CLMD-RA-2025-138

Republic of the Philippines
Department of Education
REGION IV-A CALABARZON

July 28, 2025
In compliance with DepEd Order (DO) No. 8, s. 2013
this advisory is issued not for endorsement per DO 28, s. 2001,
but only for the information of DepEd officials,
personnel/staff, as well as the concerned public.
(Visit depedcalabarzon.ph)

3rd DOST Robotics Tournament

With reference to the letter of Dr. Emelita S. Bagsit, Regional Director, Department of Science and Technology, this Office informs the Schools Division Offices of the Industry Robotics Solution Challenge Camp to be held on July 31 to August 1, 2025, Guerrero Hall, DOST PCAARRD Innovation and Technology Center (DIPTC) and Preliminary Competition for the Sumo Bot and Line Tracing Categories to be held on August 5, 2025 at SM San Pablo City, laguna.

The said activity aims to showcase the participants' skills in programming, robot designing and control system.

Kindly refer to the attached letter for more details about the activity.

Furthermore, those interested in joining are reminded of the following conditions:

a) that the Schools Division Office be informed, in writing, of participation in the said activity;

b) participation to the event is strictly on a voluntary basis;

c) expenses to be incurred shall be on a personal basis or sourced from a legitimate local government unit or donor; and

d) strict observance of Time-On-Task Policy or the No Disruption of Classes Policy of the Department.

For information of all concerned.

02/ROC7

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
REGIONAL OFFICE NO. IV-A (CALABARZON)

BAGONG PILIPINAS
ORD-ILA01-2025-429

7 July 2025

ATTY. ALBERTO T. ESCOBARTE, CESO II
Regional Director
DEPED Region IV-A
Cainta, Rizal

Dear ***Director Escobarte:***

Greetings!

The Department of Science and Technology (DOST)-CALABARZON, in partnership with the City Government of Antipolo and the Rizal Provincial Government, is pleased to announce the **2025 Regional Science, Technology, and Innovation Week (RSTW) in CALABARZON themed "Building Smart and Sustainable Communities".**

As a key pre-RSTW activity, we are organizing the **3rd DOST Regional Robotics Tournament** with the theme "Solve it with Robots", organized by the Department of Science and Technology-CALABARZON (DOST-CALABARZON) in partnership with the Laguna State Polytechnic University (LSPU) IDD Laboratory, and the Mechatronics and Robotics Society of the Philippines (MRSP). This tournament aims to showcase the participants' skills in programming, robot designing and control systems. The tournament also aims to bring together faculty, students and enthusiasts across the region. The competition will be composed of three categories namely: **(1) Line Tracing; (2) Sumobot Battle; and (3) Industry Robotic Solution Challenge.**

The **Industry Robotics Solution Challenge Camp** will be held from **July 31 to August 1, 2025, from 8:00 AM to 5:00 PM daily at Guerrero Hall, DOST PCAARRD Innovation and Technology Center (DPITC).** The preliminary competition for the **Sumo bot and Line Tracing categories** will be held on **August 5, 2025, at SM San Pablo City, Laguna.**

In line with this, we are delighted to invite both the public and private schools in the region to participate in the **3rd DOST Regional Robotics Tournament**. We also request your good office **to disseminate this invitation** to the division offices within CALABARZON. The tournament guidelines and tentative program are attached for your perusal.

Should there be clarifications related to this, please feel free to contact **Engr. Jenny Ann N. Lawas** at laguna@ro4a.dost.gov.ph or **09773056235.**

Thank you very much in grateful anticipation of your usual support to the program, projects, and initiatives of DOST CALABARZON.

