dependent on the range of the fleet and for a fleet of range 160 km we only need to introduce 50 percent extra batteries into the system.

E-Yantra is one of the prodigious contests conducted by IIT Bombay. The contest is held for more than a year. It is a mini-E-way tour. We PF#2377 (ID given to us) are proud to be a part of them. It gives us the practical experience to whatever we have learned in all these years.

It gives us a sense of how different and hard is practical from theory. And friends, we swear that it is really hard to apply whatever we think. It is a fun way of learning things. It also enhances our abilities in teamwork, not only that but also to get acquainted with professors, our dear mates, and other department friends.

As with any competition it began with online aptitude. We had them cleared and the task was assigned to us. The task was Patrol Fish i.e., to build a robotic fish that manoeuvres around seas and ocean to check the pollution level, living habitats, and also make them loiter among places where humans aren't able to get through. So, the above was the problem statement given to us.

We had them come to us in parts (tasks). And each of them was evaluated and teams were selected. A total of 113 teams all over India participated in this contest of the domain same as ours. You can also, be included as part of our team by reading our experience through the contest.

Our E-Yantra Biography:

1. Our first task was to make a 3D model of a case for Arduino Nano in Fusion 360.
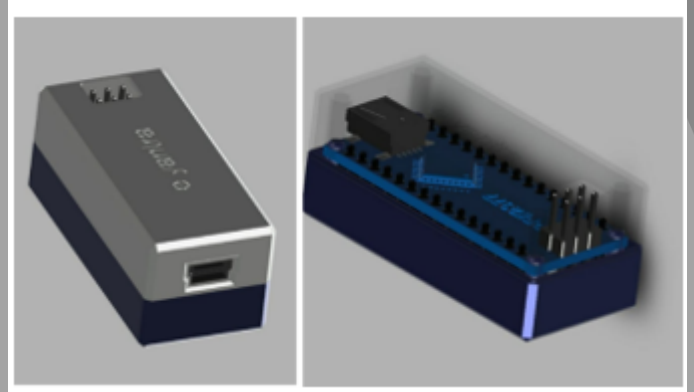
2. And our next task was to make the 3D model for a robotic fish that when met constraints will be 3D printed. And we named our fish as "White Lilly".

3. And when our semester was on our way, we were given all our jobs. We had to handle our pressure on both sides. And then a schematic of the receiver and transmitter circuit was given to us and asked to design the PCB in EAGLE.
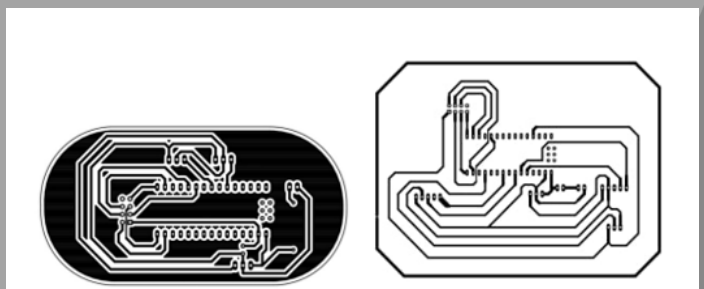
4. After completing the PCB, we received the 3D printed parts and the tool kits from E-Yantra. Out next task was to test the hardware that they gave us.
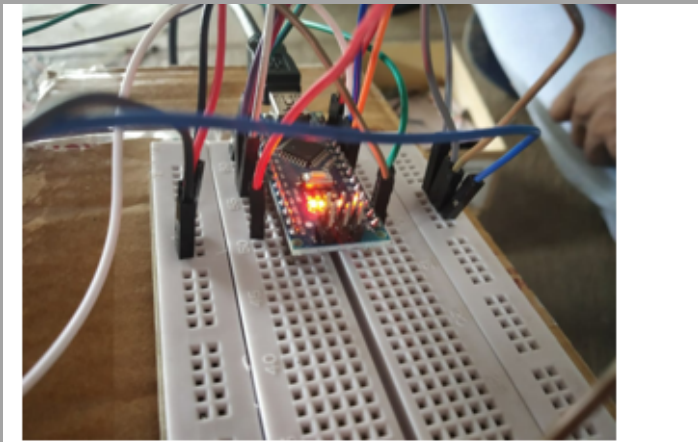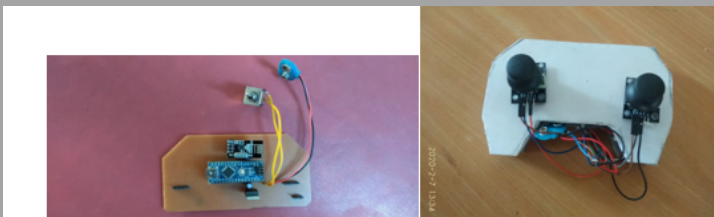

