IPS Academy

INSTITUTE OF ENGINEERING & SCIENCE

Knowledge, skills and values

MECHAZINE

Department of Mechanical Engineering

Annual Magazine

2016-17

Letter from the Editors

Dear Readers,

As Editorial Board Members of Mechanical Engineering Departmental Magazine, it is our immense pleasure to welcome you to the latest edition of magazine ***Mechazine***. The objective of magazine is to update and showcase the latest development of Mechanical engineering and application of Mechanical technology. ***Mechazine*** includes articles from Mechanical Engineering Department. Let us join hands and explore the boundless universe in quest of the never-ending truth of Mechanical Engineering and build a new world of sustainable development. We would like to thank the management of Institute of Engineering & Science, IPS Academy, all the reviewers and authors.

We take this opportunity to thank our respected Principal **Dr. Archana Keerti Chowdhary,** HOD **Dr. Sanjay Jain** and all the faculty members for their incessant inspiration and kind support.

We hope that this edition would be enjoyable as well as informative.

Editors…

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EDITORIAL BOARD

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2.	Mr. Pradeep Singh Hada	Assistant Professor

Content

Students' Articles

Waste Heat Recovery from Domestic Refrigerator

Waste heat is heat, which is generated in a process by way of fuel combustion or chemical reaction, heat removed from thermal system by heat exchanger and then "dumped" into the environment even though it could still be reused for some useful and economic purpose. The essential quality of heat is not the amount but rather its "value". The strategy of how to recover this heat depends in part on the temperature of the waste heat gases and the economics involved.

Use of waste heat recovery is an important technique of reducing total energy costs in energy system design. Attachments need to be developed to recover waste heat energy from air conditioning or refrigeration systems. If the heat recovery system is designed optimally and implemented in residential and small-scale commercial systems, the cumulative benefits would be significant

Households need both refrigeration and water heating. Refrigeration at temperatures below 4°C is employed for food preservation, while hot water at temperatures around 55°C is used for bathing and showering. But it is common for refrigeration and water heating to be separated and unconnected, each consuming their own purchased energy.

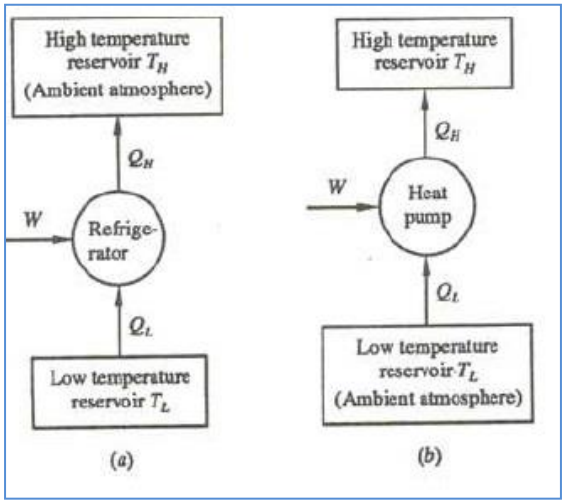
A more efficient use of this electrical energy would be to integrate the refrigeration and hot water systems. This would reduce the electrical power consumed by heating water, by making use of the heat rejected by refrigerators.

A home's single largest electricity expense is water heating, which typically accounts for about 40% of their electricity usage. The total energy consumption by geysers will continue to increase as the population grows. As electricity demand increases, the adverse environmental effects and the economic costs associated with electricity generation will also increase.

The vapor compression refrigeration cycle is a common method for transferring heat from a low temperature to a high temperature.

The figure shows the objectives of refrigerators and heat pumps. The purpose of a refrigerator is the removal of heat, called the cooling load, from a low-temperature medium. The purpose of a heat pump is the transfer of heat to a high-temperature medium, called the heating load. When we are interested in the heat energy removed from a low-temperature space, the device is called a refrigerator.

When we are interested in the heat energy supplied to the high-temperature space, the device is called a heat pump.

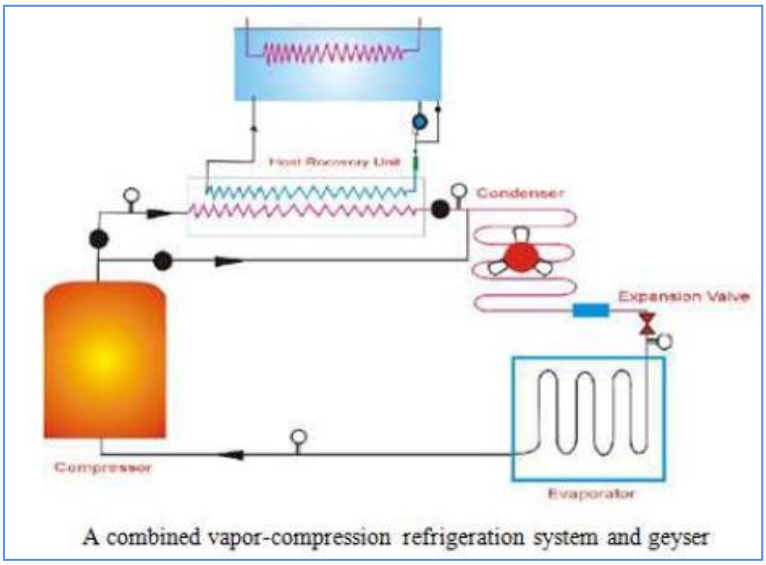


In general, the term heat pump is used to describe the cycle as heat energy is removed from the low-temperature space and rejected to the high-temperature space.

