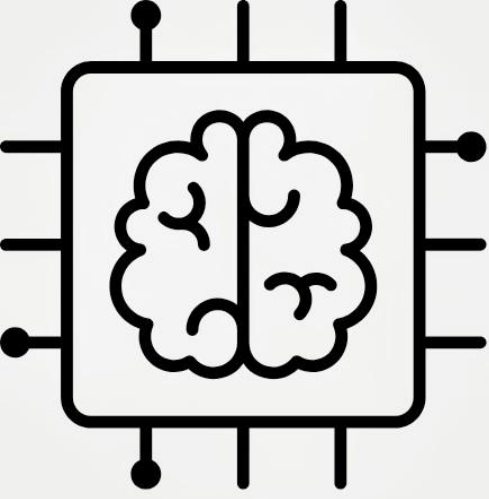




CCH ROBOTICS CLUB

BOOKLET
2025



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CLUB HISTORY

**COMMISSIONED ON 30TH DECEMBER 2014
— OWNED BY 9TH ENTRY**

The CCH Robotics Club was graciously commissioned on 30th December 2014, under the patronage of the 9th Entry, who continue to take immense pride in their Alma Mater. Recognizing the global shift toward Robotics and Artificial Intelligence, the 9th Entry envisioned a similar future for Pakistan—one where Abdalians lead the way in technological innovation. With this vision in mind, they generously funded the establishment of the Robotics Club. Their aim was to inspire a passion for robotics among Abdalians and to provide them with a platform to excel and contribute meaningfully to national progress in this vital field.

INTRODUCTION

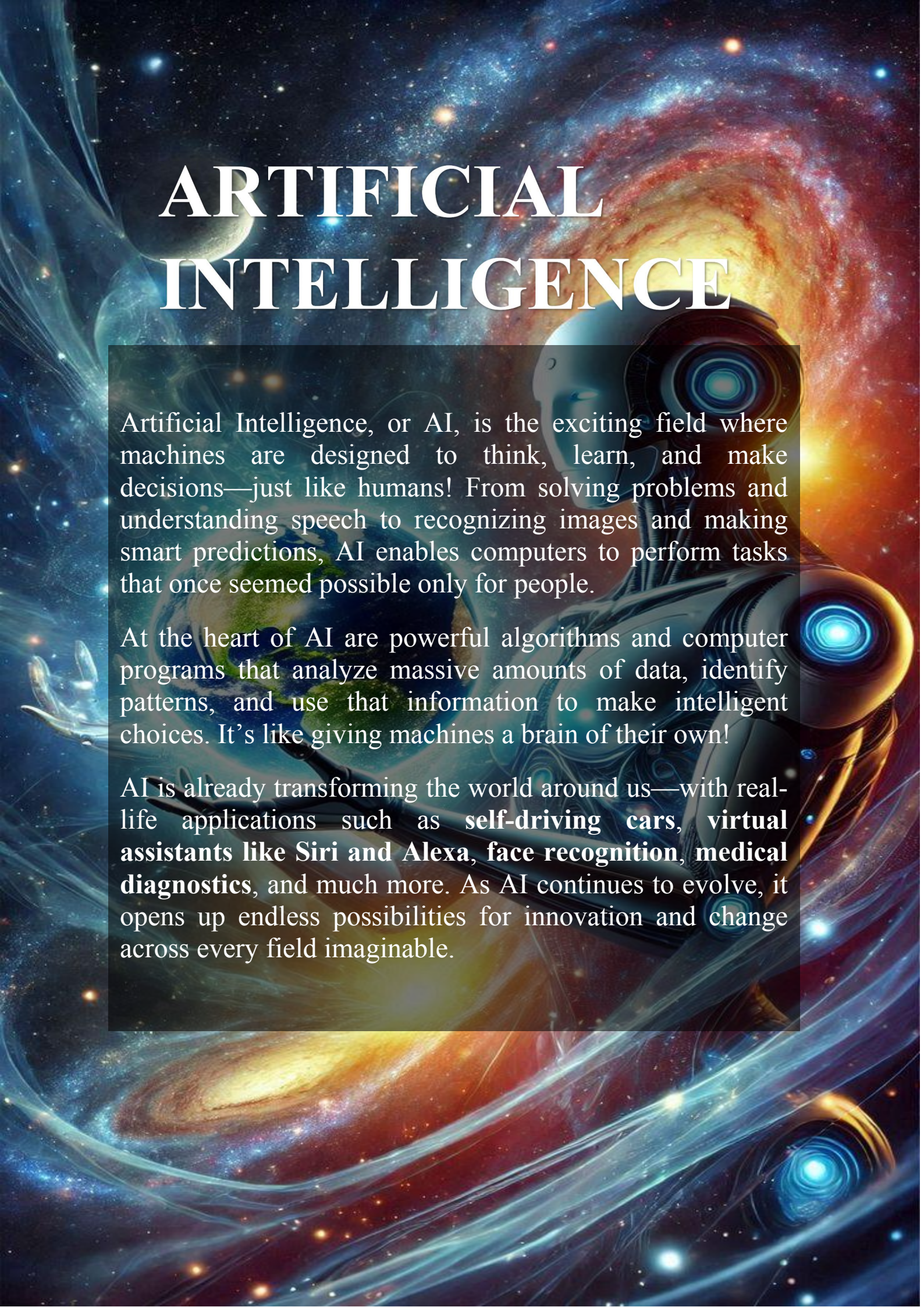
Robotics is an exciting blend of science, technology, and engineering that brings machines to life! It involves designing, building, and programming robots—smart machines that can perform tasks on their own or with minimal human help.

