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ROBOTICS & ARTIFICIAL INTELLIGENCE: WHAT EVERY TEACHER SHOULD KNOW

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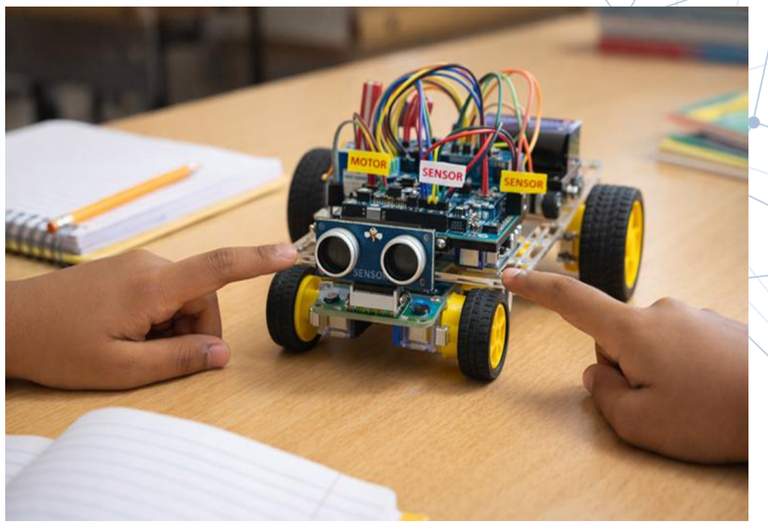
Defining Robotics

- “Robotics is the field of study concerned with the design, operation, and use of robots.” *John J. Craig (Introduction to Robotics: Mechanics and Control).*
- “A robot is a reprogrammable, multifunctional machine designed to move materials, parts, tools, or specialized devices through variable programmed motions.” *Robot Institute of America*



- Robotics is the study of making and using machines that can perform tasks automatically and assist humans. A robot is a machine that can carry out work by following instructions and responding to its surroundings.

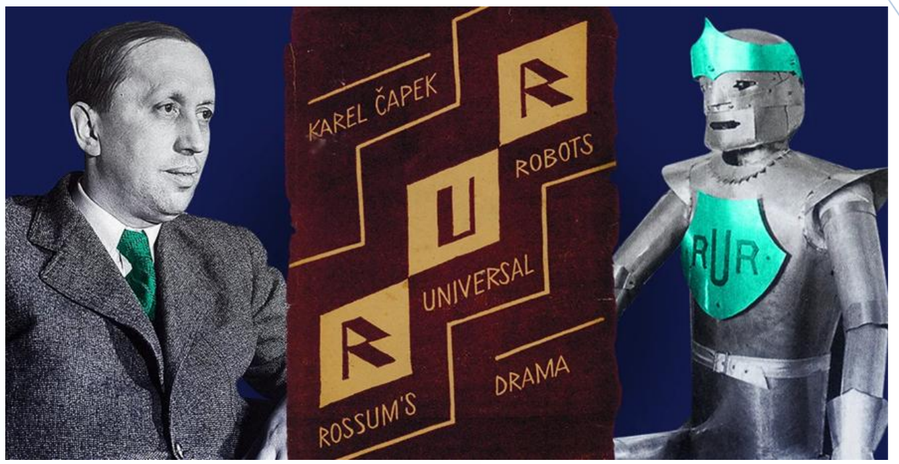
- In schools, robotics is not about complex machines, but about helping students understand how machines can be guided to perform useful actions.

History and Origin of Robotics

- The word “**robot**” was first used by **Karel Čapek (1921)** in his play R.U.R., meaning artificial workers.

- Modern robotics began in industries, where machines were built to reduce human physical effort. The first industrial robot, **Unimate (1961),** was used for repetitive factory tasks.

- With advances in computers and electronics, robots became smaller, safer, and easier to use. Today, robotics has moved from factories to areas like healthcare, homes, and education, supporting learning activities in schools.



Why Do Humans Build Robots?

Humans build robots for several practical reasons:

- **To do repetitive work:** Tasks that need to be done again and again can be handled by robots, reducing human fatigue. For example, automatic attendance machines repeat the same task accurately.
- **To work in dangerous places:** Robots can go where humans may be unsafe, such as chemical labs, fire zones, or disaster areas. This protects human life.
- **To increase accuracy:** Robots reduce human error. For example, machines in laboratories measure substances more precisely than manual work.
- **To support humans:** Robots are designed to assist teachers, doctors, and workers by reducing workload and improving efficiency.

Thus, robots are created to support human work, improve safety, and enhance performance.

