

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
CCS345 ETHICS AND AI

UNIT V AI AND ETHICS- CHALLENGES AND OPPORTUNITIES

Challenges - Opportunities- ethical issues in artificial intelligence- Societal Issues Concerning the Application of Artificial Intelligence in Medicine- decision-making role in industries-National and International Strategies on AI.

OPPORTUNITIES OF AI:

1. Artificial Intelligence in E-Commerce

- **Artificial Intelligence** is widely used in the field of **E-commerce**
- AI helps the organization to establish a good engagement between the user and the company.
- Artificial Intelligence helps to make appropriate suggestions and recommendations as per the user search history . There are also **AI chatbots** that are used to provide customer support instantly.
 - a) **Personalization:** AI helps customers to see those products based on their interest pattern .
 - b) **Dynamic Pricing Structure:** It's a smart way of fixing price of the product based on the demand data.
 - c) **Fake Review Detection:** AI algorithms are used to detect and delete Fake Reviews.

2. AI in Education Purpose

AI helps the faculty as well as the students by making course recommendations.

Making automated messages to the students, and parents regarding any vacation, and test results are done by Artificial Intelligence.

AI applications in Education.

- a) **Voice Assistant:** With the help of AI algorithms, this feature can be used in multiple ways to save time.
- b) **Gamification:** This feature has enabled e-learning companies to design attractive game models, so that kids can learn in a fun way. This will also ensure that they are catching the concepts.

3. Artificial Intelligence in Robotics

Artificial Intelligence is one of the major technologies that provide the [robotics](#) field with a boost to increase their efficiency. AI provides robots to make decisions in real time and increase productivity. For example, suppose there is a warehouse in which robots are used to manage good packages. The robots are only designed to deliver the task but Artificial Intelligence makes them able to analyze the vacant space and make the best decision in real-time. Let's take a closer look at AI applications in Robotics.

- **NLP:** Natural Language Processing plays a vital role in robotics to interpret the command as a human being instructs. This enables AI algorithms & techniques such as sentimental analysis, syntactic parsing, etc.
- **Object Recognition & Manipulation:** This functionality enables robots to detect objects within the perimeter and this technique also helps robots to understand the size & shape of that particular object. Besides this, this technique has two units, one is to identify the object & the other one refers to the physical interaction with the object.
- **HRI:** With the help of AI algorithms, HRI or Human-Robotics Interaction is being developed that helps in understanding human patterns such as gestures, expressions, etc. This technique helps maximize the performance of robots and ensures that it reaches and maintains its accuracy.

4. GPS and Navigations

[GPS](#) technology uses Artificial Intelligence to make the best route and provide the best available route to the users for traveling. This is also suggested by research provided by the **MIT Institute** that AI is able to provide accurate, timely, and real-time information about any specific location. It helps the user to choose their type of lane and roads which increases the safety features of a user. GPS and **navigation** use

the [convolutional](#) and [graph neural network](#) of Artificial Intelligence to provide these suggestions. Let's take a closer look at AI applications in GPS & Navigation.

- **Voice Assistance:** This feature allows users to interact with the AI using a hands-free feature & which allows them to drive seamlessly while communicating through the navigation system.
- **Personalization (Intelligent Routing):** The personalized system gets active based on the user's pattern & behavior of preferred routes. Irrespective of the time & duration, the GPS will always provide suggestions based on multiple patterns & analyses.
- **Traffic Prediction:** AI uses a Linear Regression algorithm that helps in preparing and analyzing the traffic data. This clearly helps an individual in saving time and alternate routes are provided based on congestion ahead of the user.
- **Positioning & Planning:** GPS & Navigation requires enhance support of AI for better positioning & planning to avoid unwanted traffic zones. To help with this, AI-based techniques are being used such as Kalman, Sensor fusion, etc. Besides this, AI also uses prediction methods to analyze the fastest & efficient route to surface the real-time data.

5. Healthcare

Artificial Intelligence is widely used in the field of **healthcare and medicine**. The various algorithms of Artificial Intelligence are used to build precise machines that are able to detect minor diseases inside the human body. Also, Artificial Intelligence uses the medical history and current situation of a particular human being to predict future diseases. Artificial Intelligence is also used to find the current vacant beds in the hospitals of a city that saves the time of patients who are in emergency conditions. Let's take a closer look at AI applications in Healthcare.

