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**TITLE OF PRACTICE:**

# **“Artificial Intelligence and Robotics”**

## **(AIR)**



## OBJECTIVES OF PRACTICE

The primary objective of the practice of Artificial Intelligence & Robotics is to research, design, and develop advanced AI algorithms that can mimic human intelligence and behavior. **By this we are emerging as the Best Educational Institute in Rajasthan and Work for Excellence in imparting Quality Education to the Students to nurture their inherent talent as Innovative Technical Professional.** This involves exploring machine learning, deep learning, natural language processing, and other AI techniques to create intelligent systems capable of reasoning, learning, and adapting to new data.

Encouraging AI systems to continuously learn and improve is a crucial objective. This involves developing algorithms that can adapt to changing data and environments, enabling AI systems to stay relevant and effective over extended periods.

- To expose and showcase to students the latest technologies like **AIR, Automation, ML, LIDAR, Pneumatics, Drone, Mechatronics, Laser Cutting, Vacuum Forming, 3D Printing etc.** and to make them capable of solving real life problems.
- To create the **R&D** environment for students and faculties in the field of **AIR** and motivate them to do **the Innovations and Inventions.**
- To develop the new Software **likes ROS, Arduino (Mega, UNO, Nano) Programming, different types of Motors and Sensors programming into them.**
- To create the designs of the Robots and PCB (Printed Circuit Board) in the form of Gerber files.

The final objective is to educate the public and raise awareness about the capabilities and limitations of AI and robotics. This includes dispelling myths, promoting responsible AI use, and fostering a better understanding of the potential societal impact of these technologies.



## THE CONTEXT

AIET has a vision to *work for excellence in imparting quality education in emerging area* with objective to introduce **Artificial Intelligence and Robotics (AIR)** as a thrust area.

- Established AIR lab to fill the academia industry gap and extend an opportunity to the students to learn latest technologies like Robotics, Machine Learning (ML), AI, LIDAR, Drone, Mechatronics etc. And to prepare them for the 4.0 Industry revolution.
- **AIR** is the enhanced and advanced field of Engineering Science & Technology which helps the students to develop the skills like **Startup, Innovation, Incubation, Entrepreneurship and Creativity.**

**AIR lab** relies on the **STEM** learning Science Technology Engineering and Mathematics with the objective of developing student's logics and intellectual capacity.



## THE PRACTICE

The integration of "Artificial Intelligence & Robotics" into the Indian education system offers several unique advantages and challenges, given the specific context of the country:

- **Technological Leapfrogging:** The adoption of AI and robotics in education can allow the country to leapfrog traditional methods and bridge the gap between urban and rural education facilities.
- **Addressing Skill Gaps:** AI and robotics education can play a crucial role in addressing the skill gaps in the Indian workforce. By training students in emerging technologies, the education system can produce a workforce that is better equipped to handle the demands of a technology-driven job market.
- **Access to Quality Education:** AI-powered educational platforms can offer quality education to students in remote or underserved areas. With the help of technology, students can access educational resources and expert teachers they might not have had access to otherwise.
- **Teacher Support and Professional Development:** AI can assist teachers in various ways, such as automating administrative tasks, providing data-driven insights on student performance, and offering recommendations for personalized teaching strategies. This support can enhance teacher efficiency and effectiveness.
- **Research and Innovation:** Integrating AI and robotics in the Indian education system can foster research and innovation in these domains. It can encourage students and educators to explore new ideas, create technology solutions, and contribute to the global AI landscape.



**AIET** has been working in the fields of AIR for last 6 Years and has made many Industrial and Commercial Robots and related products like:

<b>Ruby Robot:</b> Humanoid Robot for Restaurant Serving Robot.	
<b>Robocop:</b> Humanoid Robot working as a Robocop based on Voice & Face Recognition, Command Based.	
<b>Nancy Robot:</b> Humanoid Robot for Hospital purpose.	
<b>Sopia Robot:</b> Query Answered Robot with the features of Voice recognition and AI.	
<b>Iglu Robot:</b> Robot for the Teaching and guiding purpose in Schools and Colleges.	
<b>Anti-Viral Robot:</b> UB Sterilization and disinfectant Robot for Schools, College, Hotels and Hospital purpose.	
Industrial Robotic Arm	Line and Wall Follower Robots
Bionic Hand	Spider Robot
Digital Stethoscope	Walk With Me Robot
AI Based Robotic Face.	Cheetah Robot
Hexapod	Robotic Arm with Gesture Control
Quad Copters	

For overall development of the student's college constantly giving the training to its students on latest Technology in its Artificial Intelligence and Robotic, R&D Innovative lab for integrating the knowledge of Robotics Operating System, LIDAR, SLAM, Robotics Manufacturing, ML, AI, Raspberry Pi, Arduino (Mega, UNO, Nano etc.), Computer programming (like Python, Embedded C etc.) in order to enhance the student skillset.