From factory floors and hospital rooms to classrooms and movie sets, robots are making their mark in nearly every corner of our world. Whether it's assembling cars, assisting in surgeries, helping students learn, or entertaining audiences, robotics is reshaping how we live, work, and play.

Thanks to advancements in Artificial Intelligence and machine learning, robots are becoming even more intelligent and capable. What once seemed like science fiction is now becoming a part of our everyday reality.

As this field continues to grow, robotics opens the door to endless possibilities—inviting young innovators to imagine, create, and lead the future.

ARTIFICIAL INTELLIGENCE

A futuristic robot with glowing blue eyes and a metallic body, set against a vibrant cosmic background featuring galaxies and nebulae.

Artificial Intelligence, or AI, is the exciting field where machines are designed to think, learn, and make decisions—just like humans! From solving problems and understanding speech to recognizing images and making smart predictions, AI enables computers to perform tasks that once seemed possible only for people.

At the heart of AI are powerful algorithms and computer programs that analyze massive amounts of data, identify patterns, and use that information to make intelligent choices. It's like giving machines a brain of their own!

AI is already transforming the world around us—with real-life applications such as **self-driving cars**, **virtual assistants like Siri and Alexa**, **face recognition**, **medical diagnostics**, and much more. As AI continues to evolve, it opens up endless possibilities for innovation and change across every field imaginable.

AIMS

&

OBJECTIVES

03

AIMS

1. To ignite student interest in STEM (Science, Technology, Engineering, and Mathematics) through hands-on robotics projects.
2. To develop practical skills in electronics, programming, and mechanical design.
3. To foster innovation, logical thinking, and real-world problem-solving.
4. To encourage teamwork, leadership, and project management.
5. To prepare students for participation in national and international robotics competitions.

OBJECTIVES

1. Introduce basic robotics concepts (sensors, actuators, microcontrollers, etc.) through beginner-level projects.
2. Engage students in designing and building autonomous and manually controlled robots.
3. Incorporate real-world challenges like line following, obstacle avoidance, and robot battles.
4. Promote participation in robotics exhibitions, science fairs, and tech competitions.

CLUB OVERVIEW

04

The CCH Robotics Club welcomes students with a curiosity for robotics and a passion for innovation. It serves as an exciting platform where young minds can explore the world of robotics through hands-on experiences in building and programming robots using technologies such as microcontrollers, sensors, and actuators.

The club bridges the gap between classroom theory and real-world application, encouraging students to bring their ideas to life. Through collaborative projects, members not only enhance their technical skills but also build teamwork, problem-solving, communication, and leadership abilities.

Students often get the chance to take part in national and international competitions like the International RoboGames, work on real-world challenges, or even team up with local businesses to develop robotic solutions. The club also regularly hosts workshops, seminars, and guest sessions with industry experts, providing valuable exposure and inspiration.

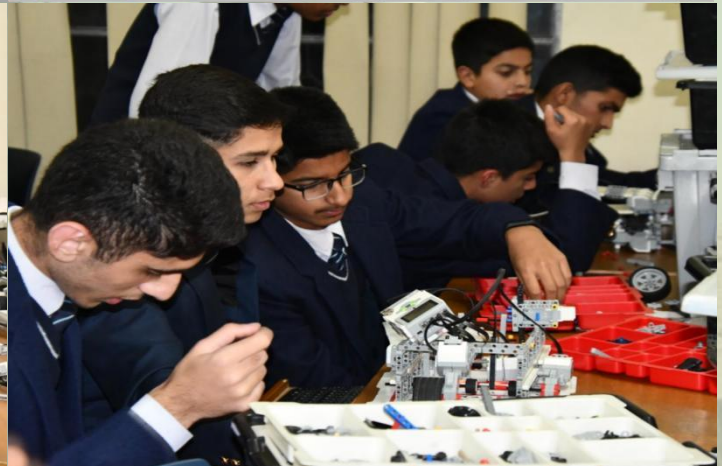
Above all, the CCH Robotics Club is a vibrant community where students learn, grow, and connect with peers who share their enthusiasm for shaping the future through robotics.