Both refrigerators and heat pumps move heat from a cold thermal reservoir to a warm thermal reservoir. The objective of refrigerators is to remove heat from a cold space whereas the objective of heat pumps is to put heat into a warm space. Both heat pumps and refrigerators use the same thermodynamic cycle and principles.

When a household refrigerator is operating, it rejects heat into the environment at the condenser and in warm climates that heat is usually wasted. In this paper, the feasibility of a new system which used the rejected heat at the condenser of the refrigerator to heat water in the geyser was investigated. Thus, a combined refrigerator/heat exchanger and geyser resulted in a single machine which maintained a certain physical space at cold temperature for storage of food and used the heat rejected by the refrigeration part for water heating.

The figure shows that a vapor compression cycle was used with the evaporator in the refrigerator and condenser in the heat exchanger which was connected to the geyser. Cold and low pressure refrigerant gas entered the compressor where its pressure (and temperature) increased. After the compressor, it then passed through the condenser where it gave up heat at approximately



A combined vapor-compression refrigeration system and geyser

constant pressure to the water in the geyser so that the refrigerant's temperature decreased sufficiently for it to condense into a sub cooled liquid.

After leaving the condenser it went through an expansion valve (which may be a capillary tube). The decrease in pressure in the expansion process caused the refrigerant to turn back into a mixture of liquid and vapour but at a much lower temperature. Then it went to the evaporator where it absorbed heat at approximately constant pressure from the food in the refrigerator.

Clark et al.1996, describe the design, construction, and testing of an integrated heat recovery system which has been designed both to enhance the performance of a residential refrigerator and simultaneously to provide preheated water for an electric hot water heater. A commercial, indirect-heated hot water tank was retrofitted with suitable tubing to permit it to serve as water cooled condenser for a residential refrigerator. This condenser operates in parallel with the air-cooled condenser tubing of the refrigerator so that either one or the other is active when the refrigerator is running. The refrigerator was housed in a controlled-environment chamber, and it was instrumented so that its performance could be monitored carefully in conjunction with the water pre-heating system.

The system has been tested under a variety of hot water usage protocols, and the resulting data set has provided significant insight into issues associated with commercial implementation of the concept. For the case of no water usage, the system was able to provide a 35 "C temperature rise in the storage tank after about 100 hours of continuous operation, with no detectable deterioration of the refrigerator performance. Preliminary tests with simulations of "high water usage," "low water usage,'' and "family water usage" indicate a possible 18-20% energy savings for hot water over a long period of operation. Although the economic viability for such a system in a residential environment would appear to be sub-marginal, the potential for such a system associated with commercial-scale refrigeration clearly warrants further study, particularly for climates for which air conditioning heat rejection is highly seasonal

Stinson et al.1987, conducted research in dairy refrigeration by recovering the heat from condenser. A theoretical energy balance was conducted, from which the potential for recovery of refrigeration

condenser heat was estimated to be up to 60% of the water heating energy requirements. Preliminary tests with heat exchangers led to the development and testing of a tube-in-tube, counter flow heat exchanger, with fins on the refrigerant side and cores on the water side to improve the heat transfer characteristics. The exchanger, designed to provide 300 1 of water at 60°C from a 2.25 kW refrigeration system which cooled 2100 1 of milk per day, had a surface area on the refrigerant side of 0.84, and an overall thermal conductance of 750 W m-2 C-1.

It was inserted between the compressor and the condenser of the refrigeration plant and tested with two condensing systems (air and water), together with varying conditions of condenser pressure and milk temperatures at inlet and final cooling. In addition, tests on the receiver pressure and suction superheat were performed to determine their effect on the overall system performance. Increasing the condenser pressure from 6.5 bar to 12 bar increased cooling times. In extreme circumstances the system failed to comply with the New Zealand milk cooling regulations. The average coefficient of performance (C.O.P.) of the refrigerator (with the heat exchanger in the circuit) decreased with increasing pressure, varying from 3.0 to 2.3 over this range of pressures for the water cooled condenser system. Values for the air cooled condenser system were 0.3 to 0.4 lower due to fan power consumption.

Sanmati Mirji 2006, presented a multipurpose warming apparatus utilizing the waste heat of domestic refrigerator. The multipurpose apparatus was constructed as an additional part of the refrigerator. It used the waste heat generated by the refrigerator and has several possible household uses like food warming, domestic fermentation purposes such as curd making, fermentation for Indian food. The maximum temperature of the chamber got as high as 50ºC and the average temperature was around 40 ºC. The main advantage of the invention was to keep cooked food warm for a sufficiently long duration before consumption as well as warming the food removed from the refrigerator before consumption. It makes use of the waste heat generated by the domestic refrigerator and does not need any additional power supply.