**AIR Lab** has the following Technologies and Machines:

LASER Cutting	Industrial Resin 3D Printer	Vacuum Forming
CNC Router	SMT Machine	Acrylic Bending
CNC Lathe	Wave Soldering	Metal Bending
Plasma Cutting	Deep Soldering	Drone Technology
Laser Welding	4-DOF Manipulator Kit	Portable Pneumatic Trainer

In addition to learning Robotics Engineering concepts and facts, students also learn and develop other valuable skills like **Team work, Creativity, Design, Problem Solving** and **Planning & Execution etc.** to improve the analytical approach.

#### **Constraints Faced:**

- **Teacher Training:** Integrating AI and robotics in education demands trained teachers who are well-versed in these technologies. Providing adequate training and professional development to teachers can be a significant challenge.
- **Affordability and Access:** The cost of implementing AI and robotics in education can be a concern, as not all schools and institutions may have the financial resources to invest in such technology.

Overall, the uniqueness of "Artificial Intelligence & Robotics" in the Indian education system lies in its potential to address specific challenges and leverage technology to enhance the learning experience and skill development of students across the country. By navigating the challenges effectively, India can position itself as a leader in utilizing AI and robotics in education.



## EVIDENCE OF SUCCESS

After learning various technologies related to Robotics, AI&ML, the students of ECE, CSE & IT, ME & EE has made many Industrial and commercial Robots.

To utilize the Technical, Startup and Innovation skills of the student's college has started one startup named "Irobolabs" [www.irobolabs.com](http://www.irobolabs.com) with the students and has commercially launched various Robots in the market which are installed in various Govt. and Non-Govt. organization pan India.

Here are some examples which are the witness of the students' success in the **field of Artificial Intelligence and Robotics**.

- **Ruby Robot-** Humanoid Robot incorporated with Artificial Intelligence, Machine Learning, Sensors Programming, Magnetic or LIDAR Programming, Command based which is used in Hotels, Restaurant for serving purpose and in Schools and Colleges as a Receptionist Robot. This Robot is installed in various Restaurants as well as in Schools, Colleges in Mumbai, Kerala, Haryana, Delhi and Rajasthan.
- **Robocop Robot:** Humanoid Robot incorporated with Face recognition, Voice recognition, This Robot is installed in Cyber Crime Office, Delhi Police, New Delhi.
- **Voice Command, LIDAR** based Robots of different size and shapes are under development phase to be used in for the learning different engineering colleges & Universities.
- **UV Disinfected Robot-** during the COVID-19 we have developed a robot which can sterilize the surface and disinfect the surroundings
- **Bionic Hand:** we made first 3D printed Robotic arm in the state of Rajasthan and with the continuous efforts of over 3 years we develop the Bionic Hand named as Jaipur Hand which is as good as natural hand, the beauty of Bionic Hand is that in Stanford or Harvard University the costing \$100,000 but the cost of our Bionic Hand is only Rs. 50000.

We had a MOU with **Bhagwan Mahaveer Viklang Sahayata Samiti (BMVSS)** for transfer of technology to **BMVSS** and we entered into **Technical Collaboration** with them (World famous Jaipur Foot)



We also have setup Robotics lab in various schools, Colleges and Universities in India.

- Won Best Startup Award by MSME Department, Govt. of Rajasthan & Laghu Udyog Bharti. Awarded by Ex-CM Smt. Vasundhara Raje.
- 2nd Winner of Innovative & Startup Competition by Rajasthan Technical University, RTU Kota.
- We have been awarded Incubation and Innovation Centre by RTU, Kota.
- We also have the MSME (HI/BI Centre) incubation Centre.
- **We have been awarded Center of Excellence in Artificial Intelligence Robotics by RTU (Rajasthan Technical University), Kota.**





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## **PROBLEMS ENCOUNTERED**

Addressing these problems requires a collaborative effort from governments, academia, industries, and society at large. Ongoing research, robust regulations, ethical guidelines, and a commitment to responsible innovation are crucial to ensuring that AI and robotics bring about positive advancements while mitigating potential risks.

- Procuring the material and other electronics components especially DC motors during Robots manufacturing.
- Products customizations.
- Problem faced in Animatronics during robot manufacturing.



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## **RESOURCES REQUIRED**

- Plastic Molding technique needs to be implementing to improve the body parts of the products.
- Increase the participation in various Innovative Idea competitions.
- Regular updation and learning of latest Technologies in the field of Machine Learning, Artificial Intelligence and Robotics.
- Plastic Molding technique needs to be implemented to improve the body parts of the products.



## NOTES

**Arya Institute of Engineering and Technology – AIET** has established state of the Art Artificial Intelligence and Robotic Lab for student leaning and R&D and manufacturing purpose in the field of Artificial Intelligence, Robotics, Automation, Machine Learning, Drone, Mechatronics, Laser Cutting, Vacuum Forming, 3D Printing etc. AIET have the capabilities of designing to manufacturing of many kinds of commercial and industrial Robots by incorporating Artificial Intelligence, Machine learning into them.

AIET has been working for last 6 Years in the field of Robotics and Artificial Intelligence and has developed more than **10 kinds of Robots** which are working in many Technical Spheres like Artificial Intelligence, Voice Command Control, Voice Recognition, Face Recognition, 24 Hours Surveillance and doing the task as per the voice command.

