Agnel Charities'
Padre Conceicao College of Engineering , Verna
Department of Mechanical Engineering

Consortium of Students of Mechanical Engineering (COSME)

Presents

ECHO '20

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ECHO

(2019 - 2020)

Renewable Technology

INSTITUTE PROFILE

On June 9, 1957 when the Ashram was inaugurated at Bandra, Mumbai, Our Founder, **Fr. Conceicao Rodrigues** spelt out his dream. "***Our principle aim will be to promote our rich heritage***", he said. As the first Indian Missionary Society, we have strived to serve our fellow citizens while nurturing this dream. The Ashram has branches all over India and is immersed in the development of modern Indian society at every level.

The Agnel Ashram in Goa spreading over 25 acres of verdant, hilly slopes, at Verna, was the fulfillment of a long felt need of providing technical education facilities for the youth of Goa. Within a span of two decades, the project has made considerable progress, thanks to the generous support from the Government, friends and well wishers.

Padre Conceição College of Engineering (PCCE) is an engineering college in Verna, Goa, India, established in 1997. The college is affiliated to Goa University, Taleigao, Goa, and the programmes are approved by All India Council for Technical Education (AICTE), New Delhi. The college is a part of Agnel Technical Education Complex, Verna, Goa. PCCE has 4 Bachelor disciplines: Mechanical Engineering, Computer Engineering, Electronics and Telecommunication Engineering and Information Technology and Masters in Information Technology

Institute Vision

" To establish a sustainable engineering ecosystem"

To strive towards excellence in Technical Education and Research by facilitating students with modern technology, interdisciplinary approach and problem solving ability to meet the needs of the industry, society and nation at large.

Institute Mission

- To continuously improve students' educational outcomes through effective teaching learning methodology.
- To provide students and faculty with advanced technology and excellent scholastic ambience for research.
- To provide opportunities for holistic development of students with a focus on self-learning, ethics, leadership, and entrepreneurship skills.
- To strengthen the network with alumni and industries.

Mechanical Engineering Department Vision:

To empower the students to serve the society and nation, by imparting value based education through contemporary infrastructure, excellence in education and research, in the realm of Mechanical Engineering

Mechanical Engineering Department Mission:

- To provide an effective and appropriate pedagogy to instill critical and proactive thinking in mechanical engineering students and empower them to make cogent contributions to the society.
- To endow the students with ethical values, professional and entrepreneurial skills and make them competitive at the national as well as global level.
- To develop alliances with Research & Development organizations, industries and alumni for excellence in teaching, research and consultancy.

Program Educational Objectives (PEO):

Within a few years of graduating, the Mechanical Engineering graduates will:

PEO 1: Have successful careers in industry, academia and entrepreneurship in various fields of mechanical engineering and allied disciplines.

PEO 2: Have professional, ethical, leadership qualities, and proactively address a variety of technical and societal problems.

PEO 3: Retain intellectual curiosity and disseminate knowledge through lifelong learning, to tackle the rapidly evolving challenges of the modern world.

PEO 4: Contribute effectively towards the advancement of industry, society and nation through research and development.

Program Specific Outcomes(PSO):

At the end of this program the student will be able to:

- Apply the knowledge of design, industrial, manufacturing, thermal engineering and multidisciplinary perspectives to address the needs of Mechanical Engineering systems.
- Develop and implement solutions for products and services with the help of engineering tools.

HOD'S MESSAGE

Academic year 2019 – 2020 , has undoubtedly been challenging for staff and students alike. Right after Mithya' 20 the college closed down after the lockdown was announced. I am glad that Consortium of Mechanical Engineering (COSME) students and faculty have been very instrumental in bringing forth this issue of ECHO'20 , with the theme Renewable Technology. Indeed, for sustainable development and conservation of the resources , new technology must be established to harness energy by means of non-conventional sources. I once again take the opportunity to thank all who have helped in bringing forth this issue.

And, I also hope and pray for the safety of the staff of PCCE and the world at large.

- Dr. Geethalakshmi K.

CO-ORDINATOR'S MESSAGE

This year's theme is indeed the need of the hour. I am happy that the student are thinking in terms of sustainability along with development via technology. I am happy to endorse the fact that student committee of COSME' 2019 -20 , has done a fantastic job this year . The activities undertaken at Techyon'19 were indeed intriguing, showcasing complex mechanism models, thus giving an opportunity for the first year students to learn and apply it in their future courses, apart from the other robotics workshops undertaken to train students .

I as faculty coordinator would like to thank the team for their efforts in making learning at PCCE an enriching one.

- Prof. Flasio Colaco

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ABOUT COSME

CONSORTIUM OF MECHANICAL ENGINEERS popularly called as COSME is a collegiate organization which relates the activities under Mechanical Engineering Department. COSME is among the most active student bodies in the institute which actively takes part in the TECHYON event and works under the banner of TURBULENCE thus gathering and forming students from the department of mechanical engineering leading to a more holistic approach in the undergraduate years. Mentored by experienced faculty members of the Mechanical Engineering department, students take upon many initiatives that prepare them to face the challenges of the future. COSME aims to create opportunities for the students to enhance their knowledge about the latest developments in the technological world by organizing various events.

Functions of COSME:

- Promoting the interests of students in various technical areas pertaining to mechanical engineering.
- To promote interaction between academia and industry by organizing industrial visits, special lectures and intellectual talks.
- Interacting with other technical societies, within and outside the institute to promote flow of knowledge and interest.
- To allow students to learn and focus on the cutting-edge technology by presenting it to the students in interesting manner through seminars and workshops.

COSME COUNCIL 2019–20

COSME FACULTY CO-ORDINATOR

Prof. Flasio Colaco

THE STUDENT COUNCIL (COSME)

Seen here are Faculty and Students along with COSME Council Members,

Mr. Pranyud Kankonkar -President , Mr. Sanish Borker – Secretary and Mr. Nikhil Kubal - Treasurer

Renewable energy

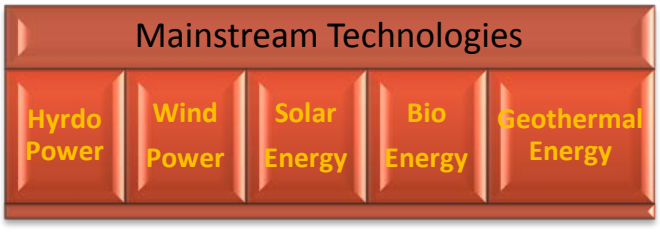
Rajat Limaye , (Mech VI)

Renewable energy is energy that is collected from renewable resources that are naturally replenished on a human timescale. It includes sources such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy stands in contrast to fossil fuels, which are being used far more quickly than they are being replenished. Although most renewable energy sources are sustainable, some are not. For example, some biomass sources are considered unsustainable at current rates of exploitation.

Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services. About 20% of humans' global energy consumption is renewables, including almost 30% of electricity. About 8% of energy consumption is traditional biomass, but this is declining. Over 4% of energy consumption is heat energy from modern renewables, such as solar water heating, and over 6% electricity.

Globally there are over 10 million jobs associated with the renewable energy industries, with solar photovoltaics being the largest renewable employer. Renewable energy systems are rapidly becoming more efficient and cheaper and their share of total energy consumption is increasing, with a large majority of worldwide newly installed electricity capacity being renewable. In most countries, photovoltaic solar or onshore wind are the cheapest new-build electricity.

Many nations around the world already have renewable energy contributing more than 20% of their energy supply, with some generating over half their electricity from renewables. National renewable energy markets are projected to continue to grow strongly in the 2020s and beyond. A few countries generate all their electricity using renewable energy. Renewable energy resources exist over wide geographical areas, in contrast to fossil fuels, which are concentrated in a limited number of countries. Deployment of renewable energy and energy efficiency technologies is resulting in significant energy security, climate change mitigation, and economic benefits. However renewables are being hindered by hundreds of billions of dollars of fossil fuel subsidies. In international public opinion surveys there is strong support for promoting renewable sources such as solar power and wind power.



