KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(**An Autonomous Institution** - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near **VIRUDHUNAGAR**).

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

20th EDITION

E SHOTS

OCTOBER - DECEMBER (2021)

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VISION OF THE DEPARTMENT

To make the Department of Electrical and Electronics Engineering of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

MISSION OF THE DEPARTMENT

Department of Electrical and Electronics Engineering is committed to

1.Inculcate technical knowledge by providing well-balanced curriculum to the urban and unreachable rural student community through "Total Quality Education"

2. Induce leadership and entrepreneurial skills with high standard of ethics and moral values to the student community.

3. Impart innovative skills to the student community by effectively involving them in research activities.

4. Create a wholesome environment to promote effective interaction of students with the industry experts

ARTICLES

PARKER SOLAR PROBE – Humanity's First visit to a Star:

A NASA spacecraft has officially "touched" the sun, plunging through the unexplored solar atmosphere known as the corona.

The Parker Solar Probe actually flew through the corona in April during the spacecraft's eighth close approach to the sun. Scientists said it took a few months to get the data back and then several more months to confirm.

"Fascinatingly exciting," said project scientist Nour Raouafi of Johns Hopkins University.

Launched in 2018, Parker was 13 million kilometers from the center of the sun when it first crossed the jagged, uneven boundary between the solar atmosphere and outgoing solar wind. The spacecraft dipped in and out of the corona at least three times, each a smooth transition, according to scientists.

"The first and most dramatic time we were below for about five hours ... Now you might think five hours, that doesn't sound big," the University of Michigan's Justin Kasper told reporters. But he noted that Parker was moving so fast it covered a vast distance during that time, tearing along at more than 100 kilometers per second.

The corona appeared dustier than expected, according to Raouafi. Future coronal excursions will help scientist better understand the origin of the solar wind, he said, and how it is heated and accelerated out into space. Because the sun

PARKER SOLAR PROBE

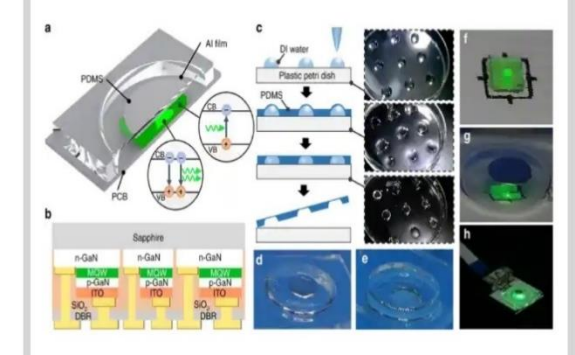
lacks a solid surface, the corona is where the action is; exploring this magnetically intense region up close can help scientists better understand solar outbursts that can interfere with life here on Earth.

Preliminary data suggest Parker also dipped into the corona during its ninth close approach in August, but scientists said more analyses are needed. It made its 10th close approach last month.

Parker will keep drawing ever closer to the sun and diving deeper into the corona until its grand finale orbit in 2025.

CHIP SCALE OPTICAL AIR FLOW SENSOR:

Introduction The velocity measurement and distribution analysis of airflow is of great significance in the fields of atmospheric environmental monitoring, aerodynamic studies, turbine inspection, navigation control, biomedical engineering, and so on. Sensing devices employing the principles of thermoresistance, piezoresistance, electrical resistance, capacitance, magnetoelasticity, and mechanoluminescence have been developed for airflow detection. However, the achievement of a sensor with both unsolved challenge. Recently, optical airflow sensors based on fiber optics have attracted substantial research interest due to their distinctive advantages, such as their lightweight, high sensitivity, and fast optical response. To improve the sensitivity of sensors to optical changes induced by airflow, several advanced architectures, such as fiber Bragg gratings, Fabry–Pérot interferometers, microcantilevers, and other nanostructures, have been incorporated. Nevertheless, the reported fiber-optic sensing systems mostly involve the complex assembly of external components and require precise optical alignment to couple the light from a light source to a spectroscopic analyzer through optical fiber as the sensing medium. The bulky and complex configurations inevitably weaken the efficiency, robustness, and compactness of the system and limit its scope of