For the same we have been awarded **Center of Excellence in Artificial Intelligence Robotics by RTU (Rajasthan Technical University), Kota.**

### Centre of Excellence in Artificial Intelligence and Robotics

#### **Introduction:**

The Centre of Excellence (CoE) in Artificial Intelligence (AI) and Robotics is a dedicated institution focused on advancing research, development, and applications in the fields of AI and robotics. It serves as a hub for interdisciplinary collaboration, innovation, and knowledge exchange.

#### **Objectives:**

The CoE in AI and Robotics is established with the following key objectives:

- **Research Advancement:** Conduct cutting-edge research in AI and robotics, exploring new algorithms, technologies, and methodologies to advance the field.
- **Skill Development:** Foster talent in AI and robotics by providing training programs, workshops, and courses to students, researchers, and industry professionals.
- **Industry Collaboration:** Forge strong partnerships with industries to drive the adoption of AI and robotics in various sectors and address real-world challenges.



- Innovation and Entrepreneurship: Promote innovation and entrepreneurship in AI and robotics by supporting startups, incubating ideas, and facilitating technology transfer.

## Research Initiatives:

The CoE in AI and Robotics undertakes several research initiatives to advance the state of the art in these domains. Some of the key areas of research include:

- Machine Learning and Deep Learning: Develop novel algorithms and techniques to enhance machine learning and deep learning models, enabling them to process complex data and make intelligent decisions.
- Computer Vision: Investigate computer vision algorithms for image and video analysis, object recognition, scene understanding, and visual perception in robotics applications.
- Natural Language Processing (NLP): Explore NLP techniques for language understanding, sentiment analysis, machine translation, speech recognition, and dialogue systems.
- Robotics and Automation: Conduct research in robotics and automation, including robot perception, motion planning, control systems, human-robot interaction, and autonomous navigation.
- Ethical and Responsible AI: Investigate ethical considerations and frameworks for the development and deployment of AI and robotics, ensuring fairness, transparency, and accountability.

## Training and Skill Development:

The CoE in AI and Robotics plays a crucial role in nurturing talent and building a skilled workforce in these emerging fields. It offers a range of training programs, workshops, and courses to various stakeholders:

- Students: Conduct specialized courses and workshops for undergraduate and postgraduate students, providing them with a strong foundation in AI and robotics.
- Researchers: Organize research seminars, conferences, and collaborative projects to facilitate knowledge exchange among researchers and promote interdisciplinary research.



- **Industry Professionals:** Provide industry-focused training programs to upskill professionals, enabling them to leverage AI and robotics technologies in their respective domains.

## Industry Collaboration:

The CoE in AI and Robotics collaborates with industries to address industry-specific challenges and foster innovation. Key aspects of industry collaboration include:

- **Joint Research Projects:** Undertake collaborative research projects with industry partners, combining academic expertise with industry insights to develop innovative solutions.
- **Technology Transfer:** Facilitate the transfer of cutting-edge AI and robotics technologies from the CoE to industries, promoting the adoption of advanced techniques in real-world applications.
- **Consultancy Services:** Provide consultancy services to industries, offering expert advice on implementing AI and robotics solutions, optimizing processes, and improving productivity.
- **Startups and Incubation:** Support startups and entrepreneurs in the AI and robotics domains, offering mentorship, infrastructure, and networking opportunities to nurture innovation and entrepreneurship.

## Innovation and Impact:

The CoE in AI and Robotics aims to drive innovation and make a significant impact in various sectors. Some of the notable achievements and impacts include:

- **Healthcare:** Developing AI-powered diagnostic tools, predictive models, and robotic assistance systems to improve patient care, disease detection, and treatment outcomes.
- **Manufacturing:** Implementing AI and robotics technologies for automation, quality control, predictive maintenance, and optimization of manufacturing processes, leading to increased efficiency and productivity.
- **Transportation and Logistics:** Enabling autonomous vehicles, drones, and smart logistics systems powered by AI and robotics, enhancing safety, efficiency, and sustainability in transportation and logistics operations.



- Agriculture: Applying AI and robotics for precision farming, crop monitoring, yield prediction, and automated harvesting, promoting sustainable agricultural practices and increasing crop yields.

## Policy and Ethical Considerations:

The CoE in AI and Robotics actively contributes to the formulation of policies and ethical guidelines concerning the use of AI and robotics technologies. It collaborates with regulatory bodies, policymakers, and ethics committees to address concerns related to privacy, bias, transparency, accountability, and the responsible deployment of AI and robotics systems.

## Conclusion:

The Centre of Excellence in Artificial Intelligence and Robotics serves as a hub for research, training, industry collaboration, innovation, and policy development in the fields of AI and robotics. Through its diverse activities and initiatives, the CoE aims to advance knowledge, foster talent, drive innovation, and ensure the responsible and beneficial use of AI and robotics technologies across various sectors, contributing to societal development and economic growth.