- **Insights & Analysis:** With the help of AI, a collection of large datasets, that includes clinical data, research studies, and public health data, to identify trends and patterns. This inversely provides aid in surveillance and public health planning.
- **Telehealth:** This feature enables doctors and healthcare experts to take close monitoring while analyzing data to prevent any uncertain health issues. Patients who are at high risk and require intensive care are likely to get benefitted from this AI-powered feature.
- **Patient Monitoring:** In case of any abnormal activity and alarming alerts during the care of patients, an AI system is being used for early intervention. Besides this, RPM, or Remote Patient Monitoring has been significantly growing & is expected to go up by USD 6 Billion by 2025, to treat and monitor patients.
- **Surgical Assistance:** To ensure a streamlined procedure guided by the AI algorithms, it helps surgeons to take effective decisions based on the provided insights to make sure that no further risks are involved in this while processing.

6. Automobiles

Artificial Intelligence is bringing revolutionary changes in the field of [automobiles](#). From speedometers to self-driving cars, Artificial Intelligence is really doing a significant difference in these sectors. AI is used to detect the traffic on the street and provide the best route out of the present all routes to the driver. It uses **sensors**, **GPS technology**, and **control signals** to bring the vehicle the best path. Let's take a closer look at AI applications in Automobiles.

- **ADAS:** Advanced Driving Assistance System or ADAS is an AI algorithm that is known for processing some of the major and sensitive data that includes driving assistance, crash detection, parking assistance, and so on. The algorithm has been designed in such a way that it automatically starts alarming to prevent any collisions.
- **Traffic Management:** With the help of AI systems, now it has become easier to analyze traffic data from various sources, including vehicles, sensors, and cameras. This feature helps in boosting driving assistance by offering alternate routes. This AI algorithm has been designed in such a way that it is well capable of assisting users with real-time traffic insight and by offering the fastest route as an alternative to users to save time efficiently.
- **Emission Reduction:** This feature detects and learns patterns from the given inputs i.e. from the driving pattern of the user and based on this it strategizes to perform efficient driving patterns by reducing emissions. This algorithm is well capable of analyzing routes, traffic, car performance patterns, and so on.

- **Autonomous Driving:** This AI approach enables automatic driving and navigating vehicles without actual human intervention. Sensors like LIDAR, RADAR, and other sensors help in collecting additional data to analyze the surroundings for taking optimal decisions in the real world.

7. Agriculture

Artificial Intelligence is also becoming a part of **agriculture** and farmers' life. It is used to detect various parameters such as the **amount of water and moisture, amount of deficient nutrients**, etc in the soil. There is also a machine that uses AI to detect where the weeds are growing, where the soil is infertile, etc. Let's take a closer look at AI applications in Agriculture.

- **Stock Monitoring:** To have rigorous monitoring, and ensure that crops that not being affected by any disease, AI uses CN to check crop feeds live and alarms when any abnormality arises.
- **Supply Chain:** The AI algorithm helps in analyzing and preparing the inventory to maintain the supply chain stock. Although it's not new, for the agriculture field, it does help farmers to ensure the demands are being met with minimal loss.
- **Pest Management:** AI algorithms can analyze data from multiple sources to identify early warnings to their respective farmers. This technology also enables less usage of harmful pesticides by offering the best resources for pest management.
- **Forecasting:** With the help of AI, analyzing the weather forecast and crop growth has become more convenient in the field of agriculture and the algorithms help farmers to grow crops with effective business decisions.

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CHALLENGES OF AI:

Artificial intelligence is **essential** across a wide range of industries, **including healthcare, retail, manufacturing, and even government.**

But there are challenges with AI, it is necessary to **be vigilant (Cautious)** about these issues to make sure that artificial intelligence is **not doing more harm than good.**

7 biggest challenges of artificial intelligence:

1. Biases

We need data to train our artificial intelligence algorithms, and we need to do everything we can to eliminate bias in that data.

The ImageNet database, for example, has far more white faces than non-white faces. When we train our AI algorithms to recognize facial features using a database that doesn't include the right balance of faces, the algorithm won't work as well on non-white faces, creating a built-in bias that can have a huge impact.