CHIP SCALE OPTICAL AIR FLOW SENSOR

applications. Furthermore, despite their intrinsic fast response based on optical means, the response time of the reported optical systems in response to airflow has not been investigated and presented. Eliminating the external light-coupling components is a promising approach for realizing the miniaturization of optical airflow sensors. Considering the materials used to construct solid-state high-performance optical devices, GaN-based direct bandgap semiconductors and their alloys are excellent candidates because of their high efficiency, fast transient response, good physical and chemical stability, and long operational lifespan. Recently, the monolithic integration of GaN-based optical and electronic components on a chip-scale platform has been demonstrated for on-chip visible light communication heart rate detection, and illumination and imaging. However, to date, reports on the use of integrated GaN based devices for airflow detection remain extremely limited. The major limitation is that the existence of rigid and hard growth substrates, such as sapphire and silicon, limits the deformation of the device in response to airflow. The only report about a GaN-based airflow sensor employs a suspended GaN membrane that shows a detectable airflow rate of up to 2.779 ms−1 and a switch-on time of 1. Although a bendable GaN film can be realized by the selective wet etching of silicon or laser lift-off of sapphire, the use of a free-standing GaN film as a sensing medium responding to high airflow is less reliable due to its fragility. Moreover, structural deformation introduces unwanted strain in the GaN epitaxial layer, which degrades the internal quantum efficiency of the device. Therefore, a highly flexible structure should be explored as an alternative sensing medium. In this work, a novel compact integration of a GaN chip with a flexible PDMS membrane that enables the chip to sense airflow without the need for external light coupling components is proposed. The GaN chip with the dual functions of emission and detection is fabricated on a GaN/sapphire template through waferscale fabrication processes, while the PDMS membrane is formed by a low-cost droplet-based molding process. The electrical and optical properties of the on-chip device, as well as its ability to detect a wide range of airflow rates, are studied to confirm the effectiveness of the proposed integration scheme.

INDIA MASSIVE TRANSFORMATION OF ENERGY SOUCES:

India, the world's third-largest oil consumer, is also one of the most active markets for renewable energy innovation and investment

India has set in motion an ambitious energy strategy to more than triple RE capacity – mainly from solar and wind. Along with additional boost from bioenergy and small hydropower, the Government has revised the domestic RE target to 175 GW of installed capacity by 2022. In the Intended Nationally Determined

ENERGY SOURCES

Contributions (INDC) of 2015, India had made a global pledge to achieve 40% cumulative installed capacity from fossil-fuel-free resources by 2030. While the domestic policy target is ambitious, the global pledge is aptly cautious and realistic.

The energy strategy and associated enabling policies are already yielding results. India was the fourth-largest country in terms of new installed solar PV capacity in 2016 and remains the fourth-largest wind energy market globally in cumulative capacity. A recent solar PV tender in Madhya Pradesh for a 750 MW solar park was awarded at a price of US$55/MWh, the cheapest in India and among the most competitive worldwide. Solar PV prices contracted in auctions have decreased by half over the last three years in India, making renewable competitive with coal-fire electricity.

With nearly US$10 billion invested in 2015, renewables represented over a third of power-generation investment, up from just over a quarter the prior year. Nonetheless, a key challenge will be to deliver electricity where and when it is most needed, for instance during the early evening peak demand period. This will require integrating

solar PV and wind with a more flexible power generation and storage systems. An investment of around US$20 billion in 2015 behind upgrading and expanding India's electricity network has already alleviated some of the infrastructure concerns.

INDIA'S FIRST UNCREWED SPACE MISSION IN 2022:

The first uncrewed space mission part of India's Rs 9,023 crore human space mission called 'Gaganyaan' is slated for the second half of 2022, the government said. Answering a question raised in the Rajya Sabha, Union Minister of

MISSION GAGANYAAN

Science and Technology Dr. Jitendra Singh on Thursday said the test vehicle flight for validation of Crew Escape System performance and the first uncrewed mission of Gaganyaan are scheduled during the beginning of second half of 2022. This will be followed by a second uncrewed mission and first crewed mission, Singh added. According to him, the design of all systems of Gaganyaan has been completed. Realization of various systems are in different stages of progress. Ground qualification tests of human rated launch vehicle (rocket) propulsion stages have already commenced and are progressing successfully. "The configuration and design of ground infrastructure has been completed and modifications needed are being implemented. The MoU, contracts and Implementation arrangement (IA) related activities with both national and international agencies are progressing well," Singh said. "Receipt of deliverables has commenced against contracts with M/s Glavkosmos (Russian Space Agency) for space suit, crew seat and View port. Also receipt of deliverables under various work packages of CNES (French Space Agency) IA has commenced," Singh added. The activities related to development of microgravity experiments have commenced, the conceptual design for experiments is under review. The astronaut training facility is getting established at Bengaluru and in an advanced stage of completion. Basic Aeromedical training and flying practice completed as part of the Indian leg of training. The objective of Gaganyaan programme is to demonstrate the capability to send humans to low earth orbit (LEO) onboard an Indian rocket and bring them back to earth safely. On the question raised about the status of India's third moon mission -- Chandrayaan-3 -- he said it is in the advanced stage of realization. All the systems in both Propulsion Module and Rover Module have been realized, integrated and tested. In the Lander Module, most of the systems have been realized and tests are under progress.