Sincerely,

EMELITA P. BAGSIT
Regional Director

ORD-ILA01-2025-429

2025 RoboClash
3rd DOST Regional Robotics Tournament
THEME: ***Solve it with Robots***

TOURNAMENT GUIDELINES

1. **Rationale**

   The DOST CALABARZON Robotics Tournament will be a regional contest organized by the Department of Science and Technology-CALABARZON (DOST-CALABARZON) in partnership with the Laguna State Polytechnic University (LSPU), IDD Laboratory and Mechatronics and Robotics Society of the Philippines (MRSP). This contest aims to showcase the participants' skills in programming, robot designing and control systems. The tournament also aims to bring together faculty, students and enthusiasts across the region.

2. **Categories**
   The competition will be composed of three categories namely: (1) Line Tracing; (2) Sumobot Battle; and Innovative Category.

   a. ***Line Tracing Category*** - It is a competition which uses autonomous robots that shall accurately trace or navigate path or tracks by following a line at a specified time limit (1-minute).This is followed by a "pick and place robotic challenge" robots autonomously pick up objects from one location and accurately place them in another designated area.

   b. ***Sumobot Battle*** - It is also known as sumo - robotics which is inspired by sumo wrestling whereas the autonomous robots oppose in a ring or arena with the goal of pushing their opponents out of the ring or disabling them within a particular time limit.

   c. ***Industry Robotic Solutions Challenge-*** This refers to a competition aimed at developing and showcasing robotic solutions to address real-world problems within industrial sectors. These challenges are crucial for driving innovation, bridging the gap between research and practical application, and fostering collaboration between academia, industry, and startups.

   d. ***Beginner Category*** – Open to students currently enrolled in **Grade 4 to Grade 6**.

   e. ***Advance Category*** – Open to students currently enrolled in **Grade 7 to Grade 12.**

3. **Entries** for all categories will be recognized with their affiliated location-specific School/University. **Only a maximum of two teams per school/university (location-specific) per category will be allowed to compete.**

4. **Judging and Criteria**

   a. The Panel of Judges will be composed of representatives from the following agencies:
      - DOST Metals Industry Research and Development Council (MIRDC)
      - Department of Education Region IV-A (DEPED CALABARZON)
      - Polytechnic University of the Philippines (PUP)
      - Department of Science & Technology IV-A (DOST CALABARZON)
      - Philippine Chamber of Commerce and Industry (PCCI)

   b. The decision of the Panel of Judges shall be final and irrevocable. The final score of the winners will be announced during the awarding. Any part of the scorecards or rating sheets are NOT for public scrutiny and may only be provided upon the request of the participant.

5. Schedule of Activities

Below is the timeline of activities from call for submission of entries to the awarding proper:

Date	Activity
July 8, 2025	Call for Submission of Entries
July 8, 2025 to July 22, 2025	Registration Period / Acceptance of Entries
July 24, 2025	Orientation about the Mechanics and Guidelines
July 31, 2025 to August 1, 2025	Industry Robotics Solution Boot Camp
August 5, 2025	Preliminary Competition for Sumobot and Line-Tracing Categories
August 14, 2025	Final Round/Championship Tournament
August 16, 2025	Awarding of Winners (RSTW 2025)

6. Announcement of Winners / Awarding of Prizes

Only three (3) winners *(1st Place, 2nd Place and 3rd Place)* shall be selected per category. In case of tie, the Panel of Judges shall convene to break the tie.

The winners shall receive the following prizes during the DOST-CALABARZON's Regional Science, Technology, and Innovation Week (RSTIW) Awarding Ceremony:

Line Tracing-Beginner Category	
First Prize	Php 5,000 + Plaque of Recognition
Second Prize	Php 3,000 + Plaque of Recognition
Third Prize	Php 2,000 + Plaque of Recognition
Participating Entries	Certificate of Participation
Line Tracing-Advance Category	
First Prize	Php 15,000 + Plaque of Recognition
Second Prize	Php 10,000 + Plaque of Recognition
Third Prize	Php 5,000 + Plaque of Recognition
Participating Entries	Certificate of Participation
Sumobot Battle-Beginner Category	
First Prize	Php 5,000 + Plaque of Recognition
Second Prize	Php 3,000 + Plaque of Recognition
Third Prize	Php 2,000 + Plaque of Recognition
Participating Entries	Certificate of Participation
Sumobot Battle-Advance Category	
First Prize	Php 15,000 + Plaque of Recognition
Second Prize	Php 10,000 + Plaque of Recognition
Third Prize	Php 5,000 + Plaque of Recognition
Participating Entries	Certificate of Participation
Industry Robotics Solutions Challenge	
First Prize	Php 20,000 + Plaque of Recognition
Second Prize	Php 15,000 + Plaque of Recognition
Third Prize	Php 10,000 + Plaque of Recognition
Participating Entries	Certificate of Participation

***Note:** Cash prizes will be subject to 20% tax based on the Final Withholding Tax Guidelines.

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7. Requirements and Mechanics

a. *Line tracing and Sumobot*

i. Interested teams must register first at
Line tracing Competition- tinyurl.com/linetracing2025
Sumobot- https://tinyurl.com/robosumobot

ii. Registration period will be from ***July 8 to July 22, 2025***

iii. Successful registered teams will receive an email from the organizing team acknowledging their entries and providing the contest guidelines.

b. *Industry Robotic Solutions (IRS) Challenge*

i. A call for submission of an Industry Robotics Solution Concept Paper based on identified gaps in agriculture and in food industries will be posted on ***July 8, 2025.***

ii. Interested teams must register and submit their Industry Robotics Solution Concept Paper at https://tinyurl.com/robotbootcamp

iii. Submission of entries will be from ***July 8 to July 22, 2025***

iv. Submitted concept papers will be judged based on a set of criteria.

v. Top ten entries will be chosen which will participate in the Industry Robotics Solution Challenge Boot Camp to be held on ***July 31, 2025 to August 1, 2025.*** They will receive an email from the organizing team announcing the results of the selection and the venue of the IRS Challenge Boot Camp

vi. Guidelines about the Boot Camp will also be provided.

c. **By joining the contest,** all participants agree to release and discharge DOST-CALABARZON, LSPU SPCC, and MRSP officials and employees from any claims, losses, or damage arising from their participation.

d. **Participants must agree** that their names and their school (location-specific)/division being represented may be released to the public for the purpose of announcing the contest finalists and winners.

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I. LINE TRACING CATEGORY

Robots per Team:	One (1)
No. of Team:	Two (2) per School
No. of Players:	3 players per team
Robot Control:	Autonomous
Event Summary:	Robot navigation is a modern day problem. Participants must work around the problem and complete the task.

A. **Objectives:** The objective of this contest is for a robot to follow a black line on a white background, without losing the lines. The robot completes the course in 1-minute while accurately tracking the course line from start to finish wins.

B. **General Robot Specifications:**

1.1. Size Limit: 25cm length x 25cm width maximum. Allows folding of parts during measurement of size. No restrictions for height and weight.

1.2. Mobility: Wheeled or tracked chassis for fast movement.

1.3. Power: Use DC power enough to drive the robot till the finish line.

1.4. The robot should have the following features:

Line Tracing

a. **Sensor Limit: Maximum of 3 IR sensors are allowed.**
b. **Speed Control: No control in any way is allowed.**

Remote-Controlled

a. **Remote Controlled (RC) Robot:** Any remote controller is allowed and not limited to RF or Bluetooth. Should only be connected to one controller.
b. **Pick-Up Actuator:** May or may not be included in the robot as long as it does not violate the size requirement. Any end effectors like claws, scoops, magnets, or suction mechanisms are allowed.

C. **Mechanics:**

1. **Line-Tracing**

1.1. Playfield Setup:

1.1.1 Arena Size: 8 ft x 4 ft.

1.1.1.1 Track: consists of black line with curves, sharp turns, intersections, and possible obstacles.

1.1.1.2. The size of the playing field is approximately 4m x 8m.

1.1.1.3. The black line is approximately 18 to 25 mm. in width on a white background.

1.1.1.4. The sample playing field is shown on Figure 1. The actual playing field will be revealed on the day of the contest. The track will include straight segments, curves and intersections to challenge the robots' navigation abilities.

