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CENTRE FOR LASER

2020-2023

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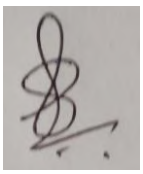
Message From Research Centre Coordinator

I am pleased to present to you, on behalf of the Laser Research Centre, our comprehensive booklet highlighting cutting-edge work and advancements in laser technology. As the coordinator of this Research Centre, it is my honor to describe our remarkable journey and significant contributions. At the Laser Research Centre, we aim to advance laser science and its applications. Our devoted team of researchers, engineers, and scientists diligently investigates the immense potential of lasers in a variety of fields, including medicine, industry, communications, and more. Our dedication to innovation and excellence has positioned us as the preeminent institution in our discipline. This booklet contains a multitude of information emphasizing our most important research areas, ground-breaking discoveries, and noteworthy accomplishments. In addition, we are grateful to our academic and industrial collaborators and partners for their support of our efforts.

Lastly, I would like to convey my gratitude to the Laser Research Centre team for their unwavering commitment to excellence and unwavering dedication. Their enthusiasm for expanding the boundaries of knowledge is the driving force behind our success.

Warm regards,



Dr. Subhraraj Panda

Coordinator, Laser Research Centre

RC members list

Dr. Padmaja Patnaik

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Contents

1. Aim of the RC

The prime focus of the centre is to do research related to applications of Laser in various industries and also to develop prototypes using laser. Apart from doing research work the members work towards developing interest in students and enabling them to explore various instrumentations in Laser applications. These are done through skill courses and summer internships offered by the centre. The research centre collaborates with other in-house research centres and external institutes for these activities.

The aim of the Laser Research Centre is to advance the understanding, application, and impact of laser technology through cutting-edge research and development activities. The Centre strives to achieve the following objectives:

- Push the Boundaries of Laser Science: The primary aim of the Laser Research Centre is to advance the field of laser science. This involves conducting innovative research, exploring new theories, and expanding the knowledge base in areas such as laser physics, optics, and laser-matter interactions. By pushing the boundaries of laser science, the Centre aims to contribute to scientific advancements and pave the way for new discoveries.

- Develop State-of-the-Art Laser Technologies: The Centre aims to develop state-of-the-art laser technologies that have practical applications across various fields. This includes designing and building advanced laser systems, devices, and components that offer improved performance, efficiency, and versatility. By developing cutting-edge laser technologies, the Centre seeks to provide solutions for industries, healthcare, communication, materials processing, and other sectors.

- Address Real-World Challenges: The Laser Research Centre aims to address real-world challenges and societal needs through laser-based solutions. This involves applying laser technology to tackle issues related to renewable energy, environmental monitoring, healthcare diagnostics and treatments, industrial processes, and more. The Centre aims to develop innovative laser-based solutions that have a positive impact on society, the economy, and the environment.

- Foster Collaborations and Partnerships: Collaboration is vital for advancing laser technology and its applications. The Centre aims to foster collaborations and partnerships with academic institutions, research organizations, industries, and other stakeholders. By working together, sharing expertise, and pooling resources, the Centre aims to accelerate progress, exchange knowledge, and drive collective innovation in laser science.

- Educate and Train Future Experts: The Laser Research Centre is committed to nurturing the next generation of laser scientists, engineers, and researchers. The aim is to provide quality education, training, and research opportunities for students and young professionals interested in laser technology. Through educational programs, internships, and research projects, the Centre aims to develop a skilled workforce capable of driving advancements and innovation in laser science.

- Disseminate Knowledge and Promote Awareness: The Centre aims to disseminate research findings, knowledge, and advancements in laser technology through publications, conferences, workshops, and other platforms. It seeks to promote awareness and understanding of laser science among the scientific community, industry professionals, policymakers, and the general public. By sharing knowledge and creating awareness, the Centre aims to inspire interest, collaboration, and informed decision-making related to laser technology.

2. Objective of the RC

The objective of the Laser Research Centre is to conduct advanced research and development activities in the field of laser technology. The Centre aims to achieve the following goals:

1. Advancement of Laser Science: The Laser Research Centre is committed to expanding our understanding of laser science, including the fundamental principles and applications of laser technology. By conducting cutting-edge research, the Centre seeks to contribute to the body of knowledge in the field and push the boundaries of what is possible with lasers.
2. Innovation and Technological Advancements: Through research and development efforts, the Centre aims to drive innovation in laser technology. This includes exploring new techniques, materials, and applications for lasers, as well as developing

novel laser systems, devices, and methodologies. The objective is to foster advancements that have practical and real-world implications across various sectors.

3. Collaboration and Partnerships: The Centre recognizes the importance of collaboration and partnerships in advancing laser technology. It actively seeks collaborations with academic institutions, research organizations, industries, and other stakeholders. By working together, the Centre aims to leverage collective expertise, resources, and perspectives to accelerate progress and address complex challenges in laser science.
4. Education and Training: The Laser Research Centre is committed to nurturing and developing talent in the field of laser technology. It aims to provide educational and training opportunities for students, researchers, and professionals interested in lasers. This includes organizing workshops, training programs, and knowledge-sharing initiatives to enhance skills, knowledge, and practical experience in laser-related disciplines.
5. Transfer of Technology and Knowledge: The Centre aims to bridge the gap between research and application by facilitating the transfer of technology and knowledge. It strives to translate research findings and innovations into practical solutions, products, or processes that benefit society, industry, and the economy. This may involve technology transfer, intellectual property protection, and commercialization efforts.
6. Outreach and Public Engagement: The Centre recognizes the importance of public engagement and awareness in fostering understanding and appreciation of laser technology. It aims to engage with the wider community through outreach programs, public lectures, exhibitions, and interactive demonstrations. By sharing knowledge, experiences, and achievements, the Centre seeks to inspire interest, curiosity, and enthusiasm for laser science among the general public.

The objective of the Laser Research Centre is to be at the forefront of laser technology research and development, driving advancements, fostering collaborations, and contributing to the growth and application of laser science for the betterment of society.

2.1. Expected Outcomes

- Development of a skill course on DIY lasers course with materials ready in courseware. This should be offered in even semester.