Integrated Sensors and Navigation performance tests on the Lander have been completed and other tests are in progress. All the identified tests will be completed before the launch of Chandrayaan-3, he said. Chandrayaan-3 is targeted to be launched in the second quarter of financial year 2022 -2023. –IANS.

RESEARCH PROPOSALS SANCTIONED/SUBMITTED: (FOR FACULTY MEMBERS

- **Dr. D. Prince Winston** has an ongoing research project work of title "**Improvement of Power Generation in a 20kW Solar PV Power Plant through Bypass Diode Scanning Algorithm and Modified Couple Matching Algorithm"** with duration of 3 years holds the cost of Rs. 1,50,000 funded by AICTE – RPS on October 2021.
- **Dr. J. Jeslin Drusila Nesamalar** has an ongoing research project of title "**Optimal Design and Development of Machine Learning Model for Remote Monitoring and Control of Hybrid Microgrid in Educational Institutions using Smart Sensor Network and IoT"** with duration of 2 years holds the cost of Rs. 28,64,400 funded by DST- SERB on October 2021.
- **Dr. S. Kalyani** has an ongoing research project of tittle **"Modernization And Removal Of Obsolescence e Of Power System Simulation Laboratory"** with duration of 2 years holds the cost of Rs. 9,00,000 funded by AICTE-MODROBS on November 2021.

BOOK /CHAPTER PUBLISHED BY FACULTY MEMBERS

- **S. Chellam, M. Jajini, S. Kalyani** has published paper on Computation of Congestion Cost in Transmission Lines in **"Research Challenges in Science, Engineering and Technology"** of volume no Chapter 05 & Page 85 on November 2021.

FACULTY RECOGNIZED AS A RESEARCH SUPERVISOR

- **Dr. B. Guru Karthick Babu** has been approved as research supervisor at "**Anna University**" during November 2021.

CONFERENCE PUBLICATIONS BY FACULTY MEMBERS

- **S. Rajendran, M Vallarasu, P Manoj Kumar, K Rajesh, T Hari Prasath, S Revathi** has published paper on Design of Harmony Vertical Axis Wind Turbine for Power Generation in **"Fourth International Conference on Microelectronics, Signals and Systems"** at T K M College of Engineering, Kollam held on 18-19th November 2021.
- **B. Pushpavanam, S. Kalyani** has published paper on AI techniques for Estimation of SoC of Li-ion Batteries - A Review in **"ICEMTAS, S' 21 International Conference"** sponsored by IEEE on December 16-18 2021.

FACULTY ACTING AS EDITORIAL BOARD MEMBERS IN JOURNALS

- **Dr. D. Prince Winston** who is a professor and head of EEE department has acted as editorial board member of Editor team in the Journal "Journal of Electronic & Information Systems" published by Bilingual Publishing Co. All., and has acted as editorial board member of Editor in the Journal "International Journal of Advanced Research in Science and Engineering" published by Publons Publications., And has acted as editorial board member of Guest Editor in the Journal "Current Alternative Energy" published by Bentham Science Publishers during November -December 2021.

- **Dr. S. Kalyani** who is a professor of EEE department has acted as editorial board member of Editorial board in the Journal "Journal of Instrumentation and Innovation Sciences" published by MAT Journals (A unit of ARV Infomedia Pvt Ltd) during November -December 2021.

FDP ATTENDED BY FACULTY MEMBERS:

- **Dr. D. Prince Winston** has participated in the programme **"National Education Policy- Sustainable Change Management in Planning and Architecture"** at School of Planning and Architecture Vijayawada sponsored by AICTE – ATAL which was held during 04-10- 2021 to 08-10- 2021.
- **Dr. S. Rajeshbabu** has participated in the programme **"Electric Vehicles"** at Mangalore institute of Technology & Engineering sponsored by AICTE – ATAL which was held during 04-10-2021 to 08-10- 2021.
- **Mrs. B. Noorul Hamitha** has participated in the programme **"National Education Policy - Sustainable Change Management in Planning and Architecture"** at School of Planning and Architecture Vijayawada sponsored by AICTE – ATAL which was held during 04-10- 2021 to 08-10- 2021.
- **Mrs. V. Chandra** has participated in the programme **"National Education Policy - Sustainable Change Management in Planning and Architecture"** at School of Planning and Architecture Vijayawada sponsored by AICTE – ATA, which was held during 04-10- 2021 to 08-10- 2021.
- **Mr. D. Mariappan** has participated in the programme **"National Education Policy - Sustainable Change Management in Planning and Architecture"** at School of Planning and Architecture Vijayawada sponsored by AICTE - ATAL, which was held during 04-10- 2021 to 08-10- 2021.
- **Mr. S. Jegan** has participated in the programme **"Research Challenges," Opportunities in smart grid with integration electric vehicles"** at VEMU institute of Technology, which was held during 08-10- 2021 to 12-10- 2021.
- **Mrs. V. Chandra** has participated in the programme **"Research Challenges,"**

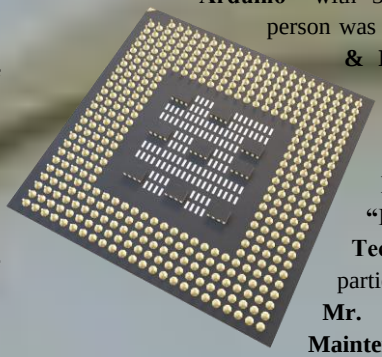
Opportunities in smart grid with integration electric vehicles" at VEMU institute of Technology, Chittoor, which was held during 08-10- 2021 to 12-10- 2021

- **Mr. D. Mariappan** has participated in the programme **"Incorporating Universal Human Values in Education"** at AICTE sponsored by AICTE, which was held during 25.10.20 21 to 29.10.20 21.
- **Mr. K. Ganesan** has participated in the programme **"Research Challenges," Opportunities in smart grid with integration electric vehicles"** at VEMU institute of Technology, Chittoor, which was held during 08-10- 2021 to 12-10- 2021.

- **Mr. R. Ganesan** has participated in the programme **"Research Challenges," Opportunities in smart grid with integration electric vehicles"** at VEMU institute of Technology, Chittoor, which was held during 08-10- 2021 to 12-10- 2021.
- **Mr. A. Karthikeyan** has participated in the programme **"Research Challenges," Opportunities in smart grid with integration electric vehicles"** at VEMU institute of Technology, Chittoor, which was held during 08-10- 2021 to 12-10- 2021
- **Mrs. R. Reenu** has participated in the programme **"Research Challenges," Opportunities in smart grid with integration electric vehicles**" at VEMU institute of Technology, Chittor, which was held during 08-10- 2021 to 12-10- 2021.
- **Mr. T. Hari Prasath** has participated in the programme **"Research Challenges," Opportunities in smart grid with integration electric vehicles"** at VEMU institute of Technology, Chittoor, which was held during 08-10- 2021 to 12-10- 2021.
- **Mrs. V. Chandra** has participated in the programme **"FDP on Artificial Intelligence and Machine Learning: Research and Application Perspective"** at Ballari Institute of Technology and Management. sponsored by AICTE Training and Learning (ATAL) Academy, which was held during 25-10- 2021 to 29- 10-2021.
- **Mr. S. Jegan** has participated in the programme **"Online Quiz series on Power Systems"** at K. Ramakrishnan College of Engineering sponsored by IEEE PES which was held on 19-11- 2021.
- **Dr. S. Kalyani** has participated in the programme **"Smart Grid – Trends and Future Perspective"** at Kings College of Engineering, sponsored by IEEE Madras Section, which was held during 08-11-2021 to 09- 11-2021.
- **Dr. S. Kalyani** has participated in the programme **"Principles of Artificial Digital Teaching Techniques"** at ICT Academy, which was held during 27 - 12 - 2021 to 31 - 12 – 2021.
- **Dr. D. Prince** Winston has participated in the programme **"State level Workshop on Public Financial Management System (PFMS) With special Reference"** at V.H.N Senthilkumaran Nadar College, which was held during 13-12-2021 to 14-12-2021**.**
- **Mrs. S. Vimala Devi** has participated in the programme **"Principles of Artificial Intelligence, Machine Learning, and Deep Learning"** at AICTE, sponsored by AICTE, which was held during 26 - 11 – 2021 to 30 - 11 – 2021.
- **Mrs. R. Reenu** has participated in the programme **"ATAL FDP on Sensor Data Analytics"** at Indian Institute of Information Technology Kottayam, sponsored by ATAL, which was held during 29-11-2021 to 03-12-2021.