Mills 1986, investigated several methods of heat recovery as applied to a residence. One of the more interesting approaches involved the reclamation of heat from water after it has been utilized. Waste water is collected in a 454 litre holding

tank, which also contains the evaporator for a 1.2 kW water-to-water heat pump. When the water temperature in the holding tank rises above a certain point, the heat pump is activated, transferring heat from the holding tank to the condenser which is mounted inside a 272 litre fresh hot water storage tank. An experimental prototype of this system was constructed and tested using a water usage pattern that was derived from an accepted standard hot water delivery schedule. The tests indicated that an energy savings of up to 60% over a typical 272 litre electric hot water heater was possible.

Akshay Paliwal (IV Year)

IC Engine with 2-stroke/4-stroke switching during its operation

Internal combustion engine with 2 and 4 strokes, switching during its operation. The proposed improvements to conventional four-stroke internal combustion engine (ICE) accelerate its gas exchange and allow switching the ICE (especially Diesel) from four stroke to two-stroke regime during engine operation. Scavenging in four-stroke and two-stroke mode of operation is fulfilled through the same inlet and exhaust valves.

The engine with proposed improvements is capable of doubling the engine output power and of holding it up for a certain period (time depends on a type of the engine) without overheating. This feature allows increasing the vehicle power-to-weight ratio when it is necessary in accordance with the changing vehicle operation and road conditions.

Eligible areas of activity for the proposed innovations are: combat tank diesel engines, combat vehicle and heavy army truck diesel engines, heavy truck diesel engines, special purpose vehicles diesel engines (emergency vehicles, fire trucks and others), and engines in electrical generator sets.

The essence of the innovation is to improve gas exchange during the two-stroke mode of engine operation. Four stroke gas exchange is performed like in ordinary four stroke diesel engine.

Two-stroke gas exchange is performed through the inlet and exhaust valve unlike scavenging ports in conventional two-stroke diesel engine.Inlet valves 6 are located on of the cylinder head; exhaust valve 4 is along the cylinder axle or with a small offset. The fresh air, preliminary compressed in the engine turbocharger and additionally compressed and cooled in the supercharger with intercooler, is supplied into the working cylinder 1 through tangential inlet passages 5 placed at a

certain angle to the cylinder head surface. Then the fresh air starts swirling as a dense bed along cylinder walls and displacing to its center and wrings exhaust gases from the cylinder walls to its axle. When the fresh air stream reaches the bottom of piston 2 it turns and expels exhaust gases, concentrated along the cylinder axle, through exhaust valve 4 into the exhaust passage 3.

To lower residual gases ratio and to cool hot surfaces, cylinder scavenging, accompanied by the discharge of some amount of fresh air charge into the exhaust system, is performed. Phases of gas exchange are typical of two stroke conventional IC engines. Supercharger of any appropriate type with inter-cooler is complemented to conventional IC engine, the arrangement of both the inlet valves and exhaust valve on the cylinder head as well as the valve-operating system are changed in order to provide a four-stroke and a two-stroke engine mode of operation.

The fuel pump is selected and adjusted to provide fuel supply in correspondence with the number of working strokes.

Unlike the conventional two-stroke IC engine (especially two-stroke Diesel engine), there are no scavenging ports in the proposed design and no losses of burnt oil through them. It provides the same harmful emission as the emission in conventional diesel engines.

Fields of implementation of the innovation in details

Combat tanks

Average characteristics of modern combat tanks: a vehicle with the weight ~60 tons; max speed 72 km/h; and acceleration 0-36 km/h for 6 sec. These travel parameters are provided by 1,500 hp power plant, which is either a diesel engine or a gas turbine. The inconsistency of a tank power plant is that the maximum power is required only for a short time of a combat tank life span – mainly during a combat or occasionally in other cases, while usually tank uses only 700-800 hp for a plain moving its weight at a constant speed and favorable moving conditions. The proposed innovation provides:

- The use of a suitable 1,000-1,500 hp diesel engine produced by any diesel engine manufacturers as a prototype for the power plant of a prospective combat tank. The engine prototype with proposed improvements produces 2,000-3,000 hp for a short time and doubles its power-to-weight ratio during a combat operation;

- The avoidance of designing the entirely new two-stroke diesel engine from scratch;

- Design a combat tank with the highest power-to-weight ratio and dominant maneuverability;

- The possibility of installing an additional fuel tanks inboard to increase the vehicle range without refueling

Trucks

It is possible to use the proposed improvements for civilian truck diesel engines. There is large market for the trucks with the "boosted" diesel engines like in Latin America, China, India and Southeast Asia (except Japan) countries. The truck with "boosted" diesel engine gains the ability to reach the given speed 1.7 times faster than with the conventional one. This feature is mostly useful when the truck outstrips the up-front vehicle on a counter traffic lane as well as overcomes the rise without switching the gear and slowing down vehicle speed.