Hydropower

The Three Gorges Dam on the Yangtze River in China

Global electricity power generation capacity	1,211 GW (2020)
Global electricity power generation capacity annual growth rate	2.7% (2011-2020)
Share of global electricity generation	16% (2018)
Levelized cost per megawatt hour	USD 65.581 (2019)
Primary technology	Dam
Other energy applications	Pumped storage, mechanical power

Since water is about 800 times denser than air, even a slow flowing stream of water, or moderate sea swell, can yield considerable amounts of energy. There are many forms of water energy:

- Historically, hydroelectric power came from constructing large hydroelectric dams and reservoirs, which are still popular in developing countries.The largest of them are the Three Gorges Dam (2003) in China and the Itaipu Dam (1984) built by Brazil and Paraguay.
- Small hydro systems are hydroelectric power installations that typically produce up to 50 MW of power. They are often used on small rivers or as a low-impact development on larger rivers. China is the largest producer of hydroelectricity in the world and has more than 45,000 small hydro installations.
- Run-of-the-river hydroelectricity plants derive energy from rivers without the creation of a large reservoir. The water is typically conveyed along the side of the river valley (using channels, pipes and/or tunnels) until it is high above the valley floor, whereupon it can be allowed to fall through a penstock to drive a turbine. This style of generation may still produce a large amount of electricity, such as the Chief Joseph Dam on the Columbia River in the United States. Many run-of-the-river hydro power plants are micro hydro or pico hydro plants.
- Hydropower is produced in 150 countries, with the Asia-Pacific region generating 32 percent of global hydropower in 2010. Of the top 50 countries by percentage of electricity generated from renewables, 46 are primarily hydroelectric. China is the largest hydroelectricity producer, with 721 terawatt-hours of production in 2010, representing around 17 percent of domestic electricity use. There are now three hydroelectricity stations larger than 10 GW: the Three Gorges Dam in China, Itaipu Dam across the Brazil/Paraguay border, and Guri Dam in Venezuela.
- Wave power, which captures the energy of ocean surface waves, and tidal power, converting the energy of tides, are two forms of hydropower with future potential; however, they are not yet widely employed commercially. According to the Energy Information Administration, the

theoretical annual energy potential of waves off the coasts of the United States is estimated to be as much as 2.64 trillion kilowatthours, or the equivalent of about 66% of U.S. electricity generation in 2020. A demonstration project operated by the Ocean Renewable Power Company on the coast of Maine, and connected to the grid, harnesses tidal power from the Bay of Fundy, location of the world's highest tidal flow. Ocean thermal energy conversion, which uses the temperature difference between cooler deep and warmer surface waters, currently has no economic feasibility.

Wind power

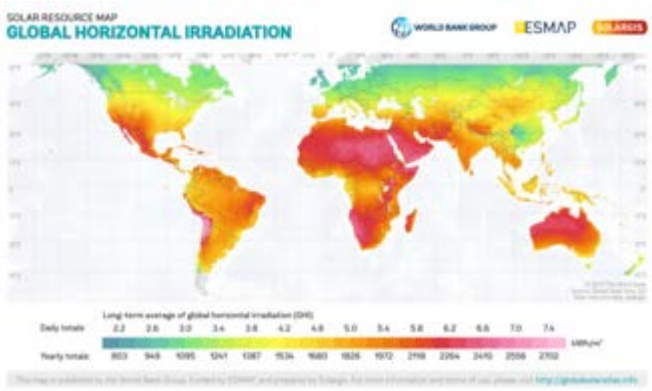
Global electricity power generation capacity	733 GW (2020)
Global electricity power generation capacity annual growth rate	14% (2011-2020)
Share of global electricity generation	5% (2018)
Levelized cost per megawatt hour	Land-based wind: USD 30.165 (2019)
Primary technology	Wind turbine
Other energy applications	Windmill, windpump

Air flow can be used to run wind turbines. Modern utility-scale wind turbines range from around 600 kW to 9 MW of rated power. The power available from the wind is a function of the cube of the wind speed, so as wind speed increases, power output increases up to the maximum output for the particular turbine. Areas where winds are stronger and more constant, such as offshore and high-altitude sites, are preferred locations for wind farms. Typically, full load hours of wind turbines vary between 16 and 57 percent annually but might be higher in particularly favorable offshore sites.

Wind-generated electricity met nearly 4% of global electricity demand in 2015, with nearly 63 GW of new wind power capacity installed. Wind energy was the leading source of new capacity in Europe, the US and Canada, and the second largest in China. In Denmark, wind energy met more than 40% of its electricity demand while Ireland, Portugal and Spain each met nearly 20%.

Globally, the long-term technical potential of wind energy is believed to be five times total current global energy production, or 40 times current electricity demand, assuming all practical barriers needed were overcome. This would require wind turbines to be installed over large areas, particularly in areas of higher wind resources, such as offshore. As offshore wind speeds average ~90% greater than that of land, so offshore resources can contribute substantially more energy than land-stationed turbines.

Solar energy



Global map of horizontal irradiation.

Global electricity power generation capacity	714 GW (2020)[78]
Global electricity power generation capacity annual growth rate	29% (2011-2020)[79]
Share of global electricity generation	2% (2018)[58]
Levelized cost per megawatt hour	Utility-scale photovoltaics: USD 38.343 (2019)[80]
Primary technologies	Photovoltaics, concentrated solar power, solar thermal collector
Other energy applications	Water heating; heating, ventilation, and air conditioning (HVAC); cooking; process heat; water treatment

Solar energy, radiant light and heat from the sun, is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, concentrated solar power (CSP), concentrator photovoltaics (CPV), solar architecture and artificial photosynthesis. Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert, and distribute solar energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. Active solar technologies encompass solar thermal energy, using solar collectors for heating, and solar power, converting sunlight into electricity either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP).

A photovoltaic system converts light into electrical direct current (DC) by taking advantage of the photoelectric effect. Solar PV has turned into a multi-billion, fast-growing industry, continues to improve its cost-effectiveness, and has the most potential of any renewable technologies together with CSP. Concentrated solar power (CSP) systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Commercial concentrated solar power plants were first developed in the 1980s. CSP-Stirling has by far the highest efficiency among all solar energy technologies.

In 2011, the International Energy Agency said that "the development of affordable, inexhaustible and clean solar energy technologies will have huge longer-term benefits. It will increase countries' energy security through reliance on an indigenous, inexhaustible and mostly import-independent resource,

enhance sustainability, reduce pollution, lower the costs of mitigating climate change, and keep fossil fuel prices lower than otherwise. These advantages are global. Hence the additional costs of the incentives for early deployment should be considered learning investments; they must be wisely spent and need to be widely shared". Solar power accounts for 505 GW annually, which is about 2% of the world's electricity. Solar energy can be harnessed anywhere that receives sunlight; however, the amount of solar energy that can be harnessed for electricity generation is influenced by weather conditions, geographic location and time of day. Australia has the largest proportion of solar electricity in the world, supplying 9.9% of the country's electrical demand in 2020.

Bioenergy

A CHP power station using wood to supply 30,000 households in France

Global electricity power generation capacity	127 GW (2020)
Global electricity power generation capacity annual growth rate	6.5% (2011-2020)
Share of global electricity generation	2% (2018)
Levelized cost per megawatt hour	USD 118.908 (2019)
Primary technologies	Biomass, biofuel
Other energy applications	Heating, cooking, transportation fuels

Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-derived materials which are specifically called lignocellulosic biomass. As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. Conversion of biomass to biofuel can be achieved by different methods which are broadly classified into: *thermal*, *chemical*, and *biochemical* methods. Wood was the largest biomass energy source as of 2012; examples include forest residues – such as dead trees, branches and tree stumps –, yard clippings, wood chips and even municipal solid waste. In the second sense, biomass includes plant or animal matter that can be converted into fibers or other industrial chemicals, including biofuels. Industrial biomass can be grown from numerous types of plants, including miscanthus, switchgrass, hemp, corn, poplar, willow, sorghum, sugarcane, bamboo, and a variety of tree species, ranging from eucalyptus to oil palm (palm oil).