ENVIRONMENT

A truly effective team environment is one where every member feels valued, respected, and empowered to share their thoughts and ideas openly—without fear of judgment or criticism. It is built on a foundation of mutual trust, where collaboration thrives and each individual is committed to the team's shared goals.

Clear communication, active listening, and a spirit of cooperation are essential in maintaining harmony and productivity. Moreover, fostering a team culture that encourages personal growth, work-life balance, and celebrates both individual and collective achievements can greatly enrich the experience for everyone involved.

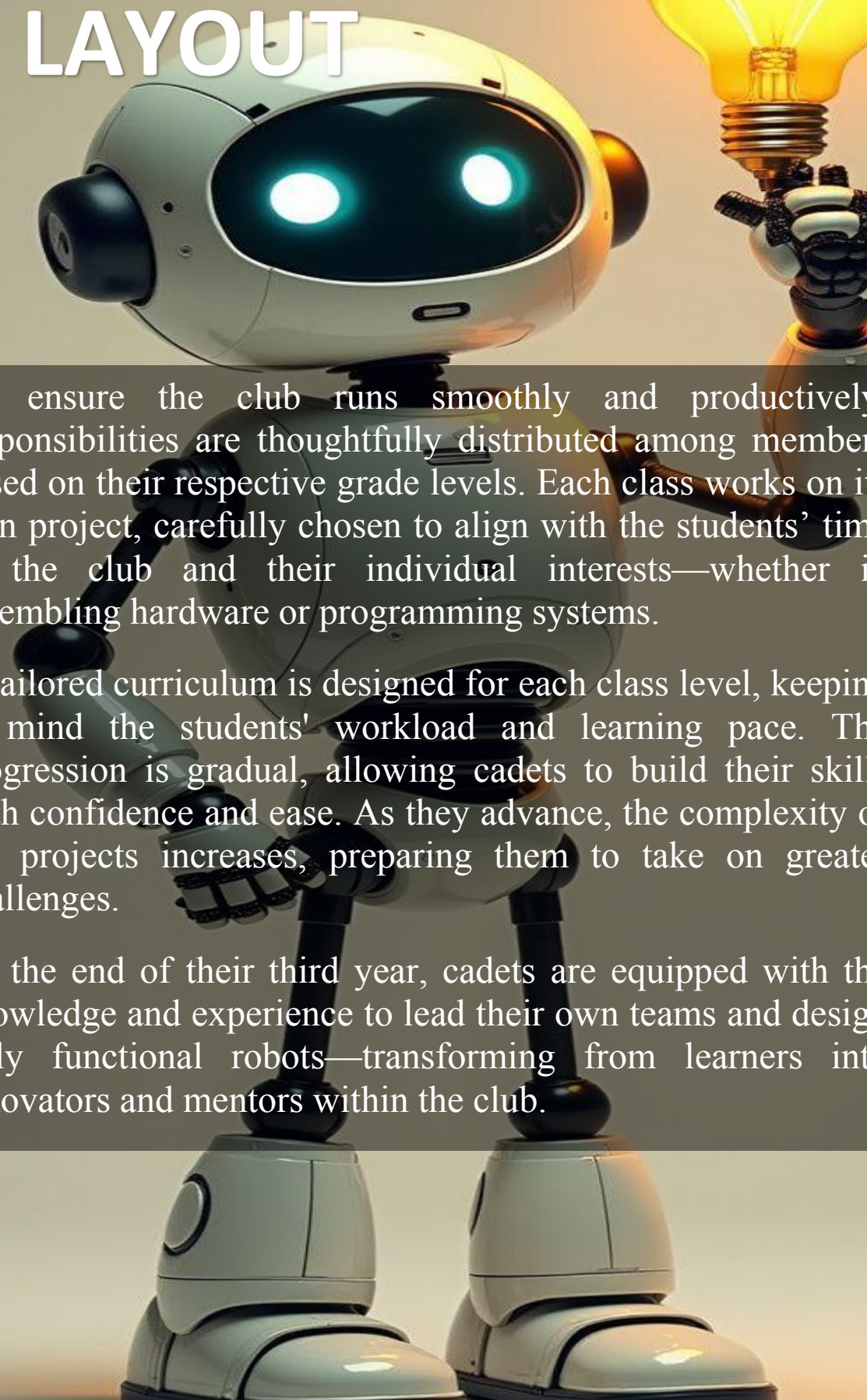
Such an environment not only brings out the best in each member but also strengthens the team as a whole, paving the way for innovation, resilience, and long-term success.



CLUB

06

LAYOUT

A small, white, rounded robot with glowing blue eyes and a friendly expression. It is holding a lit lightbulb in its right hand. The robot has a simple, friendly design with a large head and small body. The background is a soft, warm gradient.