The technology background includes:

1. Patents applications (both PPA and FPA) ready for submission

2. System to compute main characteristics of a targeted engine after its modification.

3. Different Solid Works models of designs, Solid Works COSMOSFIoWorks results, etc.

Kunal Choudhary (III Year)

Wright Brothers

Wilbur and Orville Wright were American inventors and pioneers of aviation. In 1903 the Wright brothers achieved the first powered, sustained and controlled airplane flight; they surpassed their own milestone two years later when they built and flew the first fully practical airplane.

Wilbur Wright was born on April 16, 1867, near Millville, Indiana. He was the middle child in a family of five children. His father, Milton Wright, was a bishop in the Church of the United Brethren in Christ. His mother was Susan Catherine Koerner. As a child Wilbur's playmate was his younger brother, Orville Wright, born in 1871.

Milton Wright's preaching took him on the road frequently, and he often brought back small toys for his children. In 1878 he brought back a small model helicopter for his boys. Made of cork, bamboo and paper, and powered by a rubber band to twirl its blades, the model was based on a design by the French aeronautical pioneer Alphonse Pénaud. Fascinated by the toy and its mechanics, Wilbur and Orville would develop a lifelong love of aeronautics and flying.

Wilbur was a bright and studious child, and excelled in school. His personality was

outgoing and robust, and he made plans to attend Yale University after high school. In the winter of 1885-86, an accident changed the course of Wilbur's life. He was badly injured in an ice hockey game, when another player's stick hit him in the face.

Though most of his injuries healed, the incident plunged Wilbur into a depression. He did not receive his high school diploma, canceled plans for college, and retreated to his family's home. Wilbur spent much of this period at home, reading books in his family's library, and caring for his ailing mother. Susan Koerner died in 1889 of tuberculosis.

In 1889 the brothers started their own newspaper, the West Side News. Wilbur edited the paper, and Orville was the publisher. The brothers also shared a passion for bicycles- a new craze that was sweeping the country. In 1892 Wilbur and Orville opened a bike shop, fixing bicycles and selling their own design.

Developing the Airplane

Always working on different mechanical projects and keeping up with scientific research, the Wright brothers closely followed the research of German aviator Otto Lilienthal. When Lilienthal died in a glider crash, the brothers decided to start their own experiments with flight. Determined to develop their own successful design, Wilbur and Orville headed to Kitty Hawk, North Carolina, known for its strong winds.

Wilbur and Orville set to work trying to figure out how to design wings for flight. They observed that birds angled their wings for balance and control, and tried to emulate this, developing a concept called "wing warping." When they added a moveable rudder, the Wright brothers found they had the magic formula-on December 17, 1903, they succeeded in flying the first free, controlled flight of a power-driven, heavier than air plane. Wilbur flew their plane for 59 seconds, at 852 feet, an extraordinary achievement.

The Wright brothers soon found that their success was not appreciated by all. Many in the press, as well as fellow flight experts, were reluctant to believe the brothers' claims at all. As a result, Wilbur set out for Europe in 1908, where he hoped he would have more success convincing the public and selling airplanes.

In France Wilbur found a much more receptive audience. He made many public flights, and gave rides to officials, journalists and statesmen. In 1909 Orville joined his brother in Europe, as did their younger sister Katharine. The Wrights

became huge celebrities there, hosted by royals and heads of state, and constantly featured in the press. The Wrights began to sell their airplanes in Europe, before returning to the United States in 1909. The brothers became wealthy businessmen, filling contracts for airplanes in Europe and the United States.

Wilbur and Orville always took shared credit for their innovations, and maintained a close relationship throughout their lives. Behind the scenes, however, there was a division of labor. With his sharp instincts, Wilbur was the business mind and executive of the operation, serving as president of the Wright Company.

Wilbur fell ill on a trip to Boston in April 1912. He was diagnosed with typhoid fever, and died on May 30 at his family home in Dayton, Ohio. Milton Wright wrote in his diary, ""A short life, full of consequences. An unfailing intellect, imperturbable temper, great self-reliance and as great modesty, seeing the right clearly, pursuing it steadily, he lived and died."

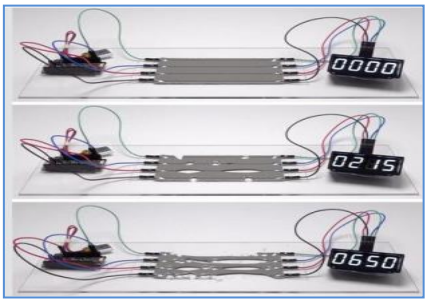
Source: History.com

Aniruddh Dongle (II Year)

Self-healing material a breakthrough for bio-inspired robotics

Many natural organisms have the ability to repair themselves. Now, manufactured machines will be able to mimic this property. In findings published this week in *Nature Materials*, researchers at Carnegie Mellon University have created a self-healing material that spontaneously repairs itself under extreme mechanical damage.

This soft-matter composite material is composed of liquid metal droplets suspended in a soft elastomer. When damaged, the droplets rupture to form new connections with neighboring droplets and reroute electrical signals without interruption. Circuits produced with conductive traces of this material remain fully and continuously operational when severed, punctured, or had material removed.



A digital clock continues to run as damaged circuits instantaneously heal themselves, rerouting electric signals without interruption.