- ❖ Development of selected diploma/advanced certificate/certificate courses with original videos and ppts.
- ❖ Develop expertise on relevant Dassault tools

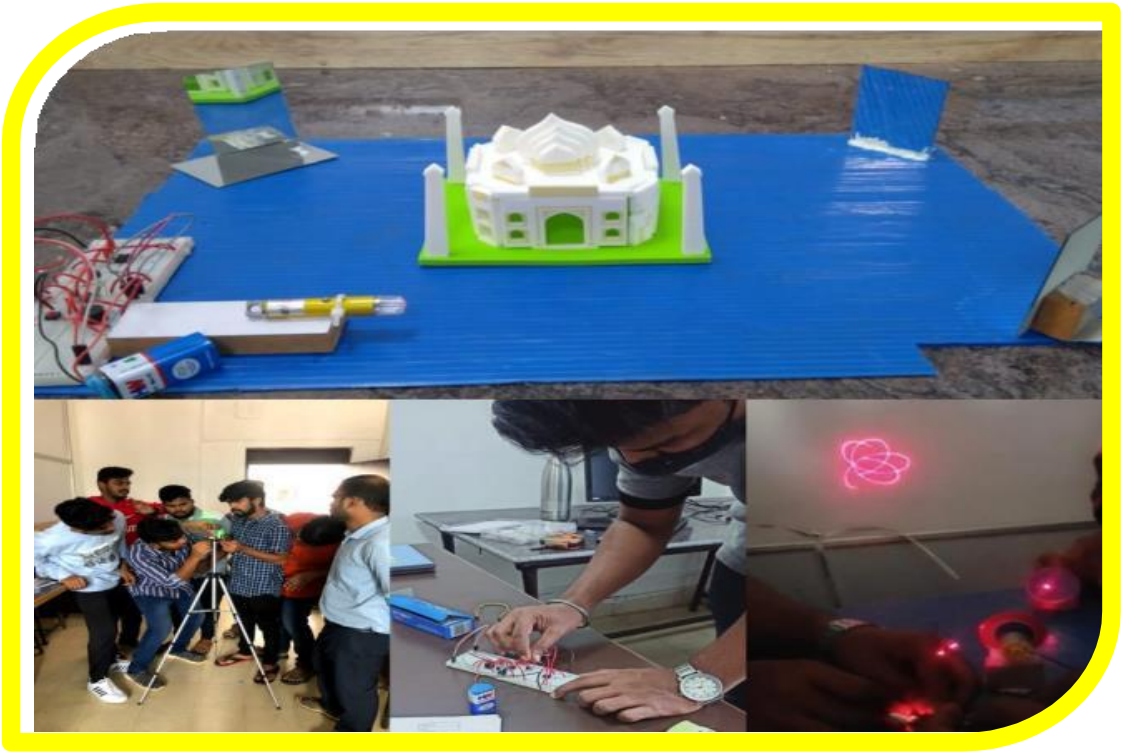
3. Research Activities

3.1. DIY Laser Lab:

The Laser Research Centre has successfully developed a DIY Laser Lab at the Bhubaneswar campus of the University. This accomplishment has been made possible through the financial support of the University and the technical expertise provided by the Physics department. The DIY Laser Lab serves as a dedicated space for students, researchers, and enthusiasts to explore the principles and applications of laser technology through hands-on experimentation. The lab is equipped with a range of laser systems, safety measures, and necessary infrastructure, ensuring a safe and conducive environment for conducting laser-based experiments and projects. By providing access to this self-contained lab, the Laser Research Centre aims to foster a culture of innovation, empower students with practical skills, and promote a deeper understanding of laser science.

3.2. Internship students working with laser engraving machine

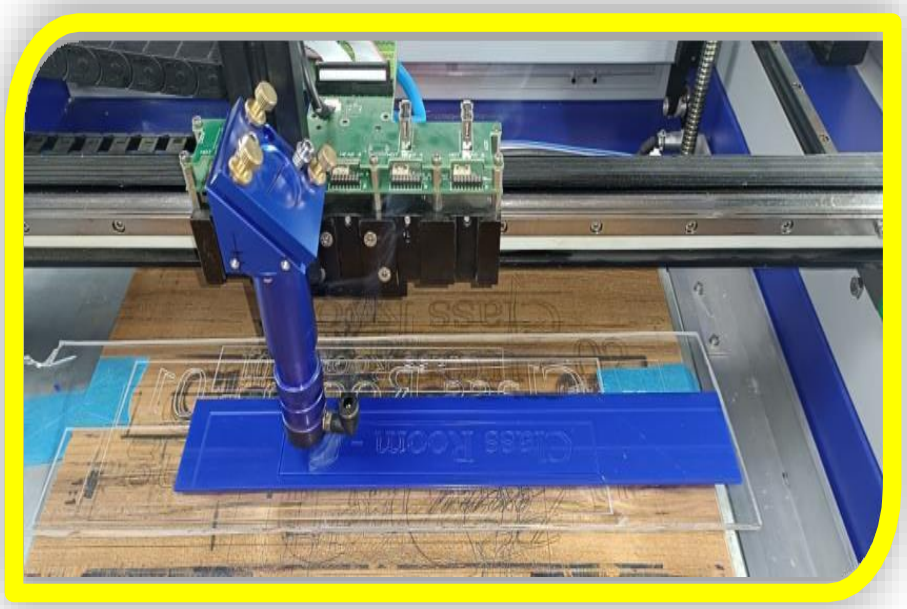
The Laser Research Centre offers internship opportunities for students interested in working with laser engraving machines. Interns are provided with hands-on training and practical experience in operating and utilizing laser engraving machines for various applications. Under the guidance of experienced researchers, interns gain valuable insights into laser engraving techniques, design considerations, and material compatibility. They have the opportunity to work on real-world projects, such as engraving artwork, creating personalized items, or developing prototypes. Through this internship program, the Laser Research Centre aims to nurture young talent, promote interdisciplinary learning, and inspire future laser technology professionals.



3.3. Laser security system, dancing light etc.

The Laser Research Centre is actively involved in the development and research of laser-based security systems. By harnessing the unique properties of laser light, such as coherence, narrow beam divergence, and high intensity, the centre explores innovative methods to enhance security measures. Laser security systems utilize laser beams as sensors to detect intrusions or unauthorized access. Through ongoing research, the Laser Research Centre aims to improve the effectiveness and reliability of laser security systems, contributing to the advancement of security technology.

In addition to security systems, the centre also explores the fascinating realm of dancing light. By employing precise control of laser beams, the research activities focus on creating captivating visual displays and lighting effects. These projects involve the synchronization of laser beams with music or programmed patterns, resulting in mesmerizing and dynamic lighting performances. The research conducted in this area not only contributes to the entertainment industry but also provides valuable insights into laser beam control and manipulation.