5. Then the receiver and transmitter PCBs for controlling our robotic fish through a new module are made. We assembled the receiver PCB inside our robotic fish and tested the fish in the water by controlling it through the transmitter.

6. We then made a buoy circuit and a gateway using PVC pipes. The buoy circuit will have a hall sensor that will be triggered when the fish with a magnet in its eyes comes beside the sensor.

We placed those gateways and buoys in a big water tub filled with water. Then we controlled our fish to trigger every buoy placed at different places in the tub and successfully completed our last task and are waiting for our ticket to IIT Bombay.

Credits…

We especially thank Dr. M. Palaninatha Raja, Head of the department, and Mr. S.Parthasarathi, Assistant professor for their continuous support and guidance. And also, we thank the Mechanical and Electrical, and Electronics Engineering departments for lending us their hands for our project.

Project By,
Gunasekar V
Balaji B
Ananth ON
Vishal RB
2nd Year, Mechatronics

Follow our videos:

https://youtu.be/VKzbFOb_DEU
https://youtu.be/5ZhCg_tI-Mc
https://youtu.be/JXkH_VN89qE

SIG WORK (CNC)

Subbiah AN

Bhaven Jain

2nd year, Mechatronics

The fabrication of low-cost CNC machine is to reduce cost and complexity of machine. The idea behind the project is how to make a basic CNC machine which is faster and relatively lower cost than others. Another main and unique idea of this project is the reduction of the size of the plotter and making it portable and handy. The most important theme of this project is to make the plotter as a good finished product. The change in software and hardware can create a new product having a different prototype and can reach good heights in the market. The software is simple and the hardware is minimized in order to give a new look. Main moto of making this is to acquire knowledge & skills.

(SUBBIAH ANNAMALAI): YOUTUBE PAGE

WE HAVE DONE OUR LAST WINTER INTERN IN NORD DRIVE SYSTEM WHICH IS ONE AMONG THE LARGEST MANUFACTURER OF ELECTRICAL MOTOR, VFD'S, GEAR BOX ETC....

NORD Drive systems Pvt. Ltd.
Mauje, Village Mann, Tal Mulshi
Adj. Hinjewadi Phase-II, 282/2, 283/2 Plot No. 15
Pune / Maharashtra - IN-411057

IIT INTERNSHIP EXPERIENCE

Hello Friends, I take immense pleasure to share my internship experience at Indian Institute of Technology Madras in the Department of Engineering Design. There, I got to meet some really amazing people from all over the country, some really talented and smart people. I worked under the guidance of Dr. Palaniappan Ramu, Associate Professor in the Department of Engineering Design and the co-guidance of Dr. Shaikh Faruque Ali, Associate Professor in the Department of Applied Mechanics. I carried out my project on "To understand the concept of Digital Twin Using a Bending Beam Test Bench". It aims at developing a twin model of the cantilever beam and to make online monitoring of the model with its hardware setup. This gave me a good insight into something outside of the usual Automation domain which was something I always wanted to do but had never got an opportunity to until then.