Applications for its use include bio-inspired robotics, human-machine interaction, and wearable computing. Because the material also exhibits high electrical conductivity that does not change when stretched, it is ideal for use in power and data transmission.

"Other research in soft electronics has resulted in materials that are elastic and deformable, but still vulnerable to mechanical damage that causes immediate electrical failure," said Carmel Majidi, an associate professor of mechanical engineering. "The unprecedented level of functionality of our self-healing material can enable soft-matter electronics and machines to exhibit the extraordinary resilience of soft biological tissue and organisms."

Majidi, who directs the Integrated Soft Materials Laboratory, is a pioneer in developing new classes of materials in the fields of soft matter engineering and soft robotics.

"If we want to build machines that are more compatible with the human body and the natural environment, we have to start with new types of materials," he said.

Keyur Soni (IV Year)

Sun in a box' would store renewable energy for the grid

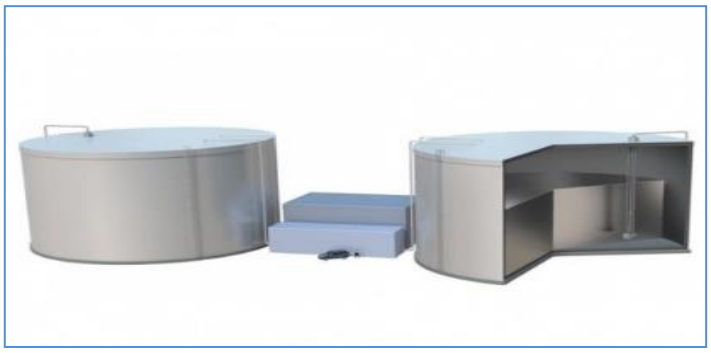
Engineers have come up with a conceptual design for a system to store renewable energy, such as solar and wind power, and deliver that energy back into an electric grid on demand. The system may be designed to power a small city not just when the sun is up or the wind is high, but around the clock

MIT engineers have come up with a conceptual design for a system to store renewable energy, such as solar and wind power, and deliver that energy back into an electric grid on demand. The system may be designed to power a small city not just when the sun is up or the wind is high, but around the clock.

The new design stores heat generated by excess electricity from solar or wind power in large tanks of white-hot molten silicon, and then converts the light from the glowing metal back into electricity when it's needed. The researchers estimate that such a system would be vastly more affordable than lithium-ion batteries, which have been proposed as a viable, though expensive, method to store renewable energy. They also estimate that the system would cost about half as much as pumped hydroelectric storage -- the

cheapest form of grid-scale energy storage to date.

"Even if we wanted to run the grid on renewables right now we couldn't, because you'd need fossil-fueled turbines to make up for the fact that the renewable supply cannot be dispatched on demand," says Asegun Henry, the Robert N. Noyce Career Development Associate Professor in the Department of Mechanical Engineering. "We're developing a new technology that, if successful, would solve this most important and critical problem in energy and climate change, namely, the storage problem."



Henry and his colleagues have published their design today in the journal *Energy and Environmental Science*.

"Sun in a box"

Now, the researchers have outlined their concept for a new renewable energy storage system, which they call TEGS-MPV, for Thermal Energy Grid Storage-Multi-Junction Photovoltaics. Instead of using fields of mirrors and a central tower to concentrate heat, they propose converting electricity generated by any renewable source, such as sunlight or wind, into thermal energy, via joule heating -- a process by which an electric current passes through a heating element.

The system could be paired with existing renewable energy systems, such as solar cells, to capture excess electricity during the day and store it for later use. Consider, for instance, a small town in Arizona that gets a portion of its electricity from a solar plant.

"Say everybody's going home from work, turning on their air conditioners and the sun is going down, but it's still hot," Henry says. "At that point, the photovoltaic are not going to have much output, so you'd have to have stored some of the energy from earlier in the day, like when the sun was at noon. That excess electricity could be routed to the storage system we've invented here."

The system would consist of a large, heavily insulated, 10-meter-wide tank made from graphite and filled with liquid silicon, kept at a "cold" temperature of almost 3,500 degrees Fahrenheit. A bank of tubes, exposed to heating elements, then connects this cold tank to a second, "hot"

tank. When electricity from the town's solar cells comes into the system, this energy is converted to heat in the heating elements. Meanwhile, liquid silicon is pumped out of the cold tank and further heats up as it passes through the bank of tubes exposed to the heating elements, and into the hot tank, where the thermal energy is now stored at a much higher temperature of about 4,300 F.

When electricity is needed, say, after the sun has set, the hot liquid silicon -- so hot that it's glowing white -- is pumped through an array of tubes that emit that light. Specialized solar cells, known as multi-junction photovoltaic, then turn that light into electricity, which can be supplied to the town's grid. The now-cooled silicon can be pumped back into the cold tank until the next round of storage -- acting effectively as a large rechargeable battery.

"One of the affectionate names people have started calling our concept is 'sun in a box,' which was coined by my colleague Shannon Yee at Georgia Tech," Henry says. "It's basically an extremely intense light source that's all contained in a box that traps the heat."