To ensure the club runs smoothly and productively, responsibilities are thoughtfully distributed among members based on their respective grade levels. Each class works on its own project, carefully chosen to align with the students' time in the club and their individual interests—whether in assembling hardware or programming systems.

A tailored curriculum is designed for each class level, keeping in mind the students' workload and learning pace. The progression is gradual, allowing cadets to build their skills with confidence and ease. As they advance, the complexity of the projects increases, preparing them to take on greater challenges.

By the end of their third year, cadets are equipped with the knowledge and experience to lead their own teams and design fully functional robots—transforming from learners into innovators and mentors within the club.

Grade - 8

(i) Introduction to Robot Parts and Their Functions

(ii) Applications of Robotics in Daily Life

(iii) Understanding the Main Robot Structure

(iv) Exploration of Robot Sensors:

Touch Sensor

Gyro Sensor

Color Sensor

Ultrasonic Sensor

Infrared Sensor

(v) Basic Robot Movements

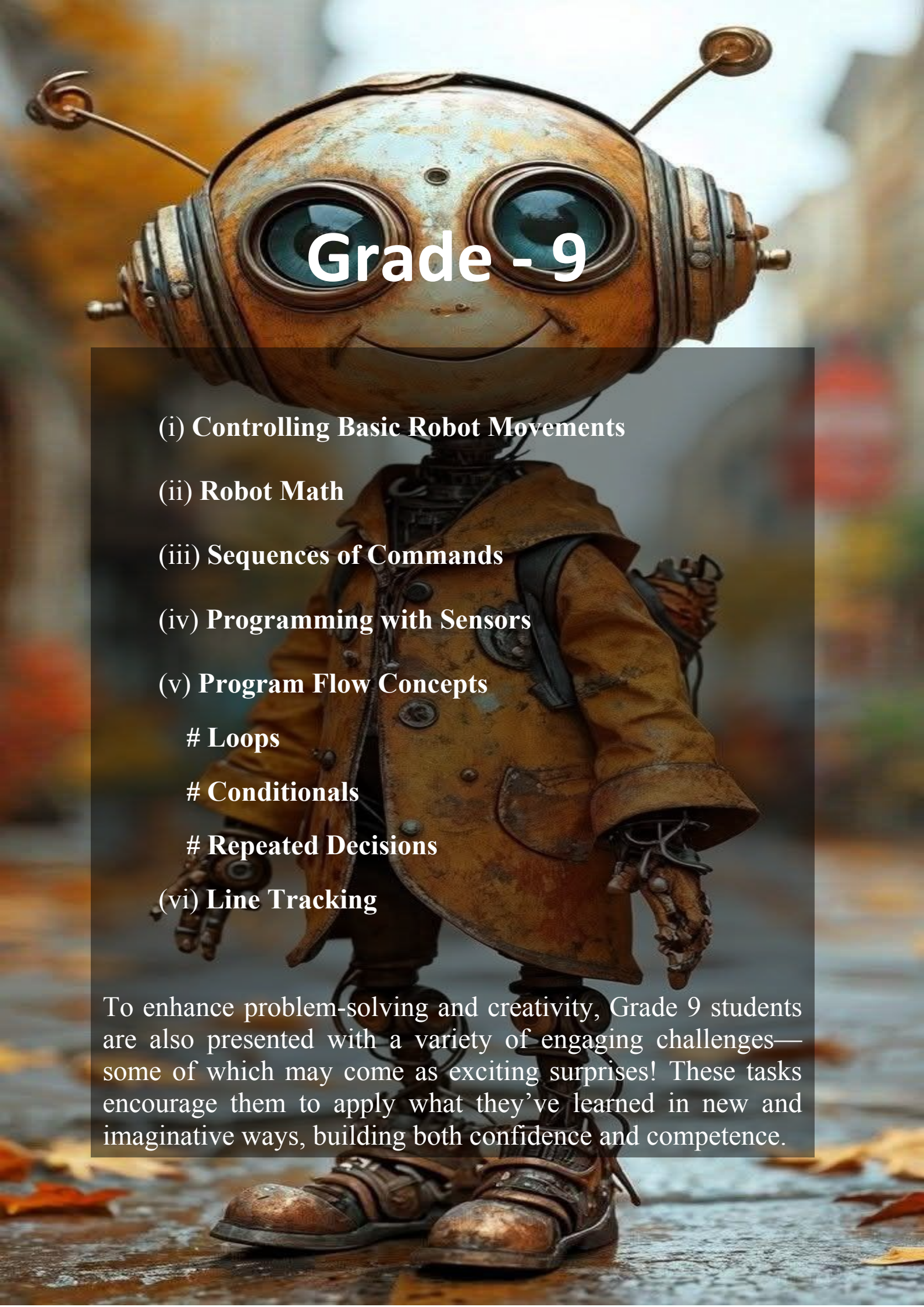
Moving Forward

Arm Control

Turning

To spark early interest in programming, students are also given a gentle introduction to coding, allowing them to see how their instructions bring a robot to life.