Plant energy is produced by crops specifically grown for use as fuel that offer high biomass output per hectare with low input energy. The grain can be used for liquid transportation fuels while the straw can be burned to produce heat or electricity. Plant biomass can also be degraded from cellulose to glucose through a series of chemical treatments, and the resulting sugar can then be used as a first-generation biofuel.

Biomass can be converted to other usable forms of energy such as methane gas or transportation fuels such as ethanol and biodiesel. Rotting garbage, and agricultural and human waste, all release methane gas – also called landfill gas or biogas. Crops, such as corn and sugarcane, can be fermented to produce the transportation fuel, ethanol. Biodiesel, another transportation fuel, can be produced from left-over food products such as vegetable oils and animal fats. There is a great deal of research involving algal fuel or algae-derived biomass due to the fact that it is a non-food resource and can be produced at rates 5 to 10 times those of other types of land-based agriculture, such as corn and soy. Once harvested, it can be fermented to produce biofuels such as ethanol, butanol, and methane, as well as biodiesel and hydrogen. The biomass used for electricity generation varies by region. Forest by-products, such as wood residues, are common in the United States. Agricultural waste is common in Mauritius (sugar cane residue) and Southeast Asia (rice husks). Animal husbandry residues, such as poultry litter, are common in the United Kingdom.

Biofuels include a wide range of fuels which are derived from biomass. The term covers solid, liquid, and gaseous fuels. Liquid biofuels include bioalcohols, such as bioethanol, and oils, such as biodiesel. Gaseous biofuels include biogas, landfill gas and synthetic gas. Bioethanol is an alcohol made by fermenting the sugar components of plant materials and it is made mostly from sugar and starch crops. These include maize, sugarcane and, more recently, sweet sorghum. The latter crop is particularly suitable for growing in dryland conditions, and is being investigated by International Crops Research Institute for the Semi-Arid Tropics for its potential to provide fuel, along with food and animal feed, in arid parts of Asia and Africa.

With advanced technology being developed, cellulosic biomass, such as trees and grasses, are also used as feedstocks for ethanol production. Ethanol can be used as a fuel for vehicles in its pure form, but it is usually used as a gasoline additive to increase octane and improve vehicle emissions. Bioethanol is widely used in the United States and in Brazil. The energy costs for producing bio-ethanol are almost equal to, the energy yields from bio-ethanol. However, according to the European Environment Agency, biofuels do not address global warming concerns.Biodiesel is made from vegetable oils, animal fats or recycled greases. It can be used as a fuel for vehicles in its pure form, or more commonly as a diesel additive to reduce levels of particulates, carbon monoxide, and hydrocarbons from diesel-powered vehicles. Biodiesel is produced from oils or fats using trans-esterification and is the most common biofuel in Europe. Biofuels provided 2.7% of the world's transport fuel in 2010.

Biomass, biogas and biofuels are burned to produce heat/power and in doing so harm the environment. Pollutants such as sulphurous oxides (SO_x), nitrous oxides (NO_x), and particulate matter (PM) are produced from the combustion of biomass. The World Health Organization estimates that 3.7 million prematurely died from outdoor air pollution in 2012 while indoor pollution from biomass burning effects over 3 billion people worldwide.

Geothermal energy

Steam rising from the Nesjavellir Geothermal Power Station in Iceland

Global electricity power generation capacity	14 GW (2020)
Global electricity power generation capacity annual growth rate	3.7% (2011-2020)[
Share of global electricity generation	<1% (2018)
Levelized cost per megawatt hour	USD 58.257 (2019)
Primary technologies	Dry steam, flash steam, and binary cycle power stations
Other energy applications	Heating

High temperature geothermal energy is from thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter. Earth's geothermal energy originates from the original formation of the planet and from radioactive decay of minerals (in currently uncertain but possibly roughly equal proportions). The geothermal gradient, which is the difference in temperature between the core of the planet and its surface, drives a continuous conduction of thermal energy in the form of heat from the core to the surface. The adjective *geothermal* originates from the Greek roots *geo*, meaning earth, and *thermos*, meaning heat.

The heat that is used for geothermal energy can be from deep within the Earth, all the way down to Earth's core – 4,000 miles (6,400 km) down. At the core, temperatures may reach over 9,000 °F (5,000 °C). Heat conducts from the core to the surrounding rock. Extremely high temperature and pressure cause some rock to melt, which is commonly known as magma. Magma convects upward since it is lighter than the solid rock. This magma then heats rock and water in the crust, sometimes up to 700 °F (371 °C).

Low temperature geothermal refers to the use of the outer crust of the Earth as a thermal battery to facilitate renewable thermal energy for heating and cooling buildings, and other refrigeration and industrial uses. In this form of geothermal, a geothermal heat pump and ground-coupled heat exchanger

are used together to move heat energy into the Earth (for cooling) and out of the Earth (for heating) on a varying seasonal basis. Low-temperature geothermal (generally referred to as "GHP") is an increasingly important renewable technology because it both reduces total annual energy loads associated with heating and cooling, and it also flattens the electric demand curve eliminating the extreme summer and winter peak electric supply requirements. Thus low temperature geothermal/GHP is becoming an increasing national priority with multiple tax credit support and focus as part of the ongoing movement toward net zero energy.

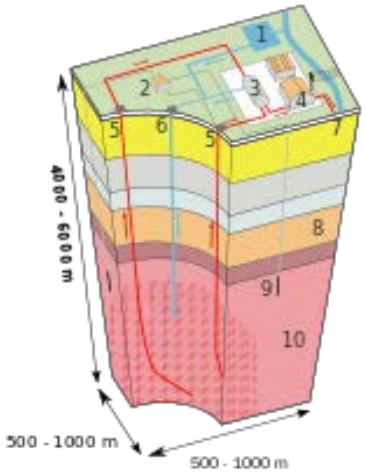
Emerging technologies using Renewable Sources

Aditya Battacharjee (Mech VI)

There are also other renewable energy technologies that are still under development, including cellulosic ethanol, hot-dry-rock geothermal power, and marine energy. These technologies are not yet widely demonstrated or have limited commercialization. Many are on the horizon and may have potential comparable to other renewable energy technologies, but still depend on attracting sufficient attention and research, development and demonstration (RD&D) funding.

There are numerous organizations within the academic, federal, and commercial sectors conducting large-scale advanced research in the field of renewable energy. This research spans several areas of focus across the renewable energy spectrum. Most of the research is targeted at improving efficiency and increasing overall energy yields. Multiple federally supported research organizations have focused on renewable energy in recent years. Two of the most prominent of these labs are Sandia National Laboratories and the National Renewable Energy Laboratory (NREL), both of which are funded by the United States Department of Energy and supported by various corporate partners.Sandia has a total budget of $2.4 billion while NREL has a budget of $375 million.

Enhanced geothermal system



Enhanced geothermal system

Enhanced geothermal systems (EGS) are a new type of geothermal power technology that does not require natural convective hydrothermal resources. The vast majority of geothermal energy within drilling reach is in dry and non-porous rock. EGS technologies "enhance" and/or create geothermal resources in this "hot dry rock (HDR)" through hydraulic fracturing. EGS and HDR technologies, such as hydrothermal geothermal, are expected to be baseload resources that produce power 24 hours a day

like a fossil plant. Distinct from hydrothermal, HDR and EGS may be feasible anywhere in the world, depending on the economic limits of drill depth. Good locations are over deep granite covered by a thick (3–5 km) layer of insulating sediments which slow heat loss.There are HDR and EGS systems currently being developed and tested in France, Australia, Japan, Germany, the U.S., and Switzerland. The largest EGS project in the world is a 25 megawatt demonstration plant currently being developed in the Cooper Basin, Australia. The Cooper Basin has the potential to generate 5,000–10,000 MW.

Cellulosic Ethanol

Several refineries that can process biomass and turn it into ethanol are built by companies such as Iogen, POET, and Abengoa, while other companies such as the Verenium Corporation, Novozymes, and Dyadic International are producing enzymes which could enable future commercialization. The shift from food crop feedstocks to waste residues and native grasses offers significant opportunities for a range of players, from farmers to biotechnology firms, and from project developers to investors.