Brahmdev Kushwaha (IV Year)

Enjoying the life with simple pleasures

You do not have to have riches to enjoy life. If you have riches, you may have better options to enjoy life. However, if you are smart you can enjoy life without being rich. I am not suggesting that you should choose poverty. If you are forced by circumstances, you can use your ingenuity to enjoy the simple pleasures of life, by cultivating the right mental attitude and devising suitable methods.

Undoubtedly, you can enjoy life more and feel good about yourself and your accomplishments if you are rich and live in luxury. Living a luxurious and comfortable life is the sweet reward of success. However, it is a fallacy to believe that only rich people have a right to enjoy life. It is important to remember to enjoy life attitude is equally, if not more, important.

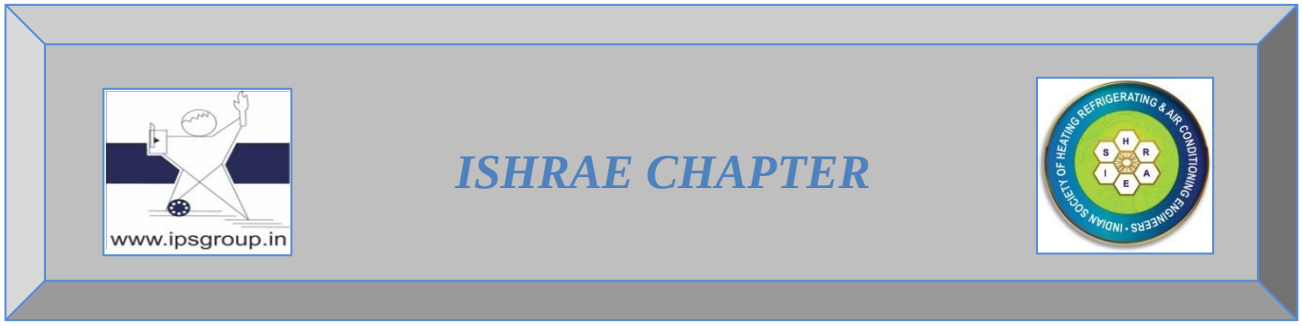
Luxuries may make people happy if they do not have the right mental attitude. As in case with all the material things in life, beyond a point the luxuries of life may not excite a person at all. Those who are accustomed to luxuries for a long time may not find any special joy in having them or using them.

Enjoyment arises mostly from attitude and the way you interpret your life and experiences. It is difficult to argue whether

the CEO of a business organization who is entitled to a Jet of his own and play golf in world's best golf clubs enjoys life better than a monk who lives in a cave in the Himalayas and eats only once in a day.

In both cases, it is the attitude which determines their ability to enjoy life and interpret their experiences. You can enjoy life even with simple means. If this not true, the world would be a depressing place to live because more that 95% of world population do not count as world's richest and do not have adequate means to spend money on luxuries.

Bhavya Tongiya (II Year)



ABOUT ISHRAE

❖ Background

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 than 12,000 HVAC&R professionals as members and additionally there are 7,500 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.

❖ Mission

To promote the goals of the Society for the benefit of the general public. Towards this objective, the Chapters of the Society participate in, and organize, activities to protect the Environment, improve Indoor Air Quality, help Energy Conservation, provide continuing education to the Members and others in the HVAC & related user Industries and offer certification programs, career guidance to students at the local colleges and tertiary institutions.

❖ Programs

ISHRAE conducts Conferences, Seminars, Workshops and Exhibitions throughout the country with both national and international participants to discuss, promote and display the state of the art technologies, systems, products and services. ISHRAE organizes ACREX INDIA, the largest international exposition in South Asia on the Air-Conditioning, Refrigeration, Ventilation and Building services industry. Held annually, ACREX is considered to be a major opportunity to showcase the latest technologies / innovations, and

provide a platform for buyer- seller meet for technical & commercial personnel in the HVAC& R field.

❖ Education & Training

IIE, the educational arm of the Society, is working towards human resource development in the HVAC&R industry in the country by conducting various courses. One of the most important objectives of ISHRAE is Training Programs & this is attempted at various levels. Right at the apex of the pyramid we have the ICP Certification Courses on Clean rooms AC-Design, AC Service and others. At the next level ISHRAE offers a 4-month full time Diploma Course for graduate engineers. In addition at Chapter level ISHRAE holds several successful training programs, workshops, short term courses, e-learning opportunities & product presentations.

❖ Research

ISHRAE promotes research in the field of HVAC&R technology. It offers financial support to Graduate/Post Graduate students, to carry out innovative work on R & D in Technology, Systems, and Processes.

❖ Activities

As part of its objectives to promote the interests of the HVAC&R Industry, ISHRAE is involved in various activities. ISHRAE reaches out to all its members and seeks their active participation & involvement in all the Events/Programs.

❖ Publications

ISHRAE publications strive to help its members & the industry keep up-to date with the technical developments, latest trends, and sunrise technologies. ISHRAE Standards, Fundamental books on various topics, HVAC&R Handbooks and the extremely popular & informative ISHRAE Journal, are a few such publications.

❖ Benefits of joining ISHRAE

- A Premiere Technical Society exclusively for AC & R community.
- Membership for individuals only, No Corporate Membership.