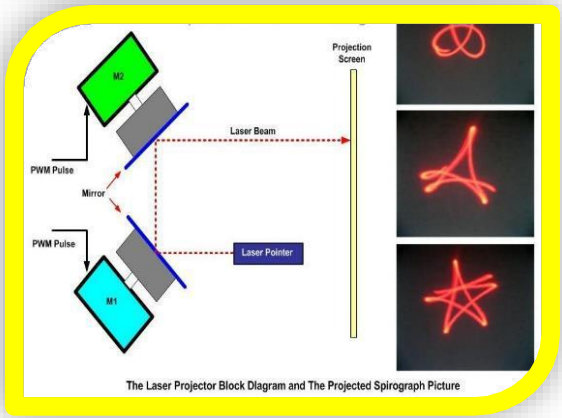
3.4. Laser engraving machine in operation

The Laser Research Centre proudly operates a state-of-the-art laser engraving machine as part of its research activities. This machine utilizes laser technology to engrave or mark various materials with precision and intricacy. It is capable of etching designs, patterns, text, or images onto surfaces, providing versatile applications in industries such as manufacturing, jewelry, and signage. The Laser Research Centre utilizes this machine for research purposes, investigating optimal engraving parameters, exploring material compatibility, and developing new engraving techniques. The operation of the laser engraving machine serves as a testament to the centre's dedication to practical experimentation and its commitment to advancing laser-bas The laser engraving machine enables the Centre to work with a wide range of materials, including wood, acrylic, metal, glass, and leather, among others. Researchers and technicians meticulously select the appropriate laser settings, such as power, speed, and focal length, to achieve the desired engraving depth, clarity, and precision.

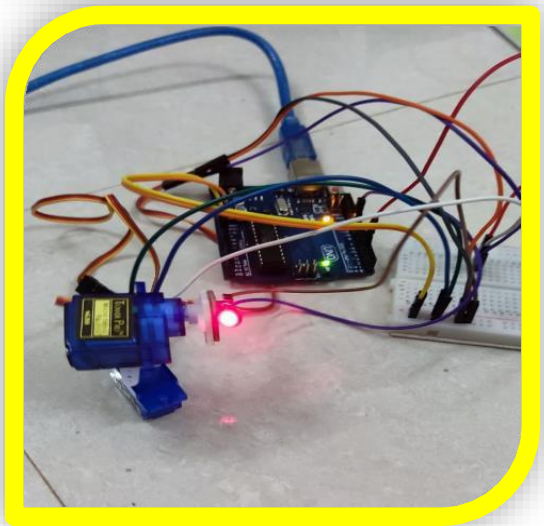
One area of focus for the Laser Research Centre is the optimization of laser engraving techniques for industrial manufacturing processes. By studying the interaction between laser parameters and different materials, the Centre aims to enhance efficiency, reduce production time, and improve the overall quality of engraved products.

Furthermore, the Centre investigates the potential of laser engraving in artistic and creative applications. This includes the exploration of laser engraving for artwork reproduction, intricate jewelry designs, and personalized gifts. By pushing the boundaries of laser engraving capabilities, the Centre seeks to inspire innovation in the realms of design, craftsmanship, and artistic expression.

The Laser Research Centre also places great emphasis on safety protocols and guidelines while operating the laser engraving machine. Strict measures are implemented to ensure the protection of researchers, technicians, and the environment. This includes the use of appropriate safety equipment, adherence to laser safety regulations, and continuous monitoring and maintenance of the equipment.Through these research activities, the Laser Research Centre strives to push the boundaries of laser science, explore diverse applications, and contribute to the ever-evolving field of laser technology.

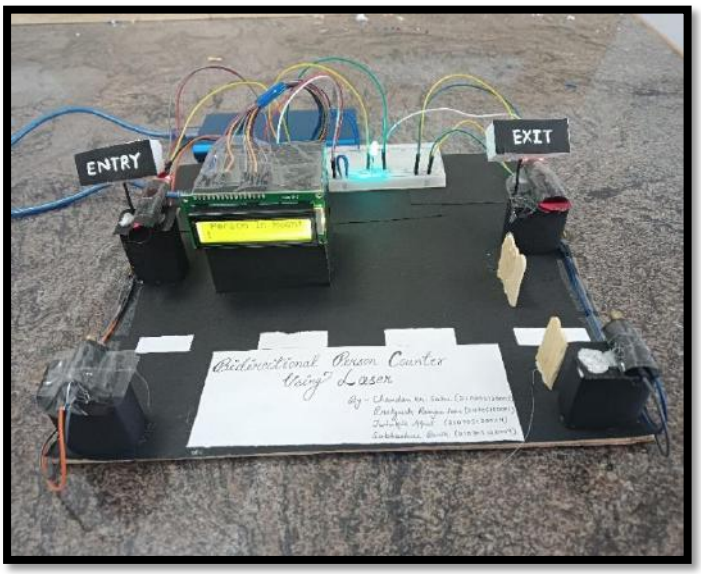


The Laser Projector Block Diagram and The Projected Spirograph Picture



4. Projects

4.1. Bidirectional Person Counter with Automatic Light Control



Bidirectional Person Counter with Automatic Light control using Arduino based on laser sensor detects the number of persons both entering and leaving. The light turns on when a single person enters the hall. The device also counts total number of people present inside the hall. If no people are inside, then the light automatically turns off.

Further, our Bidirectional Person Counter with Automatic Light Control using Arduino is designed to provide efficient monitoring of the number of people entering and leaving a hall while automatically controlling the lighting system. Building upon the laser sensor technology, this device ensures accurate and reliable detection of individuals, enabling seamless control of the lighting system.

When a person enters the hall, the laser sensor detects their presence and triggers the Arduino microcontroller. The microcontroller increments the count of people inside the hall by one and turns on the lights to provide adequate illumination. This feature ensures that individuals entering the hall are greeted with a well-lit environment, enhancing safety and convenience.

Simultaneously, the bidirectional counting capability of the device allows it to keep track of both incoming and outgoing individuals. When a person exits the hall, the laser sensor detects their movement, and the Arduino microcontroller decrements the people count by one. This bidirectional counting mechanism ensures an accurate representation of the total number of individuals present inside the hall at any given time.

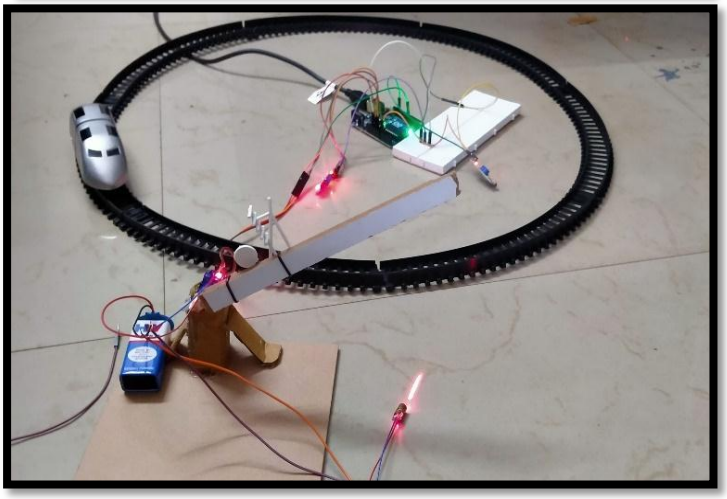
The automatic light control feature is especially useful in situations where energy efficiency is a priority. When the laser sensor detects that there are no people inside the hall, the microcontroller determines that the space is vacant. Subsequently, it turns off the lights automatically, minimizing unnecessary energy consumption.