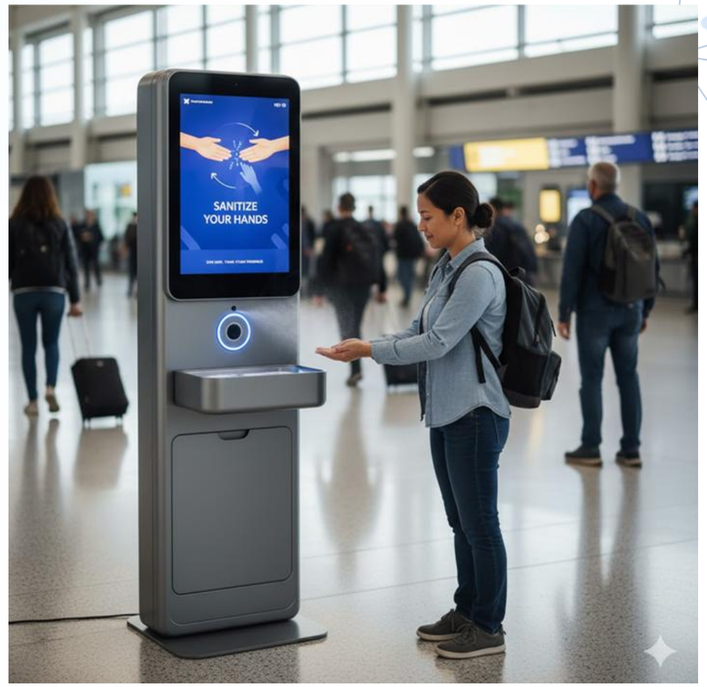
Robotics in Daily Life

Robotics is already part of everyday life, even when we do not notice it. Examples include:

- Automatic doors in malls that open when a person approaches.
- Smart lifts that decide movement based on requests.
- Ticket vending machines at stations.
- Robotic vacuum cleaners in homes.
- Automated sanitizing machines in public places.

These machines follow instructions and respond to situations.

Teachers can connect classroom learning with such examples so that students realize robotics is not distant technology but a part of daily living.



Robotics in Education

Robotics in schools helps students:

- **Learn by doing:** Instead of memorising, students experiment and observe outcomes. For example, students guide a small robot and see how instructions change movement.
- **Understand cause and effect:** Students see that when an instruction changes, behaviour changes. This strengthens logical thinking.
- **Develop teamwork:** Robotics activities often need group work, where students discuss, plan, and test ideas together.
- **Build confidence:** When students control a robot successfully, they feel capable and motivated.

For teachers, robotics transforms lessons into practical learning experiences instead of only textbook explanations.

Defining Artificial Intelligence

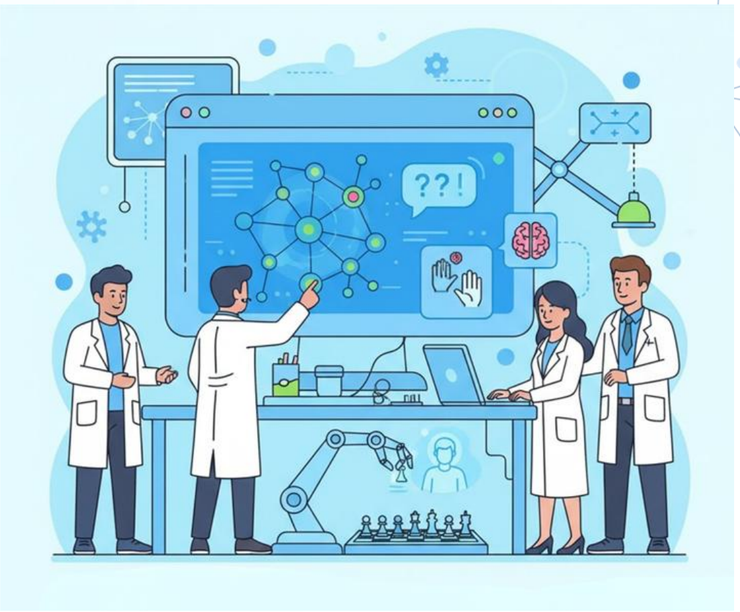
(Elaine Rich, Artificial Intelligence): “Artificial Intelligence is the study of how to make computers do things at which people are better.”
Artificial Intelligence enables machines to perform tasks that normally need human intelligence, such as learning, understanding language, and making decisions.

AI is a broad technology. Tools like **ChatGPT, Gemini AI, Copilot, etc. are applications of AI,** not AI itself. They are classroom-facing tools built using AI principles.