Marine energy

Rance Tidal Power Station, France

Marine energy (also sometimes referred to as ocean energy) is the energy carried by ocean waves, tides, salinity, and ocean temperature differences. The movement of water in the world's oceans creates a vast store of kinetic energy, or energy in motion. This energy can be harnessed to generate electricity to power homes, transport and industries. The term marine energy encompasses wave power – power from surface waves, marine current power - power from marine kydrokinetic streams (e.g., the Gulf Stream), and tidal power – obtained from the kinetic energy of large bodies of moving water. Reverse electrodialysis (RED) is a technology for generating electricity by mixing fresh river water and salty sea water in large power cells designed for this purpose; as of 2016, it is being tested at a small scale (50 kW). Offshore wind power is not a form of marine energy, as wind power is derived from the wind, even if the wind turbines are placed over water. The oceans have a tremendous amount of energy and are close to many if not most concentrated populations. Ocean energy has the potential of providing a substantial amount of new renewable energy around the world.

#	Station	Country	Location	Capacity
1.	Sihwa Lake Tidal Power Station	South Korea	37°18′47″N 126°36′46″E	254 MW
2.	Rance Tidal Power Station	France	48°37′05″N 02°01′24″W	240 MW
3.	Annapolis Royal Generating Station	Canada	44°45′07″N 65°30′40″W	20 MW

Solar energy developments:

Experimental solar power

Concentrated photovoltaics (CPV) systems employ sunlight concentrated onto photovoltaic surfaces for the purpose of electricity generation. Thermoelectric, or "thermovoltaic" devices convert a temperature difference between dissimilar materials into an electric current.

Floating solar arrays

Floating solar arrays are PV systems that float on the surface of drinking water reservoirs, quarry lakes, irrigation canals or remediation and tailing ponds. A small number of such systems exist in France, India, Japan, South Korea, the United Kingdom, Singapore, and the United States.The systems are said to have advantages over photovoltaics on land. The cost of land is more expensive, and there are fewer rules and regulations for structures built on bodies of water not used for recreation. Unlike most land-based solar plants, floating arrays can be unobtrusive because they are hidden from public view. They achieve higher efficiencies than PV panels on land, because water cools the panels. The panels have a special coating to prevent rust or corrosion. In May 2008, the Far Niente Winery in Oakville, California, pioneered the world's first floatovoltaic system by installing 994 solar PV modules with a total capacity of 477 kW onto 130 pontoons and floating them on the winery's irrigation pond. Utility-scale floating PV farms are starting to be built. Kyocera will develop the world's largest, a 13.4 MW farm on the reservoir above Yamakura Dam in Chiba Prefecture using 50,000 solar panels. Salt-water resistant floating farms are also being constructed for ocean use. The largest so far announced floatovoltaic project is a 350 MW power station in the Amazon region of Brazil.

Perovskite solar cells

A perovskite solar cell (PSC) is a type of solar cell which includes a perovskite-structured compound, most commonly a hybrid organic-inorganic lead or tin halide-based material, as the light-harvesting active layer. Perovskite materials, such as methylammonium lead halides and all-inorganic cesium lead halide, are cheap to produce and simple to manufacture.

Solar cell efficiencies of laboratory-scale devices using these materials have increased from 3.8% in 2009 to 25.7% in 2021 in single-junction architectures, and, in silicon-based tandem cells, to 29.8%, exceeding the maximum efficiency achieved in single-junction silicon solar cells. Perovskite solar cells have therefore been the fastest-advancing solar technology as of 2016. With the potential of achieving

even higher efficiencies and very low production costs, perovskite solar cells have become commercially attractive. Core problems and research subjects include their short- and long-term stability.

Solar-assisted heat pump

A heat pump is a device that provides heat energy from a source of heat to a destination called a "heat sink". Heat pumps are designed to move thermal energy opposite to the direction of spontaneous heat flow by absorbing heat from a cold space and releasing it to a warmer one. A solar-assisted heat pump represents the integration of a heat pump and thermal solar panels in a single integrated system. Typically these two technologies are used separately (or only placing them in parallel) to produce hot water.[143] In this system the solar thermal panel performs the function of the low temperature heat source and the heat produced is used to feed the heat pump's evaporator.[The goal of this system is to get high COP and then produce energy in a more efficient and less expensive way.

It is possible to use any type of solar thermal panel (sheet and tubes, roll-bond, heat pipe, thermal plates) or hybrid (mono/polycrystalline, thin film) in combination with the heat pump. The use of a hybrid panel is preferable because it allows covering a part of the electricity demand of the heat pump and reduces the power consumption and consequently the variable costs of the system.

Solar aircraft

In 2016, *Solar Impulse 2* was the first solar-powered aircraft to complete a circumnavigation of the world.

An electric aircraft is an aircraft that runs on electric motors rather than internal combustion engines, with electricity coming from fuel cells, solar cells, ultracapacitors, power beaming, or batteries.

Currently, flying manned electric aircraft are mostly experimental demonstrators, though many small unmanned aerial vehicles are powered by batteries. Electrically powered model aircraft have been flown since the 1970s, with one report in 1957. The first man-carrying electrically powered flights were made in 1973. Between 2015 and 2016, a manned, solar-powered plane, *Solar Impulse 2*, completed a circumnavigation of the Earth.

Solar updraft tower

A solar updraft tower is a renewable-energy power plant for generating electricity from low-temperature solar heat. Sunshine heats the air beneath a very wide greenhouse-like roofed collector structure surrounding the central base of a very tall chimney tower. The resulting convection causes a hot air updraft in the tower by the chimney effect. This airflow drives wind turbines placed in the chimney updraft or around the chimney base to produce electricity. Plans for scaled-up versions of demonstration models will allow significant power generation and may allow the development of other applications, such as water extraction or distillation, and agriculture or horticulture. A more advanced version of a similarly themed technology is the Vortex engine which aims to replace large physical chimneys with a vortex of air created by a shorter, less-expensive structure.

Space-based solar power

For either photovoltaic or thermal systems, one option is to loft them into space, particularly Geosynchronous orbit. To be competitive with Earth-based solar power systems, the specific mass (kg/kW) times the cost to loft mass plus the cost of the parts needs to be $2400 or less. I.e., for a parts cost plus rectenna of $1100/kW, the product of the $/kg and kg/kW must be $1300/kW or less. Thus for 6.5 kg/kW, the transport cost cannot exceed $200/kg. While that will require a 100 to one reduction, SpaceX is targeting a ten to one reduction, Reaction Engines may make a 100 to one reduction possible.

Artificial photosynthesis

Artificial photosynthesis uses techniques including nanotechnology to store solar electromagnetic energy in chemical bonds by splitting water to produce hydrogen and then using carbon dioxide to make methanol. Researchers in this field are striving to design molecular mimics of photosynthesis that use a wider region of the solar spectrum, employ catalytic systems made from abundant, inexpensive materials that are robust, readily repaired, non-toxic, stable in a variety of environmental conditions and perform more efficiently allowing a greater proportion of photon energy to end up in the storage compounds, i.e., carbohydrates (rather than building and sustaining living cells). However, prominent research faces hurdles, Sun Catalytix a MIT spin-off stopped scaling up their prototype fuel-cell in 2012, because it offers few savings over other ways to make hydrogen from sunlight.

Others :

Algae fuels

Producing liquid fuels from oil-rich varieties of algae is an ongoing research topic. Various microalgae grown in open or closed systems are being tried including some systems that can be set up in brownfield and desert lands.

Water vapor

Collection of static electricity charges from water droplets on metal surfaces is an experimental technology that would be especially useful in low-income countries with relative air humidity over 60%.

Crop wastes

AuREUS devices (Aurora Renewable Energy & UV Sequestration), which are based on crop wastes can absorb ultraviolet light from the sun and turn it into renewable energy.