To provide an intuitive user experience, the device can be equipped with an LCD display or LED indicators. These visual elements can be used to showcase the current people count or display relevant messages, further enhancing the device's functionality.

Additionally, the Arduino platform offers extensive flexibility and customization options. The device's code can be modified to suit specific requirements, such as integrating with other systems or adding additional features. This adaptability makes our Bidirectional Person Counter with Automatic Light Control a versatile solution that can be tailored to various environments and scenarios. Overall, our system offers a seamless and efficient solution for monitoring and controlling the number of people inside a hall, while optimizing energy consumption through automatic light control. Its accuracy, reliability, and customizable nature make it a valuable addition to public spaces, such as libraries, exhibition halls, conference rooms, and many more.

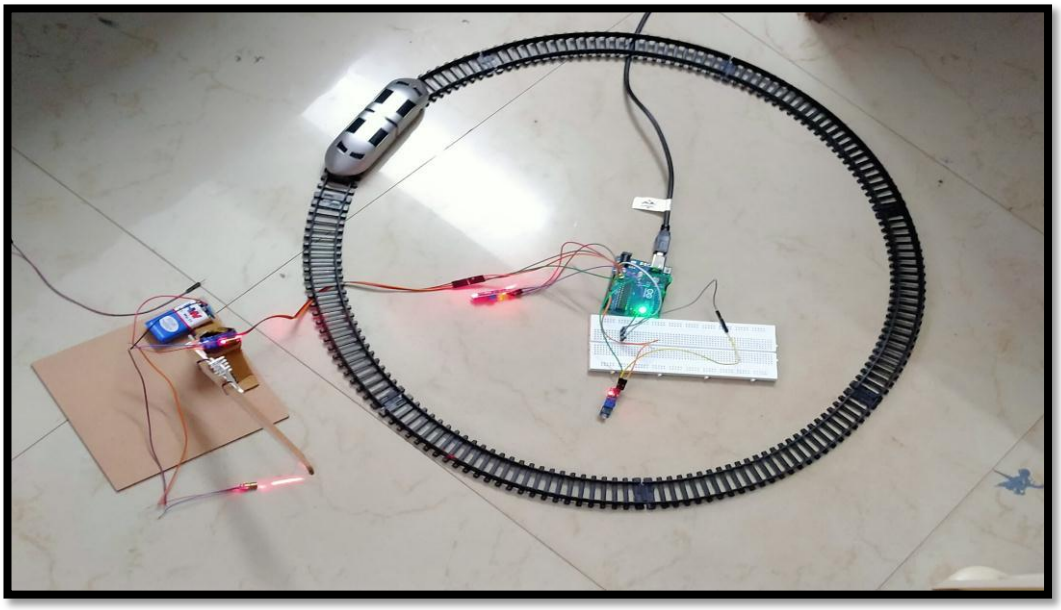
We are excited about the potential of this system to enhance the user experience, improve energy efficiency, and contribute to the overall management of public spaces.

4.2. Smart Railway Gate Management



Laser light recognizes the arrival of train. Gate will automatically close and open with an alarm when the train arrives and leaves. The Automatic Railway Gate Control System project concept is very simple. The key components of the project are the IR sensor, Arduino microcontroller, servo motor, LEDs, and Buzzer.In this project, two IR Sensor works like the eyes of the project. It detects the train position. Two Servo motors are used to open and close the railway crossing gate. Also, we will use the Arduino

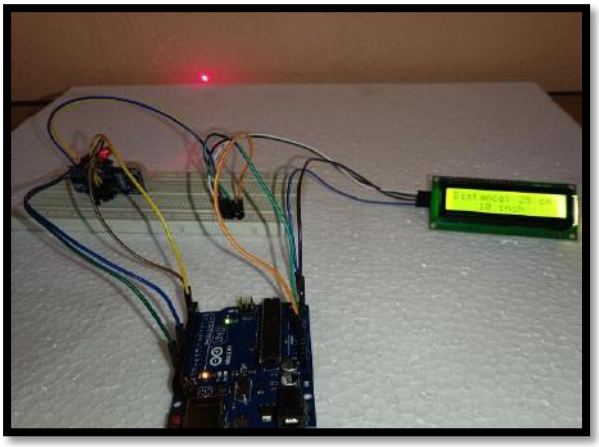
microcontroller board, which is the brain of the project. It controls the whole system. Finally, LEDs and buzzer are used as an indicator.When one of the IR sensors detects the train the system closes the gate automatically and indicated by the red LED and buzzer. When the sensors are doesn’t detect the train, then the system will be open the gate automatically and indicated by the green LED.



Automatic railway gate control system offers a powerful method to decrease the event of railroad accidents. This framework can contribute a great deal of advantages to both street clients and railroad executives. The proposed work has many significant focal points it will lessen the mishaps happening at the railroad level crossing, it will expand the accuracy and decrease mistakes happening because of manual activities. It will diminish the impact of train and will likewise deal with the course of a specific train to maintain a strategic distance from any postponement in arriving at its goal. Train will consistently be on time at the station no postpone will be caused which happens in manual activity. As the system is totally robotized, it dodges manual mistakes and in this manner gives extreme security to street clients. By this instrument, nearness of a watchman isn't fundamental and programmed activity of the door through the engine activity is accomplished. Microcontroller 8051 plays out the total activity i.e., detecting, entryway shutting and opening activity is finished by programming coding composed for the controller. The system takes a shot at a straightforward guideline and there isn't a lot of multifaceted nature required in the circuit. Along these lines, the programmed railroad entryway control utilizing 8051 smaller scale controllers is work productively and it diminishes the human work and time. This is the simple to control the railroad entryway

activity and it decreases the event of faults. We can have a few disadvantages if just IR sensors are utilized. To beat this, alongside the IR sensors we can utilize vibration sensor which are to be set on the track which detects the vibrations of the train and the doors will be shut and opened. A vibration sensor utilizes piezoelectric impact to distinguish the vibration in the track which identifies the appearance and flight of the train. The yield signal from the vibration sensor is taken care of into the small scale controller and it robotizes the door tasks. The significant use of the vibration sensor is impact recognition.