 @underaged4



Grade - 9

(i) Controlling Basic Robot Movements

(ii) Robot Math

(iii) Sequences of Commands

(iv) Programming with Sensors

(v) Program Flow Concepts

Loops

Conditionals

Repeated Decisions

(vi) Line Tracking

To enhance problem-solving and creativity, Grade 9 students are also presented with a variety of engaging challenges—some of which may come as exciting surprises! These tasks encourage them to apply what they've learned in new and imaginative ways, building both confidence and competence.

Grade - 10

(i) Intermediate Programming Concepts

- # Program Flow Models

- # “Wait Until” Commands

(ii) Search and Rescue Missions

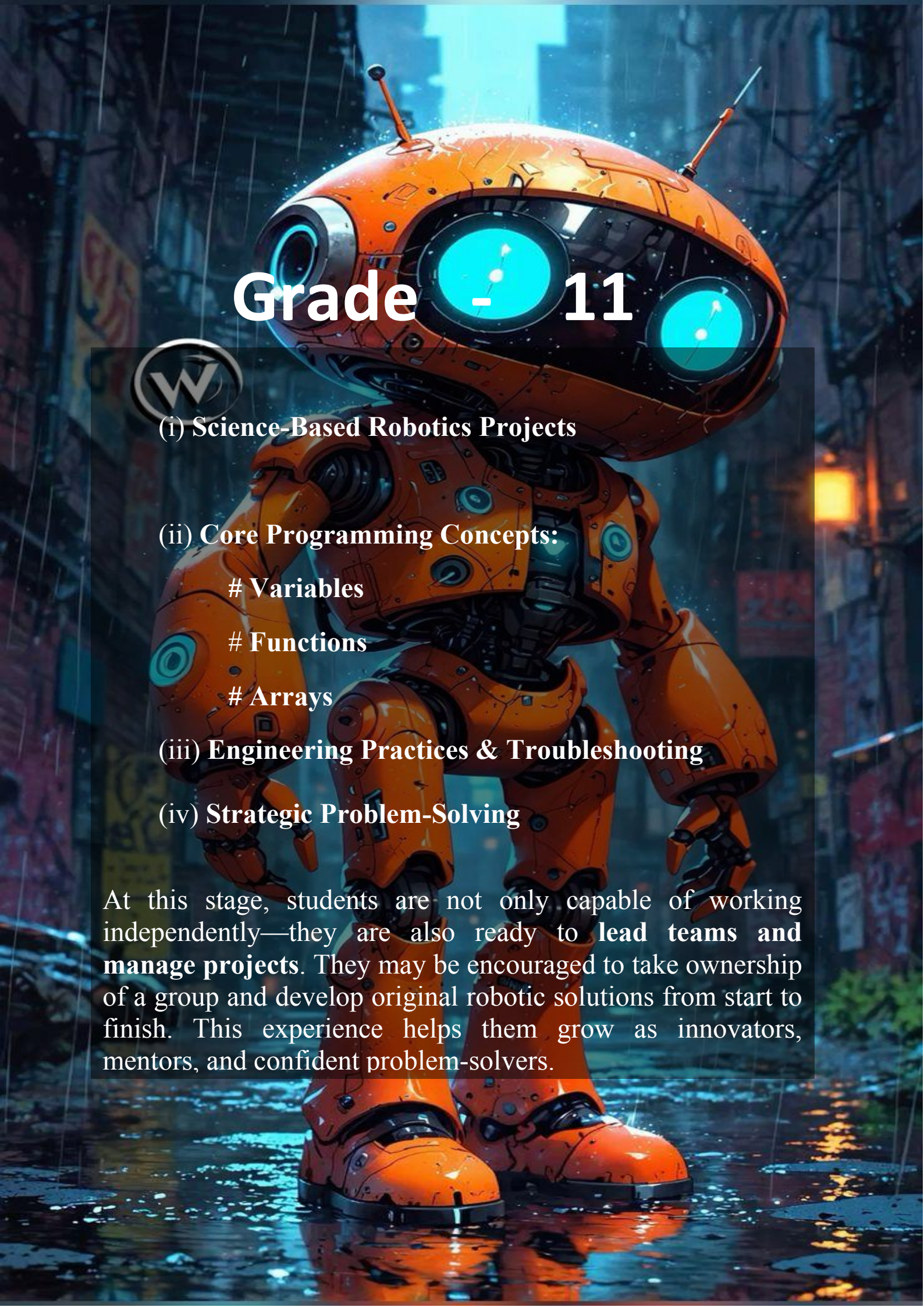
- # Planning and Strategy Development

- # Step-by-step video tutorials

- # Sensor-based lessons

- # Mini-challenges

Throughout the year, Grade 10 students may also be given the opportunity to independently **design, build, and program a fully functional robot** during club sessions. These projects allow students to take initiative, express creativity, and demonstrate mastery of the skills they’ve developed over the past years.