STUDENT ACHIEVEMENTS

TECHNICAL

[2019 - 2020]

The Below mentioned are a few of Our Mechanical Students who had outstanding performance at various intra and inter state events :

S.No.	Date	Participant	Event and Venue	Award
1	7-02-2019 to 8-02-2019	Gojay Helekar	Anantara, Damodar College of Commerce and Economics	Third
2	20-02-2019 to 21-02-2019	Pranyud Kankonkar	Battle Galactica-Techurja, Agnel Institute of Technology, Assagao	First
3	20-02-2019 to 21-02-2019	Carlton Rebello	League of Bots-Techurja, Agnel Institute of Technology, Assagao	Second
4	9-03-2019	Mahendra Desai	Robosoccer- Ignitron, Don Bosco College of Engg., Margao	First
5	9-03-2019	Mahendra Desai	Robosumo- Ignitron, Don Bosco College of Engg., Margao	Third
6	9-03-2019	Mahendra Desai	Robowars- Ignitron, Don Bosco College of Engg., Margao	First
7	9-03-2019	Sanish Borker	Designer- Ignitron, Don Bosco College of Engg., Margao	Third
8	1-04-2019 to 2-04-2019	Mahendra Desai	Robowars- Techtwister, RIEIT, Shiroda	First
09	31-01-2020 to 2-02-2020	Pranyud Kankonkar	Robowars- Quark, BITS Pilani, Vasco	Participation
10	31-01-2020 to 2-02-2020	Royce Rego	Robowars- Quark, BITS Pilani, Vasco	Participation
11	9-03-2020	Amogh Gawas	Robowars- Saavyas, NITGoa	Participation
12	9-03-2020	Daunston Rodrigues	Robowars- Saavyas, NITGoa	Participation

Can a student not knowing robots, build a working one in 2 days?

A Report by - Pushparaj Ghosarwadkar

Yes, indeed.

Team Phoenix in association with COSME (Consortium Of Students in Mechanical Engineering), PCCE organized a two-day workshop on “Robotics with Arduino”, which was held on the 3rd and the 4th of August, 2019 at Padre Conceicao College of Engineering, Verna.

77 students across engineering colleges in Goa participated in it with great enthusiasm. The workshop helped introduce the world of robotics to the participants. Kits were provided for hands-on experience.

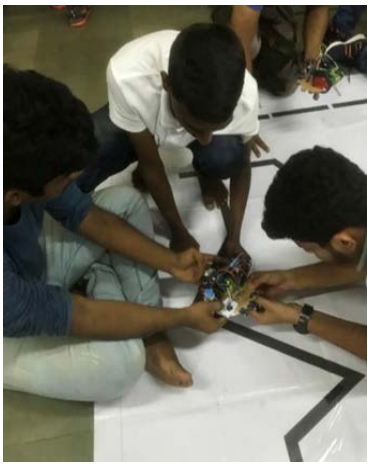
On the first day, students were introduced to Arduino programming, interfacing different sensors, the Bluetooth module and obtaining necessary measurements.

The next day, students designed autonomous Line Follower Robots by assembling the chassis, coding and finally testing the robots on the line follower track. An on-the-spot competition was held for the participants for building of the fastest line follower robot that would complete the track. Mr. Anurag Kulkarni, a student from PCCE was the winner.

Under the leadership of President, Mr. Anshul Mahale and Vice President, Mr. Pranyud Kankonkar of Team Phoenix, the workshop was a grand success.

Team Phoenix has been a pioneering Goan robotics group, founded 5 years ago. It is doing yeoman service in bringing robotics to students by providing guidance, and getting them to build different kinds of robots. This way students not only learn robotics by building them, get exposure and confidence through the events, but also win accolades for themselves. Team Phoenix participates at various state and national events and have won many titles in field of robotics. It also participated at Techfest 2017, an international event, the only team from Goa to do so.

Students at the 2- day Workshop



Mr. Pranyud Kankonkar with the participants

Workshop on Drones & Combat Robotics

Team Phoenix in association with COSME (Consortium of students in Mechanical Engineering), PCCE organized a two day workshop on Drones & Combat Robotics on 24-25 August. On the first day the students were introduced to General & Combat robotics, a clear cut idea of how a bot is built from scratch till it's final finishing was explained.

Various concepts regarding chassis, batteries, drive system, material selections and wired & wireless circuitry was explained in detail.The next session was a hands-on experience , wherein students learned about 60kg, 30kg,15kg RoboWars Robots. Small matches of Robo Soccer were also held during the session wherein students learned to control Robo Soccer Robots.

The next day there was a drone session , in the morning. The basics were cleared which allowed the students to learn the advanced concepts of drones. For the practical session, the team had 5 different drones, including a DJI Phantom .

During this session the calibration of various Flight controllers, BLDC motors, ESCs, frame, batteries, were covered in much depth which enabled enthusiasts to grasp the concepts in a better way. The workshop concluded with the flying of DJI Phantom thus giving them basic knowledge and insight into the world of drones.

Top : The Participants interacting with Mr. Sanish Borker , Drones built by Mech Students on display
Below : Participants with the organizing team.

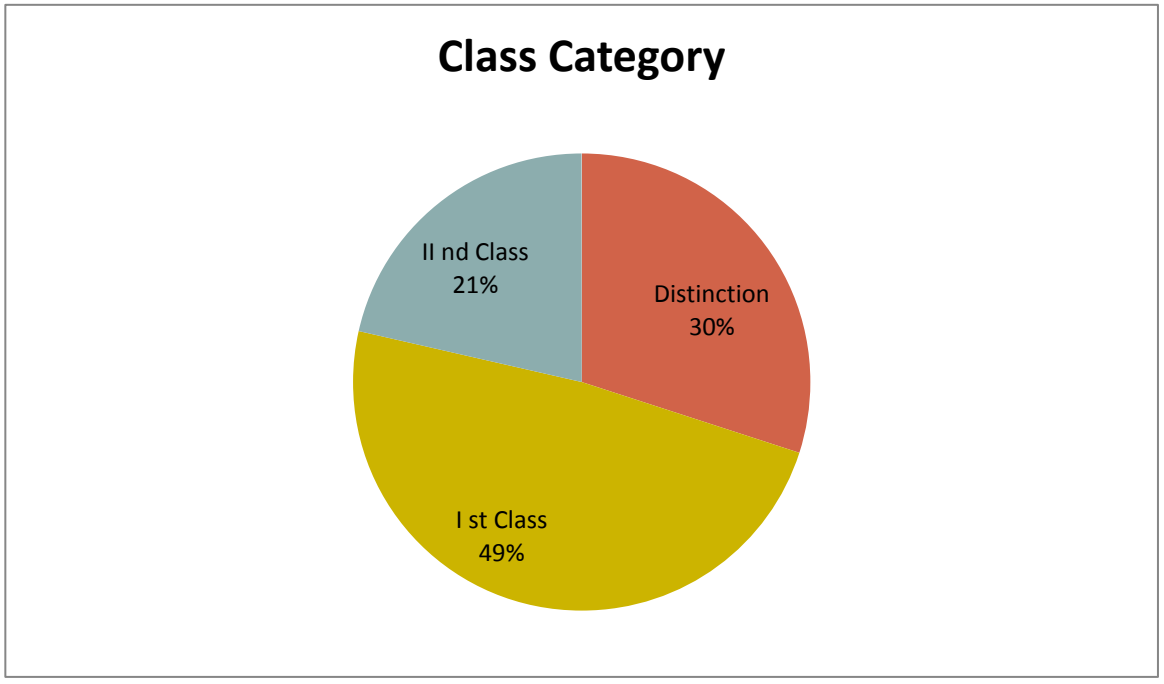
SPORTS EVENT - KURUKSHETRA @ PCCE
[2019-2020]

Some Glimpses into Sports event KHRUKSHETRA @ PCCE

MAY' 2019 Examinations

73 Students from the 2015- 2019 Batch , answered the B.E – Mechanical (Semester VIII) Examination.

70 out of the 73 students successfully passed out their semester 8 examination.