While working, I felt absolutely no pressure and things somehow always fell into my place. I was fortunate enough to be mentored by Ms. Suja Shree, PhD scholar whose guidance went a long way in making the internship a memorable one. She told me exactly what to do and was always available when in need. Other people around too were extremely friendly and easily approachable. There was always space for learning new things. Our mentors and guides gave us enough time and support to familiarise ourselves with the digital twin that we were developing which led to a much calmer environment. Apart from work, there was also ample time to go around the beautiful campus of IIT Madras. There was never a day when I had to work beyond normal working hours. Weekends were completely free.

Application Procedure:

The Summer Fellowship Programme in IIT Madras is for a period of two months with the stipend amount of Rs.6000/- per month, it would be in the month of May to July. I applied for my intern through the online application in IIT Madras official page. Out of 3000 students, I have been selected among the top five. This is one of the most popular methods of getting an internship at IITs. Shortlist the college and the department you want to intern at. Then search for professors who have similar research interest as yours and mail to them with your statement of purpose. You can search for professors as well as their email IDs from the official website of the IIT you want to intern with.

Website: https://sfp.iitm.ac.in/
            http://www.iitb.ac.in/en/education/research-internship

It is important to keep the mail terse and write concise details about you and your research interests. Here is how you can structure your email:

1. Introduce yourself. Include details about your CGPA and research interest.

2. Why do you want to work on the given subject and what skills you possess that can help you with the project?

3. Why do you want to work under him/her? Read some research papers that the professor has published and mention about what impressed you and why are you interested in working on the project.

4. If your email impresses the professor, you will get an internship call from IIT.

Thangappandiyan P
4th year, Mechatronics

Past Present Future are three great words on which the world revolves. The events kept changing and will be changing. One of the revolutionary changesis "Robotics". Robotics replaceshumans with mere machines, also a combination of futuristic human wisdom as its brain. While scientists as their role keep exploring things we student engineers keep re-innovating things and improving our knowledge. One of the most effective ways of gaining knowledge is knowing our conceptuals through games. Not only the concepts but through them also comes awesome ideas. We, the Silver Lucifer's team have created a manned fighter robot with all our creative bazzogus brains.

Silver Lucifer is what the bot named is, has an aesthetic wedge shaped outlook which is capable of unarming the opponent bot. The bot is angled such that it is closely zero clearance. Two rear and front wheels made of highly pressurized heated tyres adds up the bot with high torque. For the vehicle to be up and running the wheels are drives (power transmission drive) fitted with powerful BLDC motors with the sprockets fitted to them. To give the bot muscular bottom they are lathed with a single 5mm thick Iron sheet designed to accommodate the fittings. As humans have brains, vehicles require a controller to have them controlled. The controller (cytron) is placed in such a manner that it doesn't take any hits or disastrous vibrations at any circumstances.The transmitter and receiver of 2.4GHz frequency of RF planes' is tuned and used to send and control data of the robot. Our penultimate goal was to fight hard, secure position and gain knowledge.

Team members

Karthikeyan Palaniyapan (4th year) 16F025
Durai M (4th year) 16F063
Dhinesh T (4th year) 16F062
SubashChandraBose K (4th year) 16F071
D Shanthosh Sivan (3rd year) 17F068
R B Vishal (4th year) 18F055

ROBOWAR

AUTONOMOUS GROUND VEHICLE NAVIGATION SYSTEM FOR MULTI TERRAIN APPLICATION:

Autonomous vehicles have become an ever-growing field which has many applications for today's world. Achieving such precise autonomous navigation for any machine is not so easy. Depends on the application the hardware and software differ. The neural networks are old technique where they dropped because of the computation it requires now that we have enough computation hardware like Graphic processing Unit, it's possible now. Even though there were autonomous systems, Neural networks with high computation power makes the job very precise. The neural networks consume a lot of computation power but deliver good results in terms of navigation for a real time environment application which was hard to achieve with genetic algorithms and other soft computing techniques.