Grade - 11



(i) **Science-Based Robotics Projects**

(ii) **Core Programming Concepts:**

Variables

Functions

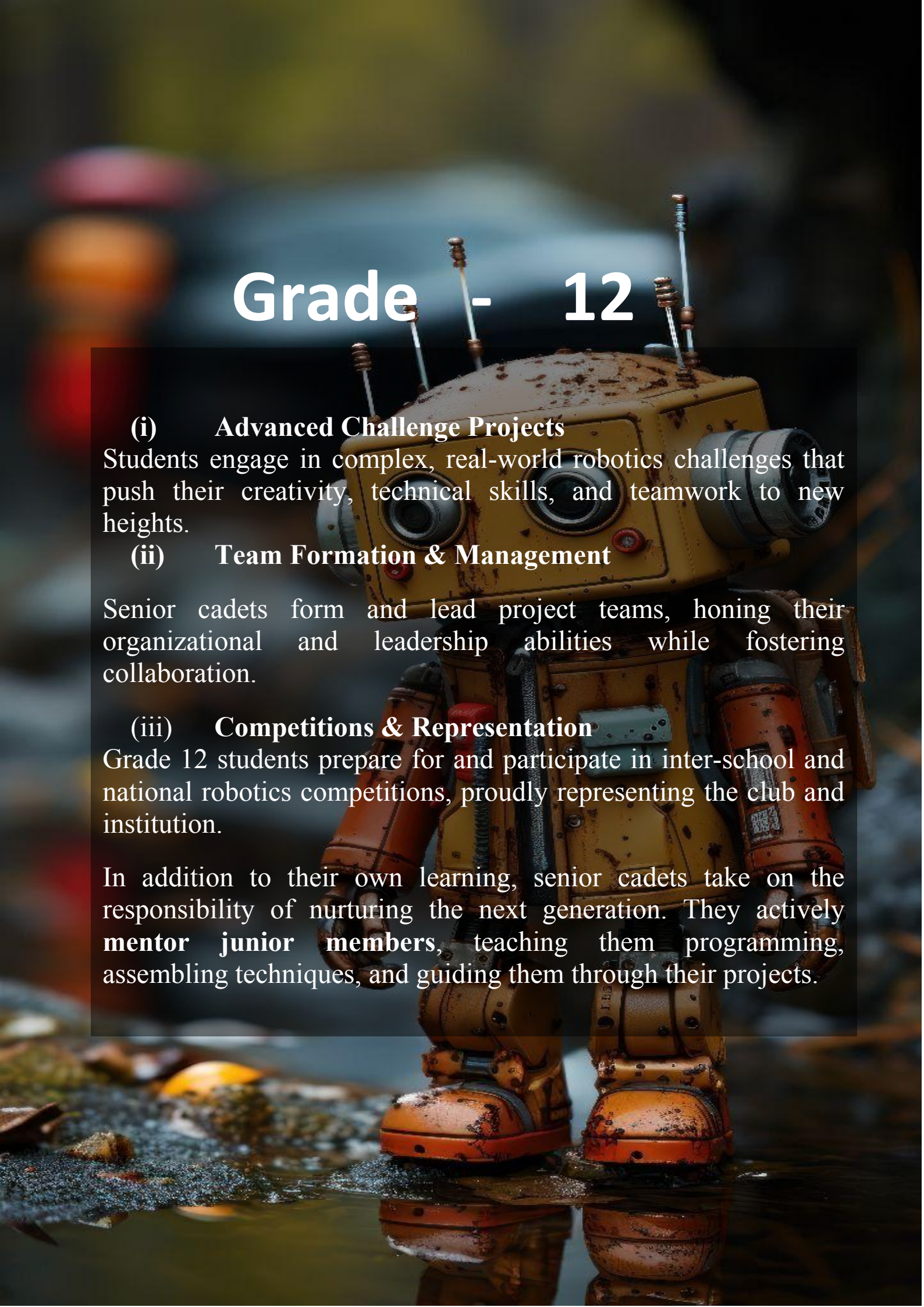
Arrays

(iii) **Engineering Practices & Troubleshooting**

(iv) **Strategic Problem-Solving**

At this stage, students are not only capable of working independently—they are also ready to **lead teams and manage projects**. They may be encouraged to take ownership of a group and develop original robotic solutions from start to finish. This experience helps them grow as innovators, mentors, and confident problem-solvers.