Toppers in Semester VIII	
Rank	**Name**
1	Dessai Sachin Shripati(2nd at Goa University)
2	Bhagat Desai Shreyas S
3	Bharne Prathamesh Avadu
Toppers in Semester VI	
Rank	**Name**
1	Kubal Nikhil Kishore
2	D'silva Nahil Ian Flores
3	Kankonkar Pranyud
Toppers in Semester IV	
Rank	**Name**
1	D'souza Brendon Benedicto
2	Desai Mahendra Mohan
3	Gadkari Narendra Chandrakant

DEC' 2019 Examinations

Toppers in Semester VII	
Rank	**Name**
1	Kubal Nikhil Kishore
2	D’silva Nahil Ian Flores
3	Gama Savio
Toppers in Semester V	
Rank	**Name**
1	De Souza Brandon Bendicto
2	Pontes Kevin Nicholas
3	Gadkari Narendra Chandrakant
Toppers in Semester III	
Rank	**Name**
1	Rebello Ohan
2	Soares Sydney
3	Rego Royce

A Report

TECHYON '19

Techyon is an inter college technical event held annually at PCCE. The word Techyon was derived from Tachyon which is a hypothetical particle with speed more than the speed of the light. It hosts various technical events across all the departments. Many colleges from various parts of Goa participate in this event. TECHYON 2019 was held from 25th to 27th of September. More than 15 companies and startups offered sponsorships for this event. Our sponsors were **Mrinq technologies, Alphacode, IO Droplet, Herald publications, team BHP, COSME, SUIT, Ciba, Imagine works, Maruti Suzuki, Kyra, Sunblaze, ZBmemes69, The Hungree Plate, Maxxcell, Yash Group, Lourenco Marine, IMS cad centre.**

Inaugural function of TECHYON was held on 25th September at 9.30 am in the college auditorium. The Chief Guest for the function was **Dr. Vivek Kamat**, **Director of Technical Education**. Other dignitaries on the dais were **Rev. Fr. Anthony Castello**, Director, ATEC, **Rev. Fr. Peter Fernandes**, Assistant Director, ATEC, **Dr. Mahesh Parappagoudar**, Principal of PCCE, **Dr. Stephen Barreto**, Registrar, PCCE and **Mr. Suyan Belurkar**, General Secretary. Dr. Vivek in his address stressed on the importance of such events in molding student's professional attitude and team work. He also congratulated the team for successfully organizing the event and declared TECHYON 2019 OPEN.

The Organizing Team with The Chief Guest Dr. Vivek Kamat & Rev. Fr. Anthony Castello

A wonderful Traditional singing presentation at the Inauguration

The Attendees

Various events organized by Mechanical department under the banner **MECHFEST** were Robowars where the bots fight on the battleground to overpower others, Roborace where robots compete to complete the given track in shortest possible time, catapult which involves designing catapults which can fire at different ranges, solid modeling where participants have to complete the given part drawing in the given time frame, project presentation and mechanism building where students develop various mechanisms which they studied in the curriculum to perform specific tasks. Students developed excavator mechanism, pipe cutting machine, vehicle elevator, etc. to demonstrate how simple mechanisms can be used to perform complex tasks.

@ TECHYON ' 2019

Robowars Underway an Ariel View !

Hydraulic Front End Loader Mechanism

Computer department organized events under the banner **PIXELS**. The event Hackathon provides a medium for developers to create new and innovative solution. It was sponsored by **Imagine Works** which also gave problem statements to which participants had to develop solutions. The company

personnel found the participants and their solutions interesting and instantly declared 3 prizes worth 25000 INR. Other events were Blind coding in which the screen of the computer is turned off and the participant has to complete the given programming task in C/C++ within the given period of time, code crunch where the participants were tested on their knowledge about programming languages, paradigms and also on object oriented capabilities of programming languages, decrypt in which the contestant mainly deals with general knowledge based puzzles and tasks, ideate which is a poster presentation on projects. **Team Alphacode** also organized a workshop on UI/UX for the PCCE students.

IT department organized events under the banner **MINDSPARK** like Code-a-thon, weave the web, logo designing, ideate, mission impossible, photology and SUIT workshop. In code-a-thon, 2 problem statements were given to the participants and they had to write a code for the same. Students from various colleges participated in this event. Weave the web is a challenge which consists of UI/UX problems where the focus is on creating an intuitive and easy to use frontend interface. Ideate was a project presentation event where students of BE IT presented their ideas in the form of posters. A Python workshop was also organized by the departmental student body **'SUIT'** for the students of PCCE.

The Electronics and Telecommunication department of PCCE held its events under the banner **ENIGMA** and had over 500 participants from various prominent colleges in Goa. The various events held were Line Follower, Robo Soccer, Quiz, Hardwired, uC Mania, Poster Presentation, Electronic Arts, Treasure Hunt, and other gaming events. Line Follower was a competition where teams make a robot that has to be designed to complete a given track the fastest. This event had 14 teams participating in it. Robo Soccer was the most popular event of all, where the crowd eagerly waited to watch the bots play football in a soccer arena. The event lasted for two days and had around 16 teams. The Quiz was an event where the participants were tested on their knowledge about current affairs and technology. Hardwired was an event that tested participants knowledge about basic electronic components. Here they had to implement an idea with making no use of micro-controller or microprocessor and only making use of self-designed pure hardwired circuits. uC Mania was a project competition where participants had to make use of MS430 micro-controller. This event was compulsory for the third year students of the ETC department and had around 13 teams. Poster Presentation provided a platform for students to present their project ideas. These were mostly the ideas on which the final year students of the ETC department are working on their final year projects. This events prize money was sponsored by **Lourenco Marine**. Electronic Arts was another open event where participants were free to use various electronic circuitry and components to create an eye-pleasing project. In addition to this, ETC also hosted some fund raising events like treasure hunt and need for speed.

Mechanical Engineering department in association with **BHP Robotics** organized a robotics and drone workshop for the students of schools which normally don't get exposed to technology. Around 50 students participated from different schools for this workshop. They also promised to organize a fully fledged workshop wherein the students will be taught how to develop robots from scratch.

HSSC and **SSC** students were also invited for the project exhibition event. Students displayed various creative projects. Projects were from various domains like agriculture, robotics, water conservation and purification, thermo-electrics, chemistry, etc. There were around 18 entries from various schools across Goa.

TECHYON 2019 ended with the valedictory function on 27th September at 2:30 PM in the college auditorium. Chief Guest for the function was **Mr. Anil Raiker**, **Head of the Design Division** at **Sierra Circuits Ltd**. Mr. Anil Raiker advised students on how to make a successful career. He also told students what is expected from them when they enter in any company. He also advised them to always maintain a professional behavior in every sects of life.

MITHYA' 20

The annual cultural festival of Agnel's Padre Conceicao College of Engineering, "Mithya 2020"was held from March 4-6. The theme of the festival was 'One India, One Dream'. The event was declared open by Pandit Kamlakar Naik, one of the India's most talented classical vocalists. The three-day extravaganza boasted of an enthralling exhibition of dance, singing, music, fashion, art, video-making, quizzes, stand-up comedy among others, in a plethora of individual and team competitions. The competitions were judged by acclaimed personalities from across the state, each chosen for their credentials and expertise. All judges unanimously appreciated the superlative talent, commitment and passion displayed by the students. The "Mithya 2020 Championship" was won by the Computer Engineering department. Savio Gama (Mechanical dept.) and Priyanka Burman (ETC dept.) won the Mr. PCCE and Miss PCCE titles, respectively. "Fair and Clean Play" award was introduced this year, and was won by the Information Technology department.

Mr. Royston Perreira with The Director , Judges and the Faculty Co-ordinators.

Mech Students Swizel Fernandes & Savio Gama Entertaining the Crowd

The Winners of MITHYA ' 20 – COMPUTER ENGG. DEPT.