It is important that we eliminate as much bias as possible as we train our AI, instead of shrugging our shoulders and assuming that we're training our AI to accurately reflect our society. That work begins with being aware of the potential for bias in our AI solutions.

Control and the Morality of AI

As we use more and more artificial intelligence, we are asking machines to make increasingly important decisions.

For example, right now, there is an international convention that dictates the use of autonomous drones. If you have a drone that could potentially fire a rocket and kill someone, there needs to be a human in the decision-making process before the missile gets deployed. So far, we have gotten around some of the critical control problems of AI with a patchwork of rules and regulations like this.

The problem is that AIs increasingly have to make split-second decisions. For example, in high-frequency trading, over 90% of all financial trades are now driven by algorithms, so there is no chance to put a human being in control of the decisions.

The same is true for autonomous cars. They need to react immediately if a child runs out on the road, so it's important that the AI is in control of the situation. This creates interesting ethical challenges around AI and control.

Privacy

Privacy (and consent) for using data has long been an ethical dilemma of AI. We need data to train AIs, but where does this data come from, and how do we use it? Sometimes we make the assumption that all the data is coming from adults with full mental capabilities that can make choices for themselves about the use of their data, but we don't always have this.

For example, Barbie now has an AI-enabled doll that children can speak to. What does this mean in terms of ethics? There is an algorithm that is collecting data from your child's conversations with this toy. Where is this data going, and how is it being used?

As we have seen a lot in the news recently, there are also many companies that collect data and sell it to other companies. What are the rules around this kind of data collection, and what legislation might need to be put in place to protect users' private information?

Power Balance

Huge companies like Amazon, Facebook, Google, are using artificial intelligence to squash their competitors and become virtually unstoppable in the marketplace. Countries like China also have ambitious AI strategies that are supported by the government.

President Putin of Russia has said, "Whoever wins the race in AI will probably become the ruler of the world."

How do we make sure the monopolies we're generating are distributing wealth equally and that we don't have a few countries that race ahead of the rest of the world? Balancing that power is a serious challenge in the world of AI.

Ownership

Who is responsible for some of the things that AIs are creating?

We can now use artificial intelligence to create text, bots, or even deepfake videos that can be misleading. Who owns that material, and what do we do with this kind of fake news if it spreads across the internet?

We also have AIs that can create art and music. When an AI writes a new piece of music, who owns it? Who has the intellectual property rights for it, and should potentially get paid for it?

Environmental Impact

Sometimes we don't think about the environmental impact of AI. We assume that we are using data on a cloud computer to train an algorithm, and then that data is used to run recommendation engines on our website. However, the computer centers that run our cloud infrastructure are power-hungry.

Training in AI, for example, can create 17 times more carbon emissions than the average American does in about a year.

How can we use this energy for the highest good and use AI to solve some of the world's biggest and most pressing problems? If we are only using artificial intelligence because we can, we might have to reconsider our choices.

Humanity

My final challenge is "How does AI make us feel as humans?" Artificial intelligence has now gotten so fast, powerful, and efficient that it can leave humans feeling inferior. This issue may challenge us to think about what it actually means to be human.

AI will also continue to automate more of our jobs. What will our contribution be, as human beings? I don't think artificial intelligence will ever replace all our jobs, but AI will augment them. We need to get better at working alongside smart machines so we can manage the transition with dignity and respect for people and technology.

Societal Issues Concerning the Application of Artificial Intelligence in Medicine

Medicine is becoming an increasingly data centred discipline and, beyond classical statistical approaches, artificial intelligence (AI) is used for the analysis of medical data.

AI applications in healthcare have literally changed the medical field, including imaging and electronic medical records (EMR), laboratory diagnosis, treatment, augmenting the intelligence of the physicians, new drug discovery, providing preventive and precision medicine.

- In healthcare, current laws are not enough to protect an individual's health data.
- Clinical data collected by robots can be hacked into and used for malicious purposes that minimize privacy and security.
- All individuals have the right to get information and ask questions before procedures and treatments.
- Patients should be able to be aware of the treatment process, the risks of screening and imaging, data capture anomalies, programming errors
- Patients will lose empathy, kindness, and appropriate behavior when dealing with robotic physicians and nurses because these robots do not possess human attributes such as compassion.
- In Gynecology, any clinical examination requires a sense of compassion and empathy, which will not be achieved with robotic doctors.
- Children usually experience fear or anxiety as they engage in healthcare settings . Their behavior could be uncontrollable with the new robotic medicine system.