Grade - 12



(i) Advanced Challenge Projects

Students engage in complex, real-world robotics challenges that push their creativity, technical skills, and teamwork to new heights.

(ii) Team Formation & Management

Senior cadets form and lead project teams, honing their organizational and leadership abilities while fostering collaboration.

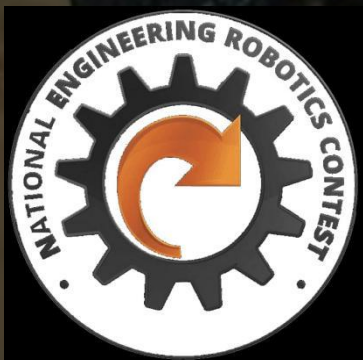
(iii) Competitions & Representation

Grade 12 students prepare for and participate in inter-school and national robotics competitions, proudly representing the club and institution.

In addition to their own learning, senior cadets take on the responsibility of nurturing the next generation. They actively **mentor junior members**, teaching them programming, assembling techniques, and guiding them through their projects.

CLUB ACCOMPLISHMENTS

- # 1st in National Engineering Robotics Contest (2015).
- # 1st in National Engineering Robotics Contest (2015), Fall 2
- # Winner Modular Category in National Engineering Robotics Contest (2016).
- # Winner Modular Category in National Engineering Robotics Contest (2017).
- # Winner Robochallenger National Olympiad (2017).
- # 1st in First Global Pakistan held at NISTE Building Auditorium.



RESOURCES FOR EV3

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Embark on an exciting journey into the world of robotics and LEGO Mindstorms EV3 with a wealth of resources, including official LEGO Education materials, programming software, online tutorials, and community forums.

1.LEGO Education - EV3 Programming:

- [LEGO Education - EV3 Programming](#)

2.Official LEGO Mindstorms EV3 Website:

- [LEGO Mindstorms EV3](#)

3.RobotC - EV3 Programming Software:

- [RobotC for LEGO Mindstorms](#)

4. EV3Lessons:

[EV3Lessons](#): This site offers a variety of lessons and tutorials for programming EV3 robots using different programming languages.

5.The NXT STEP Blog:

- [The NXT STEP Blog](#): While this blog covers both NXT and EV3, it can be a valuable resource for learning about the EV3 platform.

6.Brickset Forums - Mindstorms and Robotics:

- [Brickset Forums](#): The forums at Brickset include a section dedicated to Mindstorms and robotics, where you can find discussions and ask for help.

7.YouTube - EV3 Tutorials:

- [YouTube](#): Search for EV3 tutorials on YouTube. There are many creators who provide step-by-step guides and demonstrations for building and programming EV3 robots.

8.GitHub - EV3 Projects:

- [GitHub](#): Explore GitHub repositories for EV3 projects and code examples. Many developers share their code and projects, which can be a great learning resource.

RESOURCES FOR ARDUINO

1. Official Arduino Website:
 - [Arduino](#): The official Arduino website is a comprehensive resource with documentation, tutorials, and a community forum.
2. Arduino Project Hub:
 - [Arduino Project Hub](#): This platform features a collection of community-contributed Arduino projects along with step-by-step guides.
3. Arduino Forum:
 - [Arduino Forum](#): The official Arduino Forum is a place to ask questions, share your projects, and connect with other Arduino enthusiasts.
4. Arduino Playground:
 - [Arduino Playground](#): The Arduino Playground is a wiki-style platform that contains a wealth of information, tips, and project ideas contributed by the Arduino community.
5. Adafruit Learning System:
 - [Adafruit Learning System](#): Adafruit is a popular electronics company, and their learning system includes a variety of tutorials and projects, many of which involve Arduino.
6. SparkFun Tutorials:
 - [SparkFun Tutorials](#): SparkFun Electronics provides a range of tutorials covering Arduino basics, sensor integration, and more.
7. Instructables - Arduino Projects:
 - [Instructables Arduino Projects](#): Instructables features a collection of user-generated Arduino projects with step-by-step instructions.
8. YouTube - Arduino Tutorials:
 - [YouTube](#): Search for Arduino tutorials on YouTube. Channels like "Paul McWhorter" and "GreatScott!" offer detailed guides on Arduino projects and programming.
9. Coursera - Arduino Programming and Hardware Fundamentals:
 - [Coursera](#): Look for Arduino-related courses on platforms like Coursera. Courses like "Arduino Programming and Hardware Fundamentals with Hackster" can provide structured learning.
10. GitHub - Arduino Projects:
 - [GitHub](#): Explore GitHub repositories for Arduino projects and code examples. Many developers share their code, libraries, and projects for others to learn from and build upon.