4.3. Laser Distance Measurer



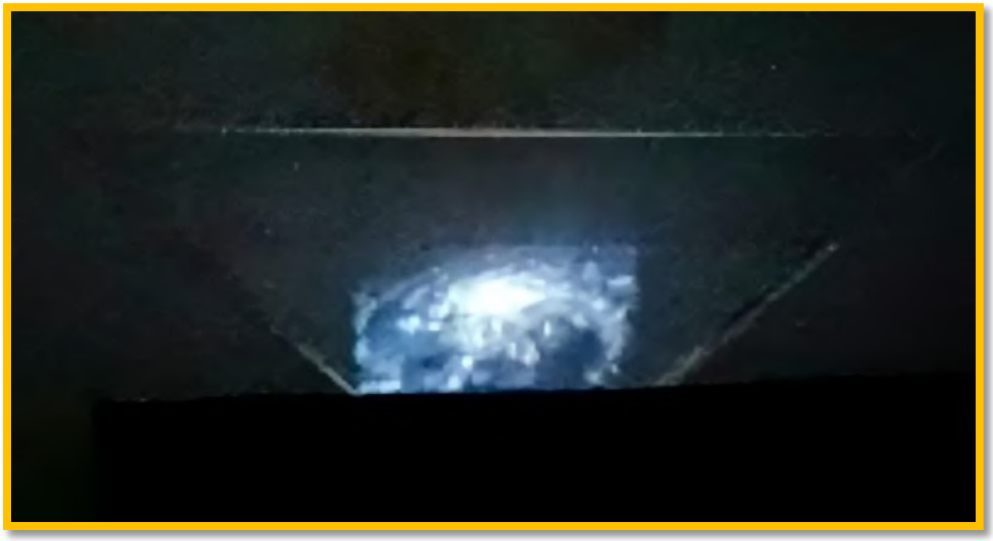
Laser distance measurer can be used to monitor or measure distances or object lengths. They can also provide positional locations over long distances.This project deals with a model of laser measuring tape design. Laser measuring sho is used to do work by many people at the time it onbe equipment and it also used for smart work .laser measuring tape is a type of a tape which measures the long distances and provides a work for many people at a time .It is done by using a lasers,dc motor,tripod stand,voltage regulator,mirror,glue,battery,switch,and a small wooden block : a beam of light falls from the laser on the mirror and the mirror start rotating then a continuoes beam of light forms a straight line 0n the wall.

A laser distance measure works by measuring the distance from the device to any surface that blocks the laser it emits. The device emits a pulse of highly focused light (the laser) and measures the time for the reflection to return. This happens extremely quickly, so it appears

that the light is being emitted continuously. There are some significant advantages to this compared to using a traditional tape measure:

- Fast: You can get an accurate reading almost immediately. If you are using a tripod or otherwise have the measure still, it can get a very quick reading. It may take a second during handheld use. However, this is still faster than a conventional measure.
- Single-User: You don't need a buddy to hold the other end. A single person can measure distances with ease.
- Height Measurements: Using an LDM, you can measure ceilings and other heights without a ladder. This is especially helpful for very high measurements.
- Always Straight: Making sure the tape is straight is difficult for long-distance measurements. However, a laser is always straight and precise.

4.4. Holography Display Of Video



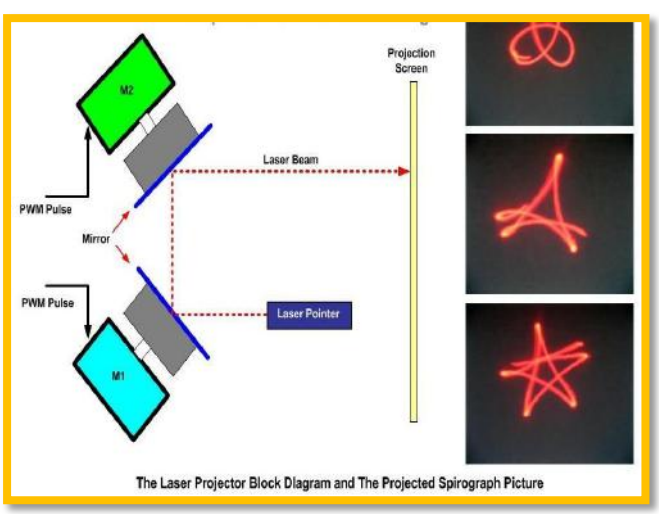
Pattern of interference produced to create a hologram. A beam of coherent light split, half of the beam fall on the photographic plate unaltered and other half is first reflected of the object to image. The two beam together produce interference pattern of concentric circles on the plate and developed a hologram.

In holography, the process of creating a hologram involves the formation of an interference pattern produced by a beam of coherent light. Here is a step-by-step explanation of the process:

1. Coherent Light Source: A coherent light source, such as a laser, is used to generate a beam of light with a single wavelength and phase. Coherence ensures that the light waves are synchronized and maintain a fixed phase relationship.
2. Beam Splitting: The coherent beam is split into two separate beams. One beam, known as the reference beam, is directed onto the photographic plate or holographic film without interacting with any objects. The other beam, called the object beam, is directed towards the object that needs to be imaged.
3. Object Interaction: The object beam is directed onto the object, and it interacts with the object's surface. As the object beam strikes the object, it undergoes changes in phase and amplitude, carrying the information about the object's shape and appearance.
4. Interference Pattern Formation: The reference beam, which was unaffected by the object, and the object beam, which carries the object's information, converge at the photographic plate or holographic film. As the two beams intersect, they superimpose and create an interference pattern.
5. Recording the Interference Pattern: The interference pattern formed on the photographic plate or holographic film contains intricate variations in light intensity. These variations correspond to the phase differences between the reference and object beams at different points on the plate. The plate or film is carefully exposed to record this interference pattern.
6. Development: The exposed plate or film is processed through a series of chemical steps known as development. This process reveals the recorded interference pattern, creating a hologram.
7. Reconstruction: To view the holographic image, coherent light, usually from the same type of laser used during recording, is directed onto the developed hologram. As the laser light illuminates the hologram, it diffracts, interacting with the recorded interference pattern.
8. Holographic Image Formation: The diffracted light reconstructs the original object wavefront, effectively recreating the light field that was present when the hologram was recorded. This reconstruction process results in the formation of a three-dimensional image of the object, which appears to float in space or have depth when viewed from different angles.

Holography allows for the creation of realistic and immersive visual representations of objects, as it captures both the amplitude and phase information of the light waves. It has various applications in fields such as art, entertainment, scientific visualization, and security, offering a unique and captivating way to display video and three-dimensional imagery.