Yet the safety of autonomous vehicles is questionable. The governments of various country want the manufacturers to improvise the safety of these autonomous vehicles in order to provide the safety for people. As the very purpose of the discovery is to give comfort and safe to the people. So, the researchers and manufacturers are working hard to provide very reliable and sturdy vehicles. Researchers have found that the failure of some sensors or time lag of transmitting signals makes real damage to the system. So, they need to improvise the hardware and software for precise outcome. In terms of hardware there are more specific sensors to recompense the purpose of autonomous navigations. And in terms of software, many custom and specific algorithms are designed to acquire as many as information from environment and provide better communication within the system. Stereo cameras and LIDARs are the most commonly used hardware for any autonomous systems. The obstacle avoidance becomes very easy with these two combos. Although experts and researchers feel LiDAR are bit expensive and the reliability of these in long term is not good which brings them to create a specific LiDAR for autonomous application.

LIDARS
High-precision laser sensors that detect fixed and moving objects

CAMERAS
Detect and track pedestrians / cyclists, traffic lights, free space and other features

ARTICULATING RADARS
Detect moving vehicles at long range over a wide field of view

LONG-RANGE RADARS
Detect vehicles and measure velocity

SHORT-RANGE RADARS
Detect objects around the vehicle

Solid state LiDAR are under research which may provide such reliability for these applications. For the functionality of Autonomous system, it requires a lot of components and there is primary component like cameras and LiDAR. Currently under the guidance of Dr .K .Hariharan, Associate Professor-ECE and along with Mechatronics department PG scholar S. Karthikeyan, we have chosen the low budget 2D camera to make a decision for the navigation using scene terrain classification algorithm. Many researchers have done work related to it have chosen the 3D camera for better data acquisition, whereas to reduce budget our work the selection of 2D camera act as vision sensor. As it was stated that researchers trying to improvise the system by custom algorithms, the classification algorithm gives the best decision for the autonomous system when other sensors failed to communicate, this avoids extra pack of sensor correcting systems which makes the reduced space and cost.

Mr .S . Julius Fusic
Assistant Professor

Reference:

Jean-Pierre Giacalone, Luc Bourgeois, Andrea Ancora, "Renault SW Labs on Challenges in aggregation of heterogeneous sensors for Autonomous", IEEE, 2019.

INSIDE SMART HOME TUYA MODULE

By BALA SARAVANAN T.R.S.

Smart! Smart! Smart!

Becoming smart and automated is the trend in recent technology. In ancient days we used an incandescent light bulb which is an electric light with a wire filament heated until it glows. The filament is enclosed in a bulb to protect the filament from oxidation. Current is supplied to the filament by terminals or wires embedded in the glass. A bulb socket provides mechanical support and electrical connections. Incandescent bulbs are manufactured in a wide range of sizes, light output, and voltage ratings from 1.5 volts to about 300 volts. This bulb uses more amount of electricity at an earlier time.

Then in the early 1990s CFL (compact fluorescent lamp) which was designed to replace an incandescent light bulb. CFLs uses one-fifth to one-third of the electric power, and lasts eight to fifteen times longer. A CFL has a higher purchase price than an incandescent lamp but can save over five times its purchase price in electricity costs over the lamp's lifetime. Like all fluorescent lamps, CFLs contain toxic mercury which complicates their disposal. In many countries, Governments have banned the disposal of CFLs together with regular garbage.