ISSUES IN USING HEALTHCARE ROBOTS :

As robots become more prevalent, the potential for future harm will increase.

1. SAFETY

Robots **should not harm people**, and that they should be safe to work with.

This point is especially important in areas of healthcare that deal with the **ill people, elderly, and children**.

Digital healthcare technologies offer the potential to improve accuracy of diagnosis and treatments, but to thoroughly establish a technology's long-term safety and performance **investment in clinical trials is required**.

2. USER UNDERSTANDING

Trained Healthcare Professional in Robotic Technologies is important to ensure the effective implementation.

With **machine learning becoming embedded in diagnoses** and medical decision- making, healthcare professionals need to become **digitally literate** to understand each technological tool and use it appropriately.

EXAMPLE SCENARIO:

A Machine learning algorithm **erroneously considered** a low risk asthmatic patient as high risk and took to **ICU**.

3. DATA PROTECTION

Personal medical data needed for healthcare algorithms may be at risk.

EXAMPLE SCENARIO:

Data :

Personnal health data of persons Gathered
by Fitness trackers

Danger:

Data Might be sold to third parties like
insurance companies

4. LEGAL RESPONSIBILITY

when issues occur, legal liability must be established. If **equipment can be proven to be faulty** then the manufacturer is liable, but it is often tricky to establish what went wrong during a procedure and whether anyone, **medical personnel or machine, is to blame**

5. EQUALITY OF ACCESS

Digital health algorithms and machines will improve the lifestyle .

Ex fitness Equipments, Self Pumping Insulin etc

But people with less digital Knowledge will not be able to use these advancements and lead to the inequality in Medical treatments.

6. AUTONOMY:

Robots could be used to help elderly people live in their own homes for longer, giving them **greater freedom and autonomy**.

Question?

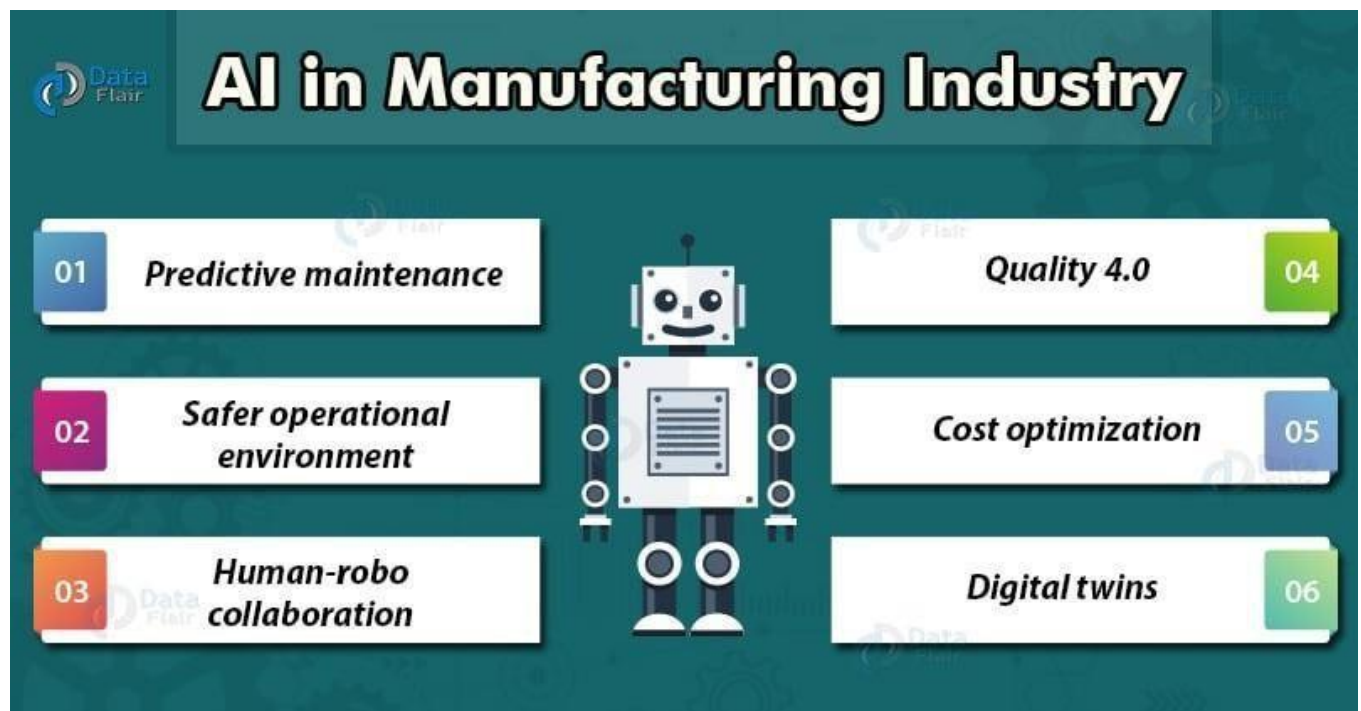
If a patient asked a robot to throw them off the balcony, should the robot carry out that command?