FDP/WORKSHOP/SEMINAR/CONFERENCES/GUEST LECTURES ORGANIZED

- **Mrs. B. Noorul Hamitha** has coordinated the training programme on **"Projects using Arduino"** with 35 participants, the resource person was **Dr. D. Prince Winston Prof & Head, EEE** held on 23-10-2021.



- **Mrs. V. Chandra** has coordinated the guest lecture programme on **"Electrical systems for EEE Technicians"** with 4 participants, the chief guest **was Mr. Mathivanan (Electrical Maintenance System),** held on 21-10- 2021.

- **Mrs. Vimaladevi. S** has coordinated the orientation programme on **"Electronic Spreadsheet (MS-EXCEL)"** with 25 participants. The chief guest of this programme was **Dr. B. Gurukarthik Babu, AP/EEE Er. S. Ramesh Prabhu, AP/EIE and Dr. S. Kalyani, Prof. /EEE**, held on 26- 11.2021.
- **Mr. S. Jegan** has coordinates the online alumni guest lecture titled **"Role of numerical relay in power system protection"** with 20 participants, the chief guest of this programme **Mr. B. Sathish Kumar, Protection Engineer, GK power expertise Pvt., Ltd, Chennai.** held on 21-12-2021.
- **Mrs. B. Noorul Hamitha** has coordinated the programme **"Hands on Training on Energy Conservation in Industry using Solar Power Plant"** with 27 participants, the chief guest of this programme **Mr. S. Siva Kumar, Project Engineer, M/s Green Solar Energy, Madurai.** held on 27-12-2021,

ACHIEVEMENT BY STAFF MEMBERS

- **Dr. S. Kalyani** has acted as an resource person of the programme **"Futuristic Technologies in Power Systems"**, organized at AAA College of Engineering and Technology, Sivakasi, held on 23-10-2021.
- **Mr. D Mariappan** has acted as Guest Speaker of the programme **"Art of Learning"** organized at Kanchi Sri Sankara Academy Matric. Hr. Sec. School, held on 23-10-2021.
- **Mr. D Mariappan** has acted as Guest Speaker of the programme **"Art of Learning"** organized at Vel's Vidyalaya, Kovilpatti, held on 18-10-.2021
- **Dr. S. Kalyani** has acted as an resource person of 2 sessions on the programme **"Introduction to Support Vector Machine and Applications in Fault Diagnosis"**, sponsored by AICTE ATAL FDP on "Artificial Intelligence Foundations for Power Systems" and organized at KLN College of Engineering, held on 27-10-2021.
- **Mrs. S Vimaladevi** has acted as a resource person of the programme **"Resource person for Creative Practices Team for the Student Induction Program 2021"**, organized at Kamaraj College of Engineering and Technology, held during 08-11-2021 to 20-11-2021.
- **Mrs. B. Noorul Hamitha** has acted as an resource person of the programme **"Computer Proficiency Team for the Student Induction Program 2021"** organized at Kamaraj College of Engineering and Technology, held during 08-11-2021 To 20-11-2021.
- **Dr D Prince Winston** has acted as an National Advisory Committee Member of the programme **"International Conference on Soft Computing and Intelligent Technologies",** organized at Cheran College of Engineering, Karur, held on 24-12-2021.

HONOURS /AWARDS BY FACULTY MEMBERS

- **Mr. D. Mariappan** has been awarded as **"Best Faculty in Engineering Dr. A.P.J Abdul Kalam Award -2021"** and awarded by Sreenman Pandikumar Memorial Trust & Vithaippom Valarppom Teachers Forum during September 2021.
- **Dr. D. Prince Winston** has been awarded as **"Top 2% Scientists Worldwide"** and awarded by Elsevier BV, Stanford University, during November 2021.

HONOURS/AWARDS BY FACULTY MEMBERS

ACHIEVEMENTS / AWARDS/ HONORS BY STUDENTS

- **Mr. A. Karthikeyan** as a investigator has submitted a project named as **"Multipurpose planetary rover".**
- **Mr. P. Lingesh Dhanraj** has been awarded **for the best NSS volunteer** in the year 2021 **by Anna University**, held on December 2021

LINGESH DHANRAJ, AWARDED FOR THE BEST NSS VOLUNTEER

SIX PLANET ALLIGNMENT

STUDENTS PARTICIPATED ONLINE TRAINING / COMPETITION

Journal Publications:

- **S. Hariharan, P. Lingesh Dhanraj, A.Dhanaseelan** have published paper on Overview of Power Quality Issues and Improvement Techniques in **Overview of Power Quality Issues and Improvement Techniques** on November 2021.