These countries have established special collection systems for CFLs and other hazardous waste. They are also made in Linear and Spiral types, including the fluorescent lamp which we are using in today life too….
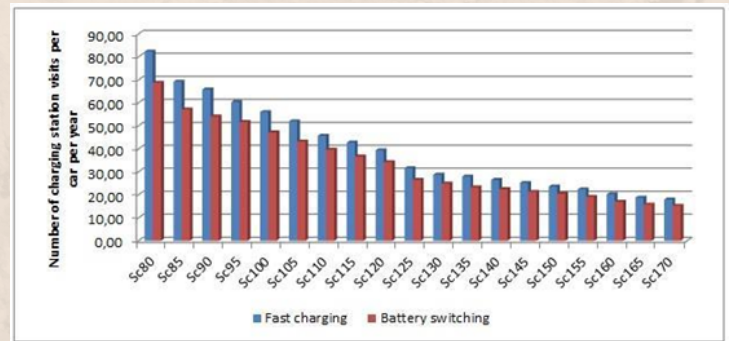

Metal-Halide lamps, which produce light by an arc between two electrodes in an atmosphere of argon, mercury, and other metals, and iodine or bromine. These were the most efficient white electric lights before LEDs, having a luminous efficacy of 75–100 lumens/W and have a relatively long bulb lifetime of 6,000-15,000 hours, but because they require a 5-7 minute warm up period before turning on, they are not used for residential lighting, but for commercial and industrial wide area lighting, and outdoor security lights and streetlights. Like fluorescents, they also contain hazardous mercury.

Here enters our Lightning star LED (Light Emitting Diode) Bulb. They replaced the CFL bulb Similar to incandescent lamps (and unlike most fluorescent lamps), LEDs come to full brightness immediately with no warm-up delay. Frequent switching on and off does not reduce life expectancy as with fluorescent lighting. These lights are turned on and off manually only.

As technology is becoming smart the LEDs also turned smart and today it is called a Smart Bulb designed for energy efficiency. It contains 16 Million colours which have the combination of RGB (Red Green Blue) combination where each has a combined rate of 256 as per the colour theory done with additive and subtractive mixing of colours. These 16M colours are formed by 256*256*256=16777216 colours are produced by the smart light.

To produce these colour compositions the controller used is Tuya which belongs to ESP family. Tuya provides both hardware and software solutions to the user and company for the home automation products a leading company where it is a start-up company founded in China. Tuya provides a leading global IoT platform that enables manufacturers, brands, OEMs and retail chains to develop one-stop smart home solutions. Tuya is internationally operated with headquarters in the U.S., Germany, India, Japan and China.
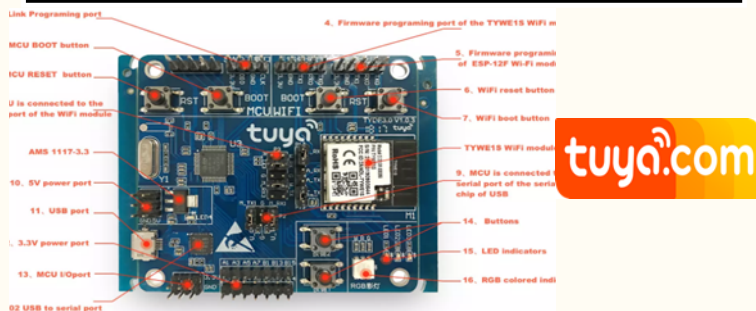
Application Fields:
- Intelligent building
- Intelligent home and household applications
- Health care
- Industrial wireless control
- Baby monitor
- Network
- Camera
- Intelligent bus

What makes me smart???
Tuya Wr5p Wireless Radio Wi-Fi Module Chip. WR5P is a low power-consuming built-in Wi-Fi module developed by Hangzhou Tuya Information Technology Co., Ltd. It consists of a highly integrated wireless radio chip (RTL8710BN) and an external flash chip, with a built-in Wi-Fi network protocol stack and robust library functions. WR5P also contains a low power-consuming ARM CM4F, a WLAN MAC, a 1T1R WLAN, a basic frequency of up to 125 MHz, a 256 KB SRAM, a 1 MB flash, and various peripheral resources.

WR5P is an RTOS platform that integrates all the function libraries of the Wi-Fi MAC and TCP/IP protocols. You can develop built-in Wi-Fi products as required.