The dignitaries at the valedictory function were Rev. Fr. Anthony Castelo, Director of Agnel Technical Education Complex, Prof. Mahesh Parappagoudar, Principal of PCCE, special invitee, Royston Alex Pereira (Mr. India Charming Face International 2019), and the judges for Mr. and Ms. PCCE, Kabir Pinto Makhija and Joanne D'Cunha. The event was organized by the PCCE Cultural Committee, led by Committee Chairman, Asst. Prof. Razia de Loyola Furtado e Sardinha, and the PCCE Students' Council, led by General Secretary, Suyan Belurkar.

Pranyud Kankonkar

President, COSME

ISHRAE COLLEGIATE CHAPTER [2019 - 2020]

XTH ISHRAE STUDENTS CWC INSTALLED AT PCCE

The induction program of the student council into the Indian Society of Heating Refrigeration and Air conditioning Engineers (ISHRAE) was held on 9TH of August 2019 at Padre Conceicao College of Engineering (PCCE), Verna-Goa.

The newly elected students CWC with the dignitaries at PCCE

The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE), was founded in 1981 at New Delhi by a group of eminent HVAC&R professionals. ISHRAE today has more than28,780 HVAC&R professionals and Student-members. ISHRAE operates from 41 Chapters and sub Chapters spread all over India, with HQ in Delhi. It is led by a team of elected officers, who are members of the Society, working on a voluntary basis, and collectively called the Board of Governors. ISHRAE has its own chapter at Goa, under which there are students' chapter at various engineering colleges and polytechnics. Currently there are 5 students chapter in Goa and another students chapter at Gogte Institute of Technology (GIT), Belgavi which is run under the Goa Chapter. Besides, ISHRAE Goa Chapter is the annual host for the National level event 'Techfest', which will be held on the 12th of September 2019 at the Ferns Kesarval, Verna Goa.

The Chief Guest for the induction program at PCCE was Mr. Bhalchandra G. Amonkar the Deputy Director of Directorate of Accounts in Art and Culture. He, being an ex-Indian Air Force Personnel motivated the youth to join the Indian Armed Forces by enlightening them about the various kinds of technical graduate examinations and the need of engineers in the Indian army. The Guest of Honor was

Ms. Komala Soares, Head of Department of Electronics Engineering at Government Polytechnic Panaji. Ms. Komala is also the Women Chair of ISHRAE Goa Chapter. She emphasized on the enrollment of women into ISHRAE by briefing the students about the increasing awareness on Global Warming. The Keynote speaker for the event was Mr. Balkrishna Chodankar, lecturer from Government Polytechnic, Bicholim. Mr. Chodankar gave a very informative and eye opening presentation to the students on 'Energy Conservation for Sustainable Living'. He briefed on how every individual can make energy consumption sustainable in day to day applications.

Prof. Joe Kurian, Head of the Department of Mechanical Engineering at PCCE inspired the students to strive towards their goals by the continuous enhancement of their overall development. Prof. Mohnish Borker, the Students Activity Chair of the ISHRAE Goa chapter and the faculty coordinator from PCCE, inducted the students of PCCE in the Xth Chapter Working committee for their respective posts and thereby forming the student council of ISHRAE. Finally the event wound up by a unique vote of thanks by the CWC member Mr. Milind Sardesai who encapsulated the entire program and thanked everyone for their contribution.

Felicitation of the keynote speaker Mr. Balkrishna Chodankar

ACREX 2020

The students got exposed to technological innovations and products displayed at the largest HVAC&R exhibition of South Asia held at greater Noida, "**ACREX 2020"** from 28th February to 2nd march 2020. 18 students of PCCE, accompanied by assistant professor Mohnish Borker and Technical staff Ms. Linnet D'Silva. A variety of devices like Air Conditioners, Compressors, Chillers, Ultra Sonic Humidifier, Air Ducts, etc were displayed at the exhibit. There were around 12,000 visitors and 400 exhibitors at the 21st editon of ACREX India from over 25 countries including Netherlands, Japan, UK, USA, France, and more.

Students and Faculty members @ ACREX 2020, Greater Noida

ATMABODH

Awakening a Greta Thunberg among ourselves, our institute saw young budding engineer Mr. Hrishikesh Dabhekar enlightening young minds on Global warming and Climate change at D.V. Chopdekar Memorial High School, Porvorim. It was an initiative by the students' chapter at PCCE to conduct a reach-out program for young school students, and was called **"Atmabodh"** which means self-awareness.

Students of D.V.Chopdekar Memorial School with Hrishikesh

TAPAS 2020

Padre Conceicao College of Engineering conducted the first all students HVAC workshop, TAPAS 2020, in collaboration with the Indian Society of Heating, Refrigerating and Air-conditioning Engineers (ISHRAE) Goa Chapter on the 31st January 2020.

The event aimed at bringing about awareness among the the youth, the need and efficient utilization of HVAC. Students from engineering colleges participated in the event in good number. Eminent dignitaries from industry graced the occasion by their presence, delivering talks on topics like Psychrometry, Heating load Calculation, Effects of HVAC on the environment, Ozone depletion and Global Warming.

Speakers for the day were Mr. Gautam Naik (Innovar Engineers and Consultants), Mr. Prakash Naik (Goa Shipyard Ltd), Mr. Lumen Araujo (Airacts Goa) and Mr. Milind Sardessai (Fomento Resources)

Faculty with Student organizers and participants @ TAPAS 2020

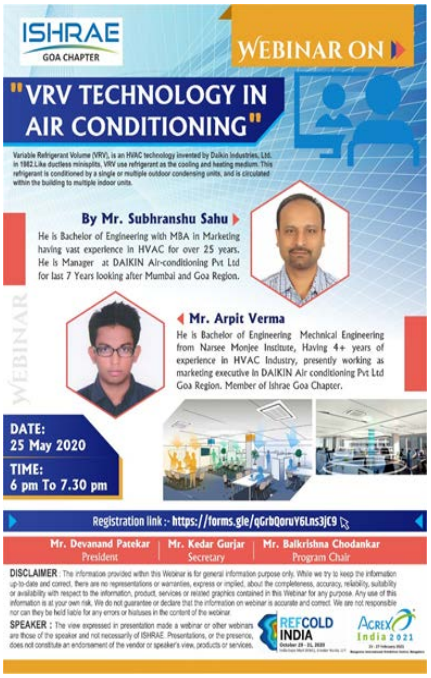
CRYOTEK 2020

An intercollegiate Quiz competition was organised with 3 different rounds during TAPAS 2020. Five teams participated from various engineering colleges. There was a written MCQ round, followed by a visual round and then the final Rapid fire round. The team from PCCE comprising of Mr. Nikhil Kubal and Mr. Kevin Barreto won the Quiz.

Elimination round of the QUIZ

A Tensed moment @ The Finals

WEBINARS attended by ISHRAE students



FACULTY ACHIEVEMENTS
[2019 – 2020]

Journal Publications /Conference , Book Chapter

S No	Name of the Authors	Title of the Paper	Name of the Journal
1	Manjunath Patel G C, Ganesh R Chate, **Mahesh B. Parappagoudar**	Modelling and optimization of Alphaset resin bonded sand moulding system using statistical design of experiments and evolutionary algorithms.	“Modelling and Optimization of Manufacturing Processes”. (edited book), Springer Int. Publications, Netherland
2	**Joe Kurian** & Nandakumar Mekoth	Deconstructing Coping using ability groups.	Taylor & Francis: Studies in Higher Education.
3	Manjunath Patel G.C, Deepak Lokare, Ganesh R. Chate, **Mahesh B. Parappagoudar**, Nikhil R, Kapil Gupta	Analysis and Optimization of Surface Quality while machining high strength aluminium alloy for aerospace applications	Measurement, Elsevier Publications, UK
4	Sandeep MJ, Manjunath Patel G C, Ganesh R Chate, Daivagna UM, **Mahesh B Parappagoudar**	Multi Response Optimization of Green Sand Moulding Parameters using Taguchi-DEAR Method,	Applied Mechanics and Materials, Trans Tech Publications, Switzerland, Vol. 895, pp. 1-7
5	Manjunath Patel G C, Kapil Gupta, Ganesh R Chate, **Mahesh B Parappagoudar**, Sandeep MJ, Daivagna UM	Performance Analysis of Cow Dung as an Eco-Friendly Binder and Additive Material for Sustainable Moulding and Casting	China Foundry, Springer Publications, 16(6), pp. 405-411
6	**Saeesh verenkar**	E-Learning: Transforming education system in India	“Transforming Education For The 21st Century:Problems And Concerns ”13th march 2020 venue: GVM’s Dr. Dada Vaidya College of Education Farmagudi, Ponda - Goa