INTRESTING EVENTS WILL HAPPEN IN 2022

- August 26 – September 15 – ESA's Jupiter Icy Moons Explorer is scheduled to be launched.
- India plans to launch its first crewed space flight by this year (DATE UNKNOWN)
- Five (possibly six) planets align (June 18 to 27)

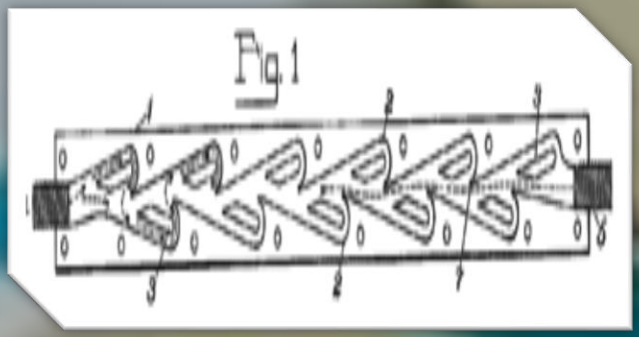
The unaided eye will be able to see Mercury, Venus, Mars, Jupiter, Saturn, and possibly Uranus. Between June 18 and June 27, the moon will travel close to each of these worlds.

SMART INVENTION

TESLA VALVE:

NO MOVING PARTS – VALVE:

A Tesla valve, called a valvular conduit by its inventor, is a fixed-geometry passive check valve. It allows a fluid to flow preferentially in one direction, without moving parts.

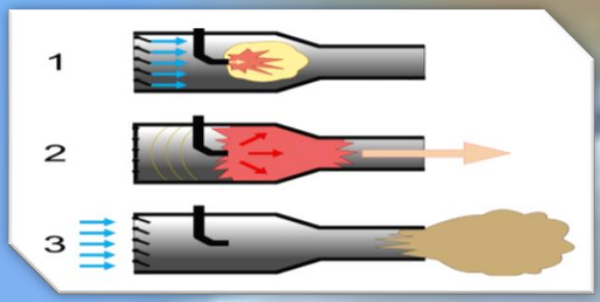


MODEL DIAGRAM OF TESLA VALVE

With no moving parts, Tesla valves are much more resistant to wear and fatigue, especially in applications with frequent pressure reversal such as a pulsejet. One computational fluid dynamics simulation of Tesla valves with two and four segments showed that the flow resistance in the blocking (or reverse) direction was about 15 and 40 times greater, respectively, than the unimpeded (or forward) direction. This lends support to Tesla's patent assertion that in the valvular conduit in his diagram, a pressure ratio

"approximating" 200 can be obtained so that the device acts as a slightly leaking valve".

Steady flow experiments, including with the original design, however, show smaller ratios of the two resistances in the



PULSEJET ENGINE DIAGRAM

range of 2 to 4. It has also been shown that the device works better with pulsatile flows.

USES:

- Microfluid application
- Pulsejet engine

GATE QUESTIONS

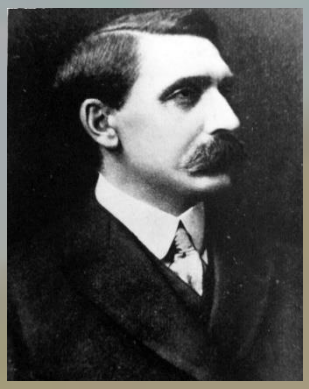
1) A single-phase, full-bridge, fully controlled thyristor rectifier feeds a load comprising a 10 ΩΩ resistance in series with a very inductance. The rectifier is fed from an ideal 230 V, 50 Hz sinusoidal source through cables which have negligible internal resistance and a total inductance of 2.28 mH. If the thyristors are triggered at an angle α=45∘α=45∘, the commutation overlap angle in degree (rounded off to 2 decimal places) is _____.

ANS: 4.51 to 5.10

2) Two generating units rated 300MW and 400MW have governor speed of regulation of 6% and 4% respectively from no load to full load. Both the generating units are operating in parallel to share a load of 600MW. Assuming free governor action, the load shared by the larger units is _____ MW.

ANS: 333MW.

THERE IS NO RESISTANCE TO STOP OUR POTENTIAL!



SEBASTIAN ZIANI DE FERRANTI

NIKOLA TESLA