PARTS FOR LEGO® MINDSTORMS® EDUCATION EV3 CORE SET



Beam 3 M,
W/4 Shaps
6x



3-Branch Cross Axle
W/Cross H.
2x



Connector
Peg/Cross Axle
6x



Technic 3M
Beam
4x



T-Beam 3X3
W/Hole 04.8
4x



Angle Element, 0°
4x



Tyre Low Wide 056 X 28
2x



Wedge-Belt Wheel 024
4x



Cross Axle 8M
2x



Technic Ang. Beam 3X5 90°
2x



EV3 Cable 300 Mm
1x



EV3 Cable 350 Mm
2x



EV3 Cable 250 Mm
4x



Angular Beam 90°
W/4 Shaps
4x



Cross Block 3X2
6x



3M Connector Peg
6x



Technic Ang.
Beam 4X2 90°
6x



Technic 3M Beam
2x



Angle Element, 90°
2x



Left Panel 5X11
1x



Cross Axle 4M
With End Stop
2x



Cross Axle 10M
2x



Technic 5M Beam
4x



EV3 Gyro Sensor
1x



EV3 Touch Sensor
1x



EV3 Color Sensor
1x



Gear Wheel 216
4x



Triangel
4x



Conical Wheel 212
2x



Hto V Beam 90°
2x



Beam 1X2
W/Cross And Hole
4x



Angle Element, 180°
4x



Cross Axle 8M
With End Stop
2x



Cross Axle 12M
2x



Technic 7M Beam
4x



Bion. Eye
4x



Steel Ball
1x



Connector Peg
W. Friction 3M
30x



2M Cross Axle
W. Groove
10x



Double Cross Block
8x



Lever 1X4,
Without Notch
2x



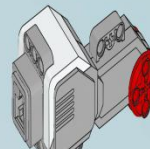
Damper 2M
4x



Bush For Cross Axle
10x



Connector Peg
10x



Large Motor
2x



Technic Ang. Beam 3X5 90°
6x



Technic 3M Beam
4x



Cross Axle,
Extension, 2M
6x



Technic Cross
Block 2X1
4x



Tyre For Wedge-
Belt Wheel
4x



Right Panel 3X5
1x



Turntable 228
2x



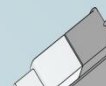
Double Conical
Wheel 212 1M
2x



Tube, W/ Double
4.85 Hole
4x



Technic Angular Beam 3X7
4x



Medium Motor
1x



EV3 Ultrasonic Sensor
1x



Technic Angular
Beam 4X4
6x



Conn. Bush
W/Fric./Cross Axle
20x



2M Fric. Snap
W/Cross Hole
22x



Technic Cross
Block/Fork 2X2
4x



Double Conical
Wheel 236
2x



Left Panel 3X5
1x



Sprocket, 040,7
4x



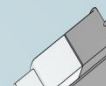
Double Conical
Wheel 220 1M
2x



Double Bush 3M 04.9
4x



Technic 9M Beam
6x



Medium Motor
1x



EV3 Ultrasonic Sensor
1x



Double Angular Beam 3X7 45°
4x



Technic 3M
Beam
4x



1/2 Bush
10x



2X1X3 Steering
Knuckle Arm
2x



Track Element,
5X1,5
54x



Left Panel 5X11
1x



Right Panel 5X11
1x



Technic Angular
Wheel
4x



Cross Block 90°
8x



Technic 11M Beam
4x



Medium Motor
1x



EV3 Ultrasonic Sensor
1x



Double Angular Beam 3X7 45°
4x



Technic 3M
Beam
4x



1/2 Bush
10x



2X1X3 Steering
Knuckle Arm
2x



Track Element,
5X1,5
54x



Left Panel 5X11
1x



Right Panel 5X11
1x



Technic Angular
Wheel
4x



Cross Block 90°
8x



Technic 11M Beam
4x



Medium Motor
1x



EV3 Ultrasonic Sensor
1x



Technic 15M Beam
6x



Rim Wide 43,2X26
W/6 Holes 4.8
2x



Technic 3M Beam
4x



Connector Peg
W. Friction
60x



Worm Gear
2x



Cross Axle 3M
14x



Cross Axle 7M
5x



Cross Axle 4M
4x



Gear Wheel
T=8, M=1
4x



Cross Block 3M
8x



Technic 13M Beam
6x



Medium Motor
1x



EV3 Ultrasonic Sensor
1x



Gear Wheel 40T
2x



Cross Axle 3M
With Knob
2x



Beam Frame 5X7 04.85
3x



Beam R. Frame 5X11 04.85
1x



Cross Axle 3M
6x



Cross Axle 9M
2x



Cross Axle 6M
4x



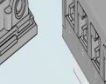
Gear Wheel 224
4x



Power Joint
1x



Ms-EV3 Recharge. Battery
1x



P-Brick
1x



Medium Motor
1x

LEGO® Education SPIKE™ Prime Set

Element Overview