Features:
- Built-in low power-consuming 32-bit CPU, which can also be used as an application processor
- Basic Frequency: 125 MHz
- Working Voltage: 3 V to 3.6 V
- Peripherals: Nine
- GPIOs, one UART, and one ADC
- Wi-Fi connectivity
- 802.11 B/G/N20/N40
- Channel 1-14 2.4 GHz
- WPA/WPA2 security mode supported +20 dBm output power in 802.11b mode SmartConfig function supported (for Android and iOS devices)
- On-board PCB antenna
- Certified by CE, FCC, and SRRC
- Working temperature: -20°C to +85°C

PROUD TO BE A NCC CADET

MUTHU PRIYA K
3RD YR
MECHATRONICS

I'm not just a GIRL,

I'm a CADET!!

I am damn proud to be a NCC Cadet. Most of my life is devoted to NCC. I may like many outfits but I love only one and that's 'Khaki'. That Khaki has some special powers which can make us to feel empowered. I didn't believe that until I wore my NCC uniform. It changed me from a Common Woman to a Special Woman. It taught me leadership, time management, team work, courage, comradeship, discipline, spirit of adventure, sportsmanship, selfless service which made myself unique. NCC – It's not only about drills, ragada (Punishments), loud commands, camps, ranks or uniform, it is all about developing myself better than yesterday. Every smallest thing teaches me a lot, Respect is what you give and earn! Officers of Indian Army are my Teachers! Stunned everyone with my loud commands. Beat every obstacle in my own way. When I lead my platoon, I feel myself as officer of Armed force and all my cadets as soldiers…. We are preparing for a battle. The tanning of my skin, the scars on my body, the toughness of my hands and the loudness of my voice. Does that make me any less of a girl?? If you think so, you must be wrong. Because the training helps me gain what society fears to find in young girls… The confidence to move mountains, the courage to stand up for what is right and the faith to become whatever the hell you want to become!!

Feeling of standing under the NCC flag in front of national flag, with patriotism in my heart, Ready to give a salute to our nation's pride. our Tricolour… Along with patriotic songs in background which are boosting up my love for Nation… Is Incredible…. Only NCC cadets can feel this moment. In this journey, I learnt how we can take our country forward to a better future by contributing our-self to this motherland of mine. As a NCC cadet, I am always ready to do my best, to make my country proud of me. NCC has motivated me to join in Armed Forces. This grand journey of my life will come to end soon. But memories what I gained from NCC was prestigious. NCC made me a GENTLEWOMAN.

If you stand Behind me… I will Protect you;
If you stand Beside me… I will Respect you;
If you stand Against me… I will Defeat you.

JAI HIND!!

SOPHIA-FIRST SOCIAL HUMANOID ROBOT

ARTICLE BY,
M. RISHWANA
P.R.K. SWATHILAKSHMI
II YEAR

SOPHIA is a social humanoid robot developed by a Hong Kong company named Hanson Robotics. Its's root word comes from a Czech word, Robota, meaning "forced labour". It was first used by the Czech writer Karel Capek, to denote a fictional character in the 1920s play 'Rossum's Universal Robots'.

WHAT IS A HUMANOID ROBOT?

A humanoid robot which is a robot with a body shape built to reflect the human body. They have a torso with a head, two arms and two legs, however, many modern humanoid robots are only based on the human body only from the waist up.

ADVANCED TECHNOLOGY AND FEATURES OF SOPHIA:

Hanson Robotics' most advanced human-like robot, Sophia, personifies our dreams for the future of AI. As a unique combination of science, engineering, and artistry, Sophia is simultaneously a human-crafted science fiction character depicting the future of AI and robotics, and a platform for advanced robotics and AI research. The character of Sophia captures the imagination of global audiences. She is the world's first robot citizen and the first robot Innovation Ambassador for the United Nations Development Programme. Sophia is also a framework for cutting edge robotics and AI research, particularly for understanding human-robot interactions and their potential service and entertainment applications.