- Provides excellent networking opportunities to interact with other Professionals, Industry Leaders and key decisions makers in the Profession and Industry.
- Provides an excellent forum for professional development and continuous training & Re-training on both fundamentals and latest products & technologies available worldwide.
- Provides a platform for effective marketing and launching of new products and technologies through exhibitions, product presentations and advertisements.
- Provides an International exposure through International Associates.
- Easy access to all ISHRAE Technical Publications, Software, Workshops, Conferences and Training Programs.

❖ Events

ISHRAE has been proudly sponsoring innumerable International and Domestic events, spreading endless insight on HVACR industry. Every Event organized under ISHRAE, holds a specific place towards building a new technology world.

❖ Student Activity

ISHRAE student chapters in more than 150 engineering colleges encourage students to opt for careers in the HVAC&R industry. Knowledge dissemination is done through seminars, quiz contests, plant and site visits. K-12 initiative of ISHRAE is focused on school students' contests, in making them aware of subjects like, energy conservation and environmental concerns through drawing competitions, poster design, quiz and planting of trees. Emphasis on STEM is stressed to inculcate a scientific fervor & help develop these young children into responsible citizens.

CHAPTER INSTALLATION SESSION 2016 – 17

The chapter was installed in IES IPS Academy in the month of September 2016 followed by a Technical talk given by the President of ISHRAE Indore chapter Dr. Sharad Chaudhary Sir working as an Associate Professor at IET DAVV, Indore on "Comfort Air Conditioning" to the student members registered as a ISHRAE Members with the oath ceremony of the cwc members.

Oath Ceremony

- Technical Talk: on "Comfort Air Conditioning" by Dr. Sharad Chaudhary

Technical Talk

❖ STUDENT VISIT

Venue- Central Mall Indore **Date: 29/04/2017**

Chilled water central cooling system

The chilled water types of central air conditioning plants are installed in the place where whole large buildings, shopping mall, airport, hotel, etc, comprising of several floors are to be air conditioned. While in the direct expansion type of central air conditioning plants, refrigerant is directly used to cool the room air; in the chilled water plants the refrigerant first chills the water, which in turn chills the room air.

In chilled water plants, the ordinary water or brine solution is chilled to very low temperatures of about 6 to 8 degree Celsius by the refrigeration plant. This chilled water is pumped to various floors of the building and its different parts. In each of these parts the air handling units are installed, which comprise of the cooling coil, blower and the ducts. The chilled water flows through the cooling coil. The blower absorbs return air from the air conditioned rooms that are to be cooled via the ducts. This air passes over the cooling coil and gets cooled and is then passed to the air conditioned space.

Photos of Visit

STUDENT VISIT

❖ TECHNICAL TALK

"BASICS OF HVAC & CARRIER OPPORTUNITIES IN ACR INDUSTRIES"

A guest lecture was organized by "ISHRAE INDORE STUDENT CHAPTER" for various ISHRAE student members on 12/05/2017(FRIDAY) at IES IPS ACADEMY, INDORE. Students were encouraged and motivated by MR. Pankaj Tiwari President ISHRAE INDORE Chapter and MR. Jitendra Vyas ISHRAE President-elect for Indore chapter. On this occasion, Mr. Sharad Chaudhary Ex-President ISHRAE INDORE Chapter, Mr. Ajeet Burgaley ISHRAE Student Chair Activity and Mr. Kautuk Dixit Chair Youth @ ISHRAE were also present. The lecture was given by Mr. Prashant Pavecha CEO COOLAID, Past ISHRAE President and Director of WEST Region, from 02:30 PM on "BASICS OF HVAC & CARRIER OPPORTUNITIES IN ACR INDUSTRIES". The session was very interactive and students gained the Basic knowledge of HVAC, the basics of working methods of ACR Industries, requirements of Industries as potential candidates. How can someone be entrepreneur using HVAC?

TECHNICAL TALK

Overall the lecture was successfully completed with all satisfactory questionnaires. Students got fruitful knowledge of HVAC and can opt HVAC & R as their career opportunity. The vote of thanks & motivation given by Mr. Ajeet Burgaley ISHRAE Student Chair Activity on behalf of all ISHRAE Team.

SAE CHAPTER

ABOUT SAE

- **SOCIETY OF AUTOMATIVE ENGINEERS (SAE)** is a non-profit educational and scientific organization dedicated to advancing mobility technology to better serve humanity.
- SAE has more than 90,000 Members- engineers, business executives, educators, and students from 97 countries.
- SAE is not restricted to India or its subcontinent but is spread all over the globe covering Africa, Asia, Canada, Europe and America**.**
- SAEINDIA is India's leading resource for mobility technology. As an individual member-driven society of mobility practitioners the ownership of SAEINDIA wrests with its members who are Individuals from the mobility community, which includes Engineers Executives from Industry, Government Officials, Academics and Students

- SAEINDIA is a strategic alliance partner of SAE International registered in India as an Indian nonprofits engineering and scientific society dedicated to the advancement of mobility industry in India

❖ MISSION

- To enhance the knowledge base of members who are mobility practitioners within India
- To provide to its members access to SAE International programs and services globally enabling them to practice world class standard in productivity and quality
- To develop technical and scientific reports and engineering standards for the benefit of mankind.