4.5. Laser Light Show



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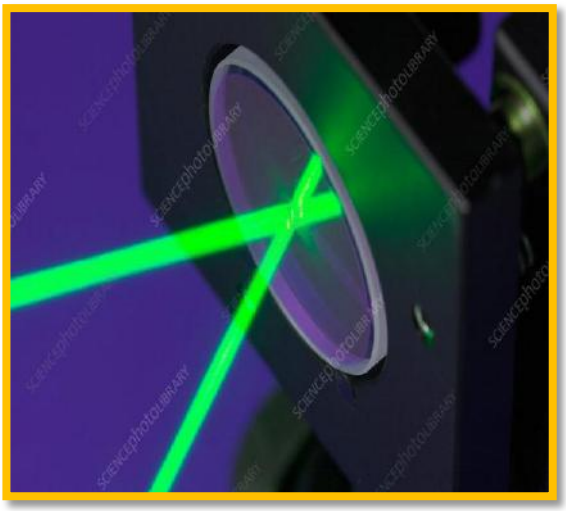
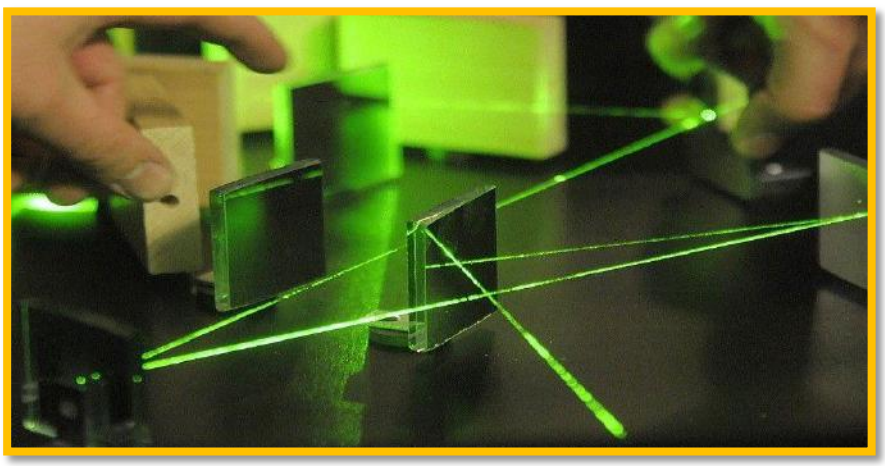




This Project deals with a “model of laser light show” A laser lighting display or laser light show involves the use of laser light to entertain an audience. A laser light show may consist of projected laser. For every show there is a laser that works best. Next using tiny mirrors a single beam of laser light can be moved so fast instead the audience see fans, cones, tunnels or cascades. It is done by using a 2battery , 2mirror , laser light, wire, battery clips, 2motor, mirror stand, 9v battery etc.

Laser light is useful in entertainment because coherent nature of laser light allows a narrow beam to be produced which allows the use of optical scanning to draw patterns or image on walls ,ceiling or other surfaces including theoretical smoke and fog without refocusing for the differences in distance as in common with video projection.

A laser lighting display or laser light show involves the use of laser light to entertain an audience. A laser light show may consist only of projected laser beams set to music, or may accompany another form of entertainment, typically musical performances.

Laser light is useful in entertainment because the coherent nature of laser light allows a narrow beam to be produced, which allows the use of optical scanning to draw patterns or images on walls, ceilings or other surfaces. This inherently more focused beam is also extremely visible, and is often used as an effect. Sometimes the beams are "bounced" to different positions with mirrors to create laser sculptures.

Here are a few additional points about laser light shows:

1. Spectacular Visual Effects: Laser light shows are known for their stunning visual effects. The focused and intense beams of laser light can be manipulated to create a variety of patterns, shapes, and images, adding a dynamic and captivating element to the performance. The use of mirrors and optical scanning techniques allows for precise control over the laser beams, enabling the creation of intricate and mesmerizing visual displays.
2. Synchronization with Music: Laser light shows are often synchronized with music or other forms of audio. The timing and intensity of the laser effects are carefully choreographed to match the rhythm, tempo, and mood of the music, enhancing the overall sensory experience for the audience. This synchronization creates a

harmonious blend of sound and visuals, making the performance more immersive and engaging.

3. Versatility in Performance Settings: Laser light shows can be adapted to various performance settings, including concerts, festivals, clubs, theaters, and even outdoor events. The portable nature of laser equipment allows for flexibility in setup and design, making it possible to create captivating displays in a wide range of venues. From intimate indoor settings to large-scale outdoor stages, laser light shows can transform any space into a visual spectacle.
4. Safety Considerations: Safety is of paramount importance in laser light shows. Laser beams are intense and can be harmful if not handled properly. Professional laser operators ensure that safety protocols and guidelines are followed to protect both the performers and the audience. Laser equipment is carefully calibrated and operated within recommended power limits to prevent any risks or hazards associated with laser usage.
5. Advancements in Laser Technology: With advancements in laser technology, the capabilities and possibilities of laser light shows continue to expand. The development of more powerful lasers, improved scanning systems, and innovative projection techniques have opened up new creative avenues for designers and performers. This ongoing progress in laser technology enables the creation of increasingly intricate and visually stunning displays.
6. Integration with Other Visual Effects: Laser light shows are often combined with other visual effects technologies to enhance the overall impact of the performance. This can include the use of fog machines, LED lighting, video projections, and 3D mapping, among others. By integrating different visual elements, laser light shows can create immersive and multi-dimensional experiences that leave a lasting impression on the audience.

Laser light shows have become a popular form of entertainment due to their ability to create awe-inspiring visual displays and their versatility in complementing various forms of artistic expression. As technology continues to evolve, laser light shows are likely to push the boundaries of creativity and continue to captivate audiences around theworld.

5. Patents

Two patent published

1. Title of the Patent: **DFT Study of Tungsten-Doped Silicon Carbide**

Patent Number (Application Number): 202331013328

Year of Award/Publish of Patent: 2023

In this patent, Dr. Padmaja Patnaik, Mandakini Baral, Santanu Kumar Nayak, Dipan Kumar Das, and Dr. Subhraraj Panda present a novel application of Density Functional Theory (DFT) in studying the properties of tungsten-doped silicon carbide (SiC).

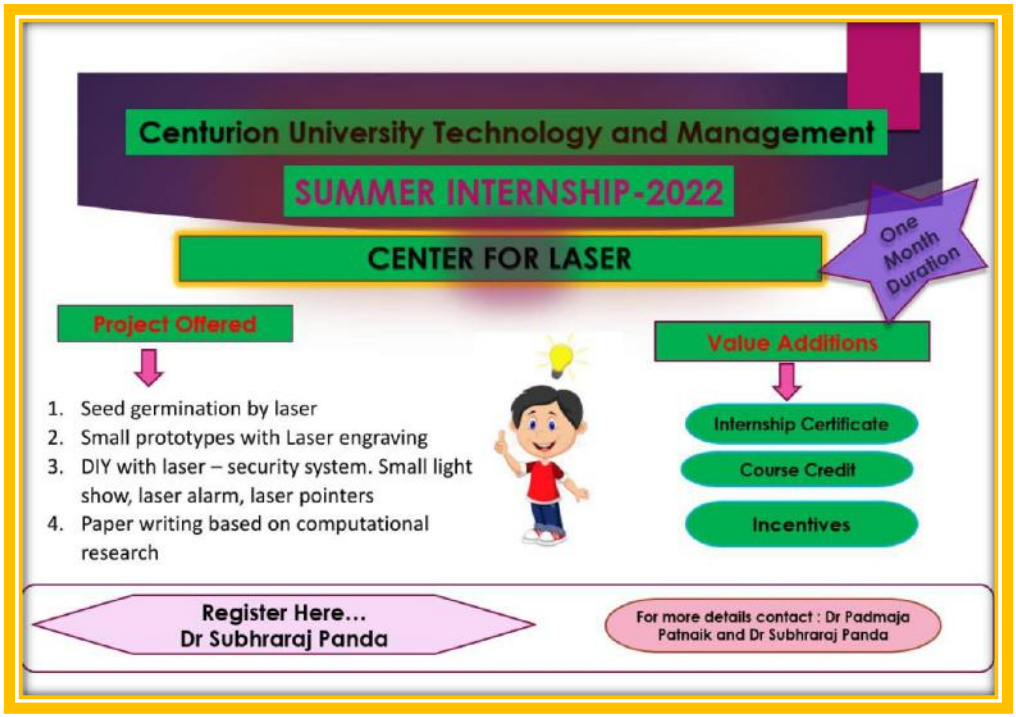
2. Title of the Patent: **A study to analyse the impact of artificial intelligence and machine learning in nuclear physics**

