Robot Design Instruction's (Class 1-5)

Objective:

Participants will Create ideas or design a robot that addresses one of the listed issues from the table shown below. The competition focuses on innovation, creativity, and practical problem-solving, encouraging students to create robots that make a positive impact in their community.

Accessibility	Community Health and Safety	Environmental Awareness	Support for the Elderly	Education and Literacy
Helping people with disabilities or limited mobility access public spaces, transportation, or services.	Assisting with tasks that improve the health and safety of the community (e.g., sanitation, emergency response).	Helping with tasks related to environmental preservation or sustainability in the region.	Providing assistance or companionship for older adults in the community.	Promoting learning or helping students in local schools or educational programs.

Competition Requirements:

1. Team Structure:

- Individuals or Teams (up to 3 members) can participate from elementary school grades 3-5.
- All team members must participate in the design, building, and presentation phases.
- A teacher or adult mentor can assist, but the robot design must be primarily done by the students.

Problem Identification

Clarity of Issue:

- Clearly defines a specific issue relevant to the region
- Provides data and evidence to demonstrate the scope and impact of the problem
- Explains why this issue is important to address

Functionality:

- Describes the robot's primary functions and capabilities
- Explains how these functions directly address the identified social issue
- Outlines any secondary features that enhance the robot's effectiveness

Innovation:

- Presents a novel approach or improvement over existing solutions
- Incorporates cutting-edge technology or creative problem-solving

Design Specifications:

- Provides a clear overview of the robot's physical design
- Outlines key components and systems (e.g., sensors, actuators, AI capabilities)
- Considers power requirements and operational constraints

Implementation Plan:

- Proposes a realistic timeline for development and deployment
- Identifies potential technical challenges and mitigation strategies

Effectiveness:

- Clearly articulates how the robot will make a measurable impact on the issue
- Provides projected outcomes or metrics for success
- Considers potential limitations or areas for future improvement

Ethical Considerations:

- Addresses potential ethical concerns related to the robot's deployment
- Considers privacy, safety, and societal implications

Visual Aid:

- Includes clear diagrams, mockups, or 3D renderings of the robot concept
- Uses visuals effectively to communicate key features and functionality
- Organization:
- Presents information in a logical, easy-to-follow structure
- Balances technical details with accessible explanations for a general audience

Upload your video presentation to the provided online platform.

2. Robot Specifications:

Students do not necessarily need to build or program a robot, but can also just present their ideas.

If you would like to build one make sure:

- **Size and Weight**: The robot must fit within a space of **L**:**11 x W:11 x H:11 inches** and weigh no more than **3.8 lb**.
- **Power Source**: The robot should be powered by standard batteries.
- **Materials**: Teams are encouraged to use safe, durable materials that are age-appropriate, with an emphasis on creativity in using household or recyclable materials.
- **Movement**: The robot should be able to move and perform a simple task autonomously or with basic control mechanisms (e.g., remote control).

4. Presentation:

- Each team will have **3-5 minutes** to present their robot to the judges.
- The presentation should include:
    - An explanation of the issue being addressed.
    - A demonstration of how the robot solves or helps with this issue.
    - Details on the robot's design, how it works, and how it could benefit the community.
    - Discussion of challenges faced during the building process and how they were overcome.

5. Safety Requirements:

- Robots must be safe to operate and pose no risk to participants or others.
- No sharp edges, exposed wires, or harmful materials are allowed.
- Robots must pass a safety inspection before competing.

Scoring Rubric:

Category	Description	Max Points	Deductions	Notes
Creativity and Innovation	Originality of the robot's design and solution for the issue.	25	-5 points for lack of creativity or original idea	Unique solutions are rewarded higher.
Impact on the Community	How well the robot addresses a regional issue and its potential impact.	30	-10 points for minimal or unclear impact	Solutions with clear benefits for the local community score higher.

Functionality	How effectively the robot performs its intended task.	20	-5 points for incomplete or inconsistent task performance	The robot should perform the task reliably.
Robot Design and Build	The structural design and functionality of the robot (stability, durability).	20	-5 points for fragile or unstable design	Robots should be well-built and stable during operation.
Autonomy and Programming	Degree of autonomy in the robot's operations and the complexity of its programming.	15	-10 points if the robot requires human intervention	Points awarded for autonomous functions or basic programming logic.
Presentation and Explanation	Quality of the presentation and clarity in explaining the problem, the robot, and its impact.	20	-5 points for unclear or incomplete presentation	The presentation should be clear, concise, and well-organized.
Teamwork and Collaboration	How well the team worked together and shared responsibilities.	10	-5 points for unequal participation or lack of teamwork	Effective teamwork and collaboration are encouraged.
Safety and Age Appropriateness	Safety of the robot and whether the design is appropriate for elementary school students.	10	Disqualification if safety standards are not met	Robots must pass a safety inspection to compete.

Additional Considerations:

- **Community Involvement**: Encourage students to consult with local community members or organizations to better understand the social issues they are trying to solve.
- **Inclusivity**: Emphasize that the robots should aim to benefit a wide range of people in the community, promoting inclusivity and accessibility.
- **Sustainability**: Teams should consider how their robot could have a long-term, sustainable impact on the community or the environment.
- **Real-world Application**: Bonus points may be awarded to teams whose robots show potential for real-world application in solving the chosen social issue.

Robot Examples:

1. **Assistance Robot for the Elderly**: A robot that helps elderly people by delivering small items or reminding them of daily tasks.
2. **Accessibility Robot**: A robot that helps individuals with disabilities by guiding them through public spaces or carrying small objects.
3. **Environmental Helper Robot**: A robot that helps sort recyclables or cleans small areas of public parks.
4. **School Support Robot**: A robot that helps students or teachers in a classroom by organizing or moving educational materials.