Hence the degree of autonomy for robots should be under control.

IMPACT OF AI IN DECISION MAKING ROLE IN INDUSTRIES:

Manufacturing in the near future would be fully automated. The manufacturing processes enabled by Artificially Intelligent Systems would be able to perform the required processes. It will also be able to inspect, improve, and quality checks the products without any human intervention.

According to the reports of Markets and markets, Artificial Intelligence in the manufacturing market is expected to grow from USD 1.0 billion in 2018 to USD 17.2 billion by 2025, at a CAGR of 49.5% during the forecast period.



1. Predictive Maintenance

Predictive maintenance techniques are designed to determine the condition of machines to estimate when maintenance should be performed. **This approach promises cost savings over routine or time-based preventive maintenance**, because maintenance tasks are performed only when required.

For example, if a machine is under continuous load. With the help of an infrared imager, we can monitor the temperature profile of equipment without affecting the overall performance.

2. Safer Operational Environment

With even a **minor mistake** occurring on the assembly line proving hazardous, a stage towards **AI implies less human assistance** needed to complete unsafe work.

As robots support people and perform unsafe exercises, the number of working environment mistakes will diminish . As a result, this will lead to safer working conditions than before.

For example, instead of a human doing a crash test of a car, an AI would be a natural option.

3. Human-Robo Collaboration

There are a large number of robots working in manufacturing plants everywhere throughout the world. People are concerned that their **occupations may be replaced** by robots.

Individuals can be recruited for more elevated level situations for **programming** and the **executives of the business** forms.

4. Quality 4.0

Industry 4.0 methods, can deliver good quality items by utilizing AI calculations. If any issue is found at the **starting stages**, we can deal with it right away.

5. Cost Optimization

Bringing AI into the production lines would require an **enormous capital venture**, but the ROI (RETURN ON INVESTMENT) is high. As smart machines begin dealing with everyday exercises, organizations can get lower working costs.

6. Digital Twins

[AI and Digital Twins](#) make a **virtual portrayal** that reproduces the physical attributes of the plant, items, or machine segments.

By utilizing cameras, sensors, computerized twin can make **a live model** of the production line plant that helps to precisely foresee wear, development, and collaborations with different gadgets.

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NATIONAL AND INTERNATIONAL STRATEGIES ON AI

NATIONAL STRATEGIY OF AI:

The National level strategy of India is

1. #AiforAll.

- #AiforAll will aim at enhancing **human capabilities** to address the challenges of
 - access,
 - affordability,
 - shortage and inconsistency of skilled expertise;
- effective implementation of AI **to develop scalable solutions** for emerging economies;
- **To tackle some of the global challenges** from AI's perspective, like application, research, development, technology, or responsible AI.

- #AiforAll will focus on **harnessing collaborations** to ensure prosperity for all.
- Thus, #AiforAll means technology leadership in AI for achieving the **greater good**.

2. **AI Garage for 40% of the world**

- **Solve for India** means solve for 40% or more of the world.