Patent Number (Application Number): 202311002700

Year of Award/Publish of Patent: 2023

In this patent, Dr. Padmaja Patnaik, Dipan Kumar Das and others present a novel application of A study to analyse the impact of artificial intelligence and machine learning in nuclear physics.

6. Summer Internship

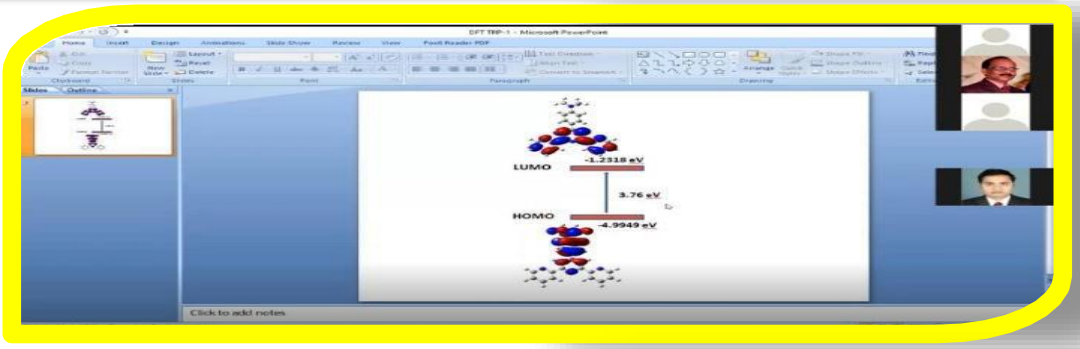


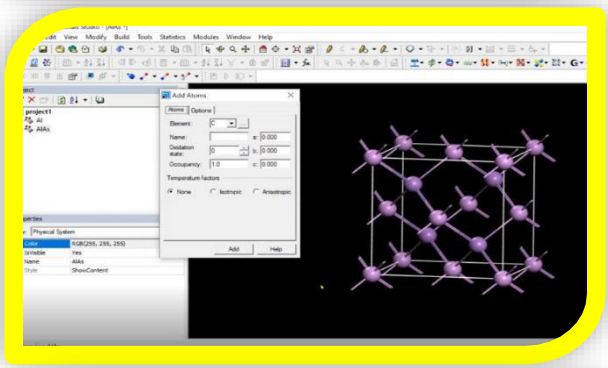
Internship offered by centre

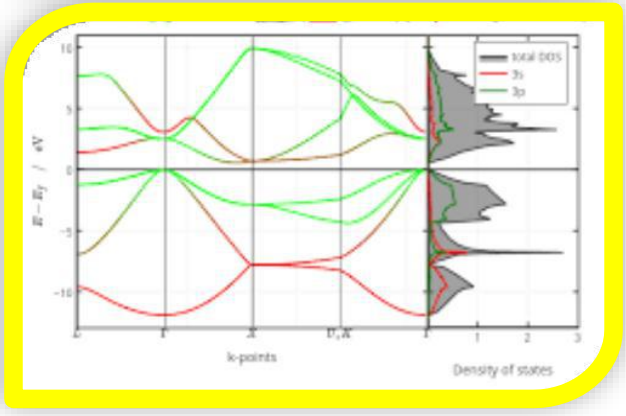
1. Laser controlled automatic railway crossing gate
2. Products with Laser engraving
3. DIY with laser – security system. Small light show, laser alarm, laser pointers

7. Faculty Development Programs

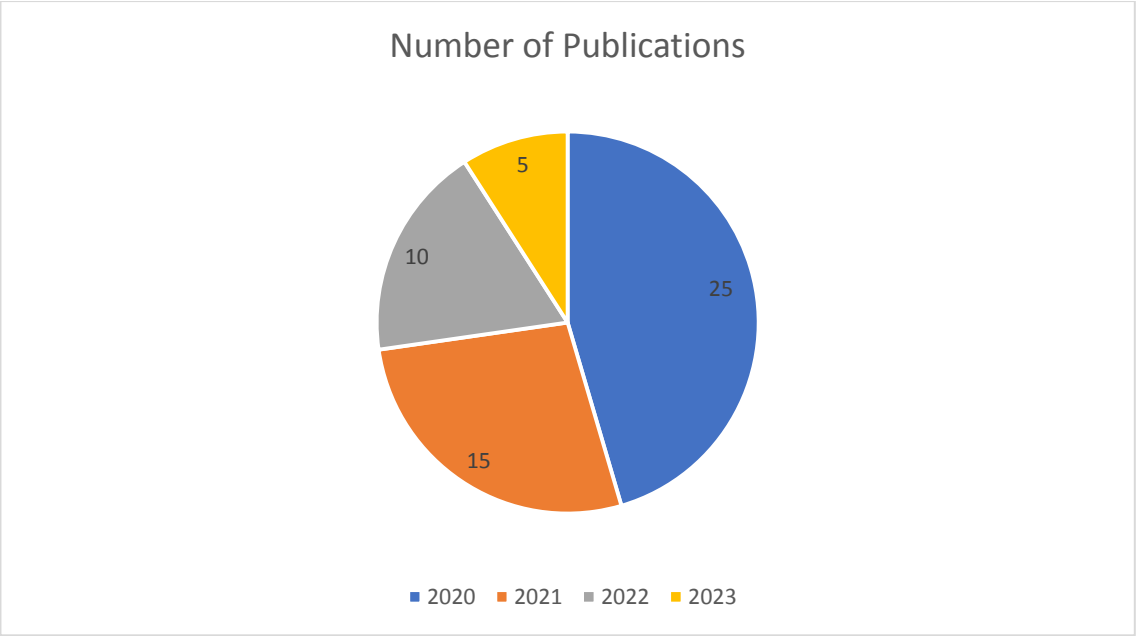
Two FDPs conducted by the centre on Computational method of verifying material properties for various applications using software tools.