INTERESTING FACTS

SOPHIA is a social humanoid robot developed by Hong Kong based company Hanson Robotics.Sophia was activated on April 19, 2015.She made her first public appearance at south by southwest festival in mid-march 2016 in United States. She was able to display more than 62 facial expressions. In October 2017, Sophia became a Saudi Arabian citizen, the first robot to receive citizenship in any country. The robot, was modelled after actress Audrey Hepburis known for her human-like appearance. Sophia has seven humanoid "Siblings" who were also created by Hanson Robotics. Sophia also visited India for first time in IIT Bombay's Tech fest on 30 December. Recently, on March 21, 2018, Sophia addressed a conference in Kathmandu Nepal as a part of UN'S Sustainable Development Goals in Asia. In an interview with business Insider's chief UK editor Jim Edwards, he predicted it was a step towards" conversational artificial intelligence". Sophia marks the beginning of new era in humanity. Sophia's debut is gaining worldwide popularity because it has some remarkable human psychological features such as learning by socialization and expressing emotions according to the topic of her conversation.

LET'S FREE OUR MOTHER NATURE....

Do you know how many pandemics entangled the world in a desperate condition? There were severe pandemic outbreaks in the world. Major pandemics were Cholera (1817), Spanish Flu (1918), Plague (1855).

These murderous pandemics were led to millions of deaths. Now we the people are facing a pathetic situation because of the deadly virus named Covid-19 (Corona virus). History is repeating itself. Isn't it? Is this pandemic a Nature's backlash to human? Human beings are severely consuming the resources of Nature. After all, why humans did not learn a lesson from all such kinds of pandemics and calamities. We have been so reluctant to the preservation of natural resources and sustainable development that we had forgotten the beauty of the Earth completely.

Now the Mother Nature is healing because of this complete lockdown. For breathing pure air to greener trees, spotting various wildlife into cities, here are some crucial environmental changes that we have seen for Covid-19 lockdown across the world. The sudden decrease in the pollution level all over the world has a significant positive impact on the ozone layer. Major decrease in the concentration of Nitrogen dioxide were observed throughout Europe in recent weeks. Venice had sparkling clear water in its canals after several years and people even witnessed swans swimming in it. Animals such as Nilgai, Leopards, Deer were seen on the streets of various parts of the world because of the peace and calm in cities, vehicle free roads which attracted them to residential areas.

Some vital environmental changes happened in India also. Clear blue skies and empty roads had become the rarest of rare sites in Delhi. According to National Capital Region (NCR), Delhi is the most polluted city in the world. But recently pollution levels have come down to a huge extent. i.e., The city had an Air Quality Index (AQI) ranging from 500-600 in winters saw an AQI as low as 50. Spotted Malabar Civet (a critically endangered mammal) have not seen until 1990 resurfaces for the first time in Calicut, Kerala. Due to reduced water pollution, critically endangered South Asian river Dolphins also known as Ganges Dolphins have spotted back in Ganga after 30 years.

"If we surrendered to earth's intelligence, we could rise rooted like trees" –
Rainer Mariya Rilke.

As a result of lockdown imposed due to Covid-19, tens of thousands of Flamingos have gathered in the city of Navi Mumbai. Do these facts show the sign of rebooting of Mother Earth? The lockdown leads a significant impact on Mother Earth within these few months. Humans often forgot that we are dependent on Nature and avoid taking care of it. These tangible movements in Nature made us believe that the Earth can be saved. Remember, our actions can impact the Earth's sustainability. So why can't we think about a well-planned lockdown in every year for a month to sustain the Nature.

According to Inger Andersen (UN's environmental chief), "**Nature is sending us a message that if we neglect the planet, we put our own well being at risk**". Earth is the home for all living organisms in the world. Let them enjoy the beauty of Nature too. Nature shows us how to live, love, and nurture alongside each other. So, Let's conserve and preserve our Mother Nature by our good deeds and positive thoughts.

2019-2020

FUSION

"The Only Source of Knowledge is Experience"

- Albert Einstein