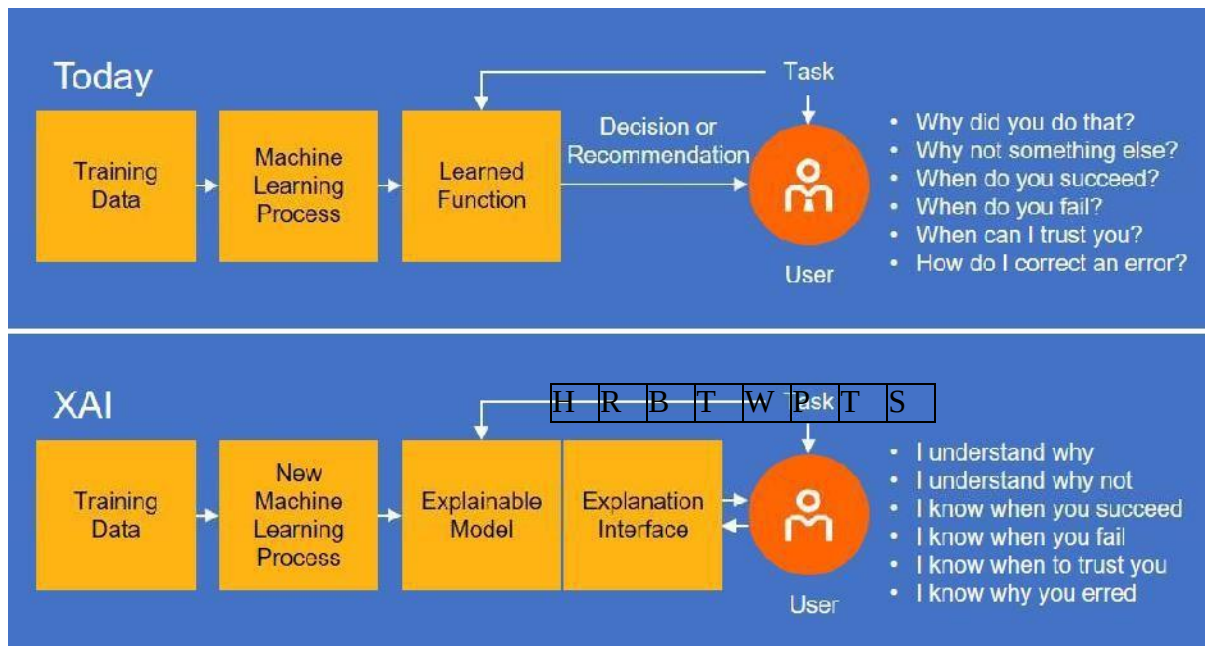
An advanced AI based solution for early **diagnosis of tuberculosis** (one of the top-10 causes of deaths worldwide), for example, could easily be **rolled out to countries** in South East Asia or Africa, once developed and refined in India.

- **Solved in India** (or more accurately, **solved by Indian IT companies**) could be the model going forward for Artificial Intelligence as a Service (AIaaS). Indian IT companies have been pioneers in bringing technology products and developments as solutions across the globe.

3. **Decoding Explainable AI**

The Explainable AI (XAI) program aims to create a suite of machine learning techniques that:

- Produce **more explainable models**
- The machine learning algorithms of tomorrow should have the **built-in capability** to explain their logic



INTERNATIONAL STRATEGIES:

Initiative	Country	Key issues tackled
The Institute for Ethics in Artificial Intelligence	Germany	<u>Human-centric engineering</u> covering disciplines including philosophy, ethics and political science.
The Institute for Ethical AI & Machine Learning	United Kingdom	Based on <u>eight principles for responsible machine learning:</u> 1.maintenance of <u>human</u> control, 2. <u>redress</u> for AI impact, 3.evaluation of <u>bias</u> , 4. <u>transparency</u> , 5. effect of AI automation on <u>workers</u> , 6. <u>privacy</u> , 7. <u>trust</u> , and 8. <u>security</u> .
The Future of Life Institute	United States	Focus on safety : <u>autonomous weapons arms race</u> ,
The Association for Computing Machinery	United States	The transparency, usability, security, accountability of AI in terms of <u>research, development, and implementation</u> .

The Foundation for Responsible Robotics	The Netherlands	Responsible robotics with <u>Proactively taking actions</u> (Anticipating or Foreseeing)
Enabling responsible AI ecosystems	Finland	Helping companies, governments, and organisations to develop and deploy <u>responsible AI ecosystems</u> ,
euRobotics	Europe	extending <u>progress in robotics & AI</u> in Europe