7	**Saeesh Verenkar**	Positive Psychology: A wheel of change	"Transforming Education For The 21st Century:Problems And Concerns "13th march 2020 venue: GVM's Dr. Dada Vaidya College of Education Farmagudi, Ponda - Goa
8	Vishwajit Gauns, Sachin Desai & **Geethalakshmi K**	Characterisation of S-Glass Fibre Reinforced PEEK/Epoxy composite before and after γ-irradiation	National Conference on Recent Trends in Materials Science & Technology (NCMST-2019); organised by *Indian Institute of Space Science & Technology, Trivandrum*
9	**Mohnish Borker**, Suchithra T.V	Rice Paddy as a source of Sustainable Energy in India,	7th International Conference on Advances in Energy Research (ICAER 2019), IIT Bombay
10	Nikhil Kubal, Hrishikesh Dabhekar, Kevin Barreto, Shirish Shettigar, Gauresh Kankonkar, **Mohnish Borker**	Design of Solar Assisted Vapor Absorption Refrigeration System for Food Cart	National E-Conference on PRIME-20: Progresses and Research Trends in Mechanical Engineering, SDM College of Engineering and Technology, Dharwad

Conference Paper

rticipation at Workshops / Seminars & Courses Completed

SR.NO	NAME OF FACULTY	DATE	DAYS	FDP / Training Activities / STTPs	ORGANISED BY
2	Dr. Geetalakshmi K	29th & 30th October 2019	2 Days	Frontiers in Materials	NITK, Surathkal
3	Mr. Joe Kurian	03.08.2020 to 07.08.2020	1week	Training of Trainers	NITTR, Bhopal
4	Mr. Saeesh Verenkar	JAN-APRIL 2020	12 WEEKS	NPTEL online certification in NBA accreditation and teaching learning in engineering	NPTEL

5	Mr. Dattaprakash Vernekar	24th Jan 2020	01 Days	Workshop on ACRESERVE	Art and Culture Hall Patto Panjim Goa.
6	Mr. Prasad Pawar	17th to 22 Feb 2020	One Week	Basics of Entrepreneurship	CIBA Verna Goa.
		8th june to 12th june 2020	One week	Exploring the dimension of innovation, incubation and emerging technologies to embrace post COVID changes	FAMT,Ratnagiri
		17th to 19th june 2020	3days	Advances in Machining Process	PES institute,Shivmogga
7	Mr. Mohnish Borker	9^{th} December 2019	One Day	International Workshop on Hydrogen Storage	DST-IIT Bombay Energy Storage Platform on Hydrogen/IIT Bombay
		24th Jan 2020	01 Day	Workshop on ACRESERVE	ISHRAE Goa Chapter
		$15^{th} – 21^{st}$ May 2020	One Week	Renewable Energy Sources: A Way ahead	MKSSS's Cummins College of Engineering for Women/Nagpur
		$17^{th} – 19^{th}$ June 2020	Three Days	Advances in Machining Process	PES Institute of Technology and Management/Shivamogga
8	Mr. Flasio Colaco	03-08 Aug 2020	1 week	FDP - Emerging Green Technologies for the Mechanical Engineers	GIET UNIVERSITY, GUNUPUR
		17-19 June 2020	3days	FDP - Advances in Machining	PES institute,Shivmogga

				Process	
9	Mr. Ramdas Pandit	5-8th Aug 2020	4 days	Engineering Failure Analysis	VIT, Chennai
10	Mr. Pratik Sawardekar	17th to 22 Feb 2020	One Week	Basics of Entrepreneurship	CIBA Verna Goa.
11	Mr. Pundalik Salkar	14th to 18th Sept 2020 21st Sept to 25th Sep 2020	5 days 5 days	3D printing and design Recent trends in advanced material and devices	ATAL Online

Guest Lectures Conducted

Workshop on R – Programming conducted for students by Mr. George Paes , Optessa Inc.

A workshop on R – programming for statistical analysis was organised for students of 5th and 7th semester on 21st September ' 2019. The workshop started with complete basics of R – programming software and ended with data visualization and sampling.

FACULTY PROFILE

Dr. Mahesh Parappagoudar	**Phd – (IIT – Kharagpur) –** Mechanical Engineering Professor & Principal (Industry Exp.– 2 Years, Teaching Exp.– 26 Years) Area of Interest – Manufacturing science, Soft computing
Prof. Joe Kurian	**Phd – pursuing (Goa University)** **M.Tech (IIT-Madras) –** Maintenance Engg. & Management. Professor (Industry exp. – 5 Years, Teaching Exp.– 20 Years) Area of Interest – Mechanical vibrations, Industrial automation , Six sigma management
Dr. Geethalaxmi K.	**Phd (NIT, Surathkal) –** Containerless Extrusion Professor (Teaching Exp. – 20 Years) Area of Interest – Polymer composites, Nano-structured materials
Prof. Saeesh Verenkar	**M.Tech (SRM University) –** Computer Aided Design Assistant Professor (Industry Exp - 01 Year, Teaching Exp. – 6 Years) Area of Interest – FEM, Mechanical vibrations, Composites
Prof. Dattaprakash Vernekar	**M.Tech (V.J.T.I, Mumbai University) –** Automobile Engg. Assistant Professor (Industry Exp - 01 Year, Teaching Exp. – 05 Years) Area of Research – I.C engines, Energy conversion
Prof. Marvin Fernandes	**M.E (Mumbai University) –** Machine Design Assistant Professor (Industry Exp - 01 Year, Teaching Exp. – 05 Years) Area of Interest – Engg. Mechanics, Hydraulic machinery
Prof. Prasad Pawar	**M.Tech (M.G.University, Kerala) –** Thermal Power Engg. Assistant Professor (Teaching Exp. – 2.5 Years) Area of Interest – Fluid mechanics, Heat transfer
Prof. Pushparaj Pingulkar	**M.Tech (N.I.E, VTU) –** Machine Design Assistant Professor (Industry Exp. – 2 Years, Teaching Exp. – 03 Years) Area of Interest – Kinematics, Dynamics of Machinery, FEA
Prof. Mohnish Borker	**M.Tech (NIT, Calicut) –** Energy Engg. & Management Assistant Professor (Teaching Exp. – 03 Years) Area of Interest –Thermodynamics, Renewable Energy

Prof. Ramdas Pandit	**M.Tech (VIT, Bangalore)** – CAD-CAM Assistant Professor (Industry Exp. – 04 Years ; Teaching Exp–03 Years) Area of Interest – FEA, Vibrations, SCM
Prof. Gaurak Phaldessai	**M.Tech (NIT, Jamshedphur)** – Thermal Engineering Assistant Professor (Industry -01 Year, Teaching – 2.5 Years) Area of Interest –Thermal Engg., CFD, Phase change material, Solar technology
Prof. Flasio Coalco	**M.Tech** (Manipal University) - Thermal Science and Energy Systems Industry:1 Year 5 Months Teaching: 4 Years Areas of Interest:Thermal design, Solar technology, Engine research, LCA, Engineering Graphics.
Prof. Pratik Sawardekar	**M.E (Goa University)** – Industrial Engineering Assistant Professor (Industry - 02 Years, Teaching – 04 Years) Area of Interest – Multi-Criterion Decision Making, Optimization Techniques
Prof. Pundalik Salkar	**M.E (Goa University)** – Industrial Engineeering **LLM (Goa University) -** Criminal Law Assistant Professor (Teaching - 02 Years) Area of Interest – Machine Design, Manufacturing Technology, Workstation Design.