- To provide a forum for members to informally exchange views and ideas
- SAEINDIA is a professional engineering society whose membership represents practically every engineering and scientific discipline. Its members combine their specialized abilities to further advance the research, development, design, manufacture and utilization of vehicles which operate on land, water, air and space.

❖ Why Should You Join SAE India?

Be a part of a National organization with a link to SAE International, whose benefits are geared specifically to the needs of the mobility engineering community. Your formal education and professional development will be enhanced through your SAEINDIA member benefits. Many of these benefits and opportunities are outlined below.

- SAEINDIA is one of the few professional engineering societies whose membership represents practically every engineering and scientific discipline. Its members combine their specialized abilities to further advance the research, development, design, manufacture and utilization of vehicles which operate on land and water and in air and space.
- Membership provides for regular members to have access to emagazine- either Automotive Engineering International or Aerospace Engineering magazine. These award winning magazines target hot topics about ground vehicle and aircraft developments to provide members with a valuable resource for keeping pace with the rapidly changing technology in the mobility industry.
- Members can purchase SAEINDIA and SAE International technical papers and publications at member discount prices.
- Members receive free registration at SAEINDIA's lecture meetings and exhibits. This unique benefit puts the members in touch with other professional engineers and suppliers who determine the future of the expanding mobility industry worldwide.
- SAEINDIA regularly plans and offers many career development activities such as job fairs, career enhancement sessions, resume/recruitment boards, and resume database services. Professional development seminars are also available at special member discounted rates, as well as undergraduate and graduate scholarship programs.
- Access vital high-tech mobility information through renewal registration fee for attending SAEINDIA National and International Congress.

- Network with industry leaders and corporate officials at SAEINDIA meetings and local section activities.
- Save Rs.2500 to Rs.10000 while attending SAEINDIA professional development business and TOP TECH Programs.

SAE-INDIA COLLEGIATE CLUB - 2016
IES-IPS ACADEMY

- Our college has an SAE Collegiate Club of around 120 members who can participate in any automobile event conducted by SAEINDIA and any college of India.
- The team name of our college is **"Team Automaniacs".** Club members are skilled in **various modeling, designing and analysis software** and in **marketing, managing, machine shops** and many more.
- Members of the club have also been engaged in many automobile projects at National level as a part of their studies.

Team Name - **AUTOMANIACS**

❖ BAJA SAE INDIA 2017

Harshit Yadav & Team Participated in the 10th edition of the Mahindra BAJA SAE India recently concluded at the National Automotive Testing and R&D Infrastructure Project (NATRiP) facility in Pithampur, near Indore. The 2017 edition of BAJA took place on 18–19th February. About 415 teams registered for the 10th edition of the BAJA SAEIndia series, out of which 185 teams qualified for the finale.

Departmental News & Updates

Students Achievements

1. ACHIEVEMENTS

S. No.	Name of Student	Date	Achievement (Detail)
1	Harshit Yadav & Team	18/02/2017	Participated In BAJA SAE India 2017
2	Aquib Khan & Dr. Sanjay Jain	06/05/2016	Patent No.201621010053 A
3	Ummed Singh	31/03/2017	Secured II position in Navrachana Organised by Shri Vaishnav Vidyapeeth Vishwavidyalaya
4	Harshit Yadav & Team	31/03/2017	Got Best Designed Award in Cintronics organized by Chamelidevi Institute of Technology and Management
5	Harshit Yadav & Group	06/05/2017	Secured First Position in Final Year project presentation
6	Rimanshu Chhari & Group	06/05/2017	Secured First Position in Final Year project presentation

2. VICE CHANCELLOR SCHOLARSHIP received from Rajiv Gandhi Technical University, Bhopal (M.P.)

1. Krishnakumar Singh (IInd Year)

3. ACADEMIC AWARDS

S. No.	Student Name	Name of Events	Position
1	Akshat Shrivastav	Swaranjali	First
2	Krishna Kumar	Swaranjali	First
3	Shubham Choudhary	Swaranjali	First
4	Samarth Jain	Swaranjali	Second
5	Vishal Makhija	Swaranjali	Second
6	Akhsat Shukla	Swaranjali	Second

7	Shubham Patel	Swaranjali	Second

4. CULTURAL

List of Students Shining in Cultural Activities

S. No.	Name	Year	Event	Position
1	Shourya Nigam	II	Group Dance	Second
2	Keyur Soni	I	Videography	First

5. SPECIAL AWARDS

S. No.	Name	Achievement
1	Keyur Soni	Face of the Year
2	Pritesh Goyal	Overall Performance

6. SPORTS

Winners of Sports

S. No.	Winner	Games
1	Varun Agrawal	Chess
2	Shubham Pandey	Shot Put

7. Students Who Got First/Second Position (Academics) (UG)

S. No	Name of Student	Sem/Year	Position	Percentage
1	Akshat Shrivastava	VIII/ IV	First	8.31
2	Vishal Makhija	VIII/ IV	Second	8.15