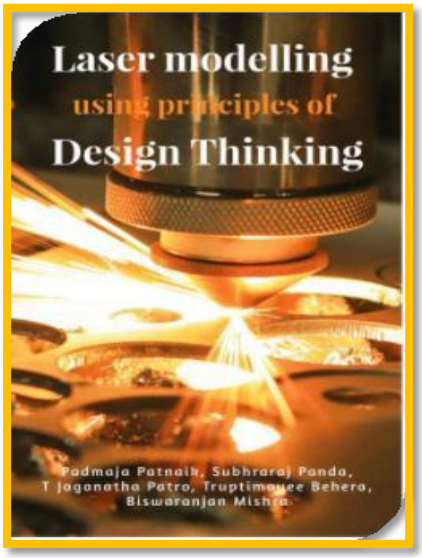






8. Publications

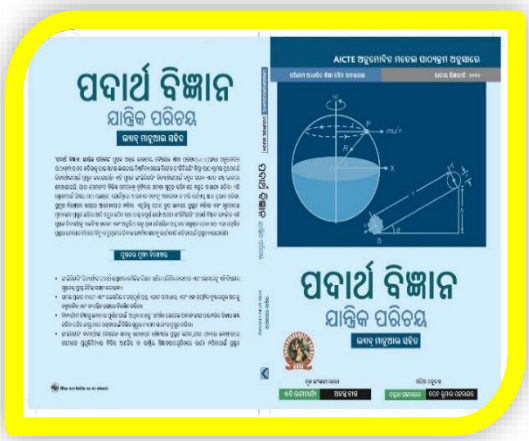




1. Book published by the members with title –

"Laser modeling using principles of Design Thinking"

This book is to facilitate both students and instructors with enough knowledge on the various threads like lasers, laser cutter, design thinking and CorelDRAW that are required for this skill course. This book will be helpful to teach and also to learn this course.



2. Dr Padmaja Patnaik translated Physics book from English to Odia for BTech students under for AICTE.

The book titled "Physics - Introduction to Mechanics" is an outcome of the rich experience of authors' teaching of basic physics courses. The initiation of writing this book is to expose basic science to the engineering students to the fundamentals of physics as well as enable them to get an insight of the subject.

Keeping in mind the purpose of wide coverage as well as to provide essential supplementary information, the topics recommended by AICTE are included, in a very systematic and orderly manner throughout the book.

9. Collaborations

9.1. Photo Engraving And Logos For Different Research Centres Using Laser


Laser engraving on wood involves designing with Catia and the use of a laser beam to remove the top layer of wood to reveal the design in a contrasting colour. This method is often used for customizing wooden products, such as picture frames, plaques, and keepsake boxes, as well as creating unique artwork on wooden surfaces.

9.2. AWARD AND TROPHY ENGRAVING USING LASER

Laser engraving is a popular method for customizing awards and trophies because it is precise and creates a permanent, high-quality mark. The process involves designing with Catia and then using a laser beam to vaporize the surface material of the award or trophy, leaving a detailed and intricate design.


10.Achievements

1. Skill courses - Syllabus for two skill courses developed and uploaded on courseware
    - Laser modelling using principles of Design Thinking
    - Gamified DIY kits using Laser

2. Skill courses running successfully - trained around 75 students from various disciplines.

3. One Book Published – All members have contributed chapters (Title: Laser modelling using principles of Design Thinking)

4. Research paper work continuing – 40 research articles published (SCI, Scopus, UGC, WoS)

5. Two book chapters published

4. Two patent published

5. Developed a Laser DIY Lab – being used by Skill students, MSc Physics students, Interns

6. Membership in ILA

8. Summer Internship – 10 students registered and completed

9. Projects done -
    - Bidirectional Person Counter with Automatic Light control
    - Smart Railway Gate Management
    - Holography Display of Video
    - Photo engraving
    - Medals designing and developing with Laser engraving
    - Laser distance measurer
    - Designing a memento with Laser engraving
    - Designing a Medal for rank holders with Laser engraving
    - Designing a logo for RCs with Laser engraving

11. Future Goals

As we look to the future, the Laser Research Centre at Centurion University of Technology and Management is steadfast in its commitment to pushing the boundaries of laser technology and making impactful contributions to various fields. Our goals are aimed at advancing research, fostering innovation, and creating a positive impact on society. Here are some of our key future goals:

- Advancing Laser Science: We strive to expand our understanding of laser science and its fundamental principles. Through extensive research, experimentation, and collaboration with experts in the field, we aim to uncover new insights and develop innovative laser technologies.
- Planning for new programs
    1. MSc in laser and its applications
    2. Domain/Certificate course in Laser

- Exploring Novel Applications: Our laser research endeavors are focused on exploring novel applications across diverse domains. We aim to harness the power of lasers in areas such as renewable energy, environmental monitoring, quantum computing, telecommunications, agriculture, and more. By identifying new application areas, we aim to drive innovation and contribute to solving real-world challenges.
- Enhancing Industrial Partnerships: We recognize the importance of strong collaborations with industry partners. In the coming years, we aim to strengthen our ties with various industries, fostering mutually beneficial relationships. These partnerships will enable us to better understand industry needs, facilitate technology transfer, and drive the implementation of laser-based solutions in industrial settings.
- Promoting Interdisciplinary Research: The Laser Research Centre believes in the power of interdisciplinary collaboration. In the future, we aim to foster closer ties with other research institutions, faculties, and departments within the university. By bringing together experts from diverse backgrounds, we can leverage their knowledge and expertise to tackle complex problems and foster innovation.

- Training and Education: We are committed to nurturing the next generation of laser scientists, engineers, and researchers. In the future, we plan to establish specialized training programs, workshops, and courses that provide hands-on experience in laser technology. These initiatives will help cultivate a skilled workforce capable of driving advancements in laser science and its applications.
- Community Engagement: We aim to actively engage with the local community and create awareness about the potential of laser technology. Through outreach programs, public lectures, and interactive demonstrations, we aspire to inspire young minds, promote scientific curiosity, and encourage the pursuit of careers in science and technology.
- Global Collaborations: Collaboration knows no boundaries, and we envision establishing strong ties with international research institutions and laser centres. By fostering global collaborations, we can share knowledge, resources, and expertise, leading to accelerated advancements in laser technology and expanding our impact on a global scale.

As we embark on this journey, we remain committed to excellence, innovation, and creating a positive impact through laser research. We are excited about the future possibilities and the transformative potential that laser technology holds.

Thank you for your continued support and interest in the Laser Research Centre of Centurion University of Technology and Management.

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