History and Origin of AI

The term **Artificial Intelligence** was introduced by **John McCarthy in 1956.** Scientists aimed to make computers solve problems, understand language, and imitate some human abilities.

Initially, computers were limited. With growth in computing power, data, and internet access, AI developed rapidly. Today, AI supports education, communication, research, and learning platforms in schools.



Why Was AI Developed?

AI was developed to help humans:

- manage large amounts of information quickly,
- save time in searching, sorting, and organising,
- support decision-making using data patterns, and
- personalise services, including learning support.

For teachers, AI assists in lesson preparation, assessment support, content organisation, and learner guidance, making teaching more effective and focused.

How AI Works in the Background

AI works using:

- **Logic:** Following rules to reach conclusions.
- **Patterns:** Finding similarities in data.
- **Algorithms:** Step-by-step methods to solve tasks.

AI does not think emotionally or ethically like humans. It works logically using data and instructions. It improves by analysing examples, similar to how students learn from practice.

Why Robotics and AI Engage Students

Robotics and Artificial Intelligence engage students because they combine action with intelligent behaviour:

- **Visible results:** Students see how machines respond to instructions.
- **Active learning:** Learners explore, test, and improve ideas instead of only listening.
- **Curiosity building:** Students ask why a robot moves in a certain way or how an AI tool generates answers.
- **Learning without fear:** Mistakes become part of improvement.
- **Theory to practice:** Abstract ideas become concrete experiences.

For example, students may guide a robot or use an AI tool to create a story, understanding both action and intelligence together.

AI in Teacher’s Daily Life

Teachers already use AI through:

- search engines that predict queries, Eg: Copilot
- document tools that correct grammar and spelling: Grammarly
- translation tools for multilingual classrooms: Google Translate
- learning platforms that recommend resources: any digital education app like OneNote, Teams, Sway, Whiteboard and Minecraft Education Edition etc.

Examples of AI tools include **Copilot, ChatGPT, Gemini AI, and language-support systems.** These observe usage patterns and improve suggestions. Teachers guide students to use these tools critically and creatively.

AI in Classroom Practice

AI supports teachers by:

- preparing worksheets and exercises,
- supporting different learning levels,
- analysing student responses,
- organising resources efficiently.

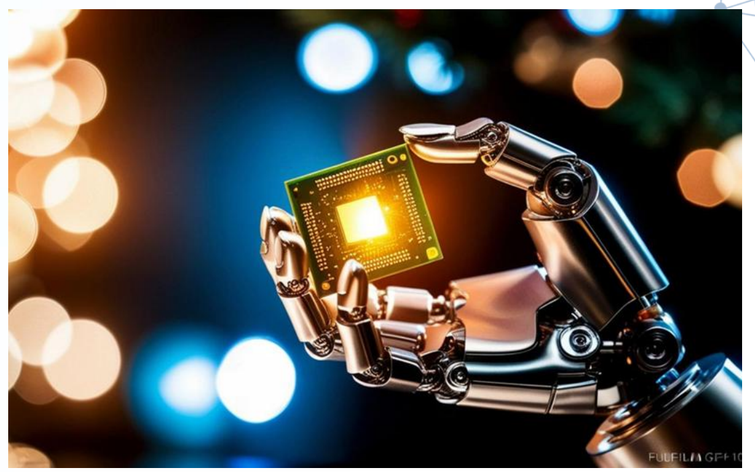
For example, a teacher may use AI to prepare reading material for mixed-ability students, enabling personalised learning support.

Relationship Between Robotics and AI

Robotics provides physical action, while AI provides intelligence.

Robotics allows machines to move and perform tasks. AI enables machines to understand situations, learn from experience, and choose better actions.

For example, a classroom robot may move using robotics principles, but with AI it can adjust behaviour based on surroundings. Robotics gives the **body**, and AI gives the **brain**, making educational systems smarter and more useful.



Why Teachers Must Understand Robotics and AI

Teachers must understand Robotics and AI to:

- guide students in meaningful technology use,
- design curriculum-linked learning experiences,
- ensure responsible use of tools, and
- develop reasoning and creativity.

Understanding these technologies helps teachers remain academically relevant and support learners effectively in a technology-supported education system.

Closing Summary: Robotics and AI for Teachers

Robotics brings action into education, and Artificial Intelligence brings understanding into technology. Together, they support interactive, student-centred, and meaningful classrooms.

For teachers, Robotics and AI are not about mastering machines, but about using them as academic tools to improve teaching, deepen learning, and encourage inquiry. When aligned with classroom practice, they help transform lessons into experiences and prepare learners for a technology-supported future of education.

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