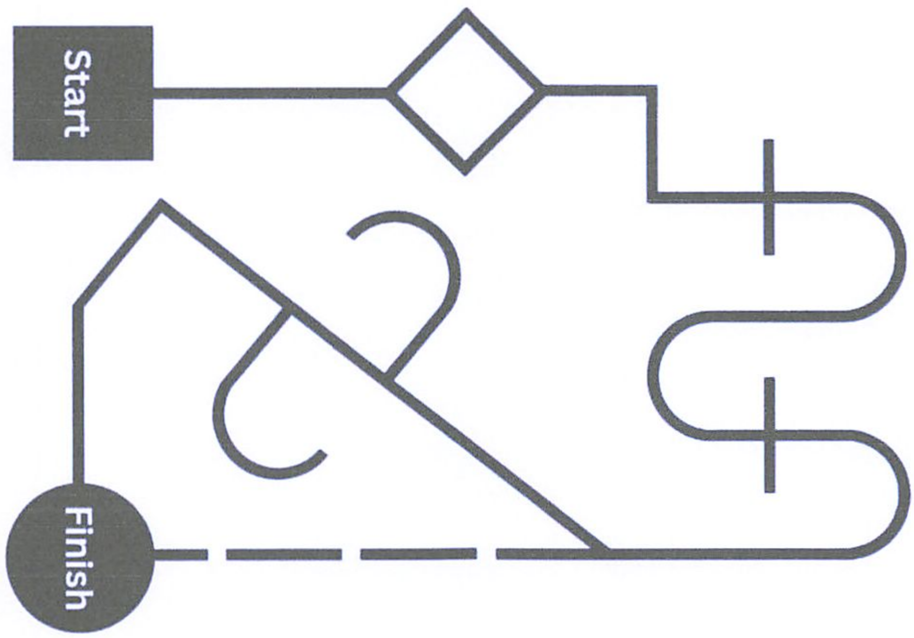

Figure 1. Sample Track

1.1.1.5. **Length and complexity of the track:** was designed to allow skilled robots to finish within **1 minute.**

1.1.1.6. **Checkpoints:** indicates restarting points in case the robot goes off track.

1.1.1.7. **Obstacles (optional):** Barriers or ramps may be added to increase difficulty.

1.2. Game Rules

Game proper

1.2.1. The whole body of the robot will be placed behind the starting line.
1.2.2. When the referee blows the whistle, it indicates to run the robot.
1.2.3. Each team will be given **3 running rounds**. The one running round consists of 1 practice run and 2 actual runs to finish the 1-minute. The better time from the two runs will be considered for scoring.

Start/Stop Phase:

1.2.4. The starting point is defined with a start sensor at the beginning of the cube sorting track.

1.2.5. The start sensor activates the timer. Each robot is timed until it reaches the finish line indicated by a stop sensor located after the block collection track. The maximum time, including block collection, is 60 seconds.

1.2.6. Robots are placed at the starting line.

1.2.7. Countdown (3,2,1... GO!) – Robots should cross the start sensor and begin following the track.

1.2.7.a. **Live Timer:** The start sensor activates the timer. Each robot is timed until it reaches the finish line indicated by a stop sensor. The maximum time is 60 seconds.

1.2.7.b. **Score Calculation:** Based on completion time, penalties, and checkpoints. If the 60 seconds lapse, the referee will stop the robot and calculate penalties. The shortest time ranks higher.

1.3. Robot Rules & Limitations

1.3.1. Start Rules: Once the robot is placed on the track, players are not allowed to hold or modify the robot except during checkpoint restart.

1.3.2. Restart Rules: Robots should follow the off-track rules.

1.4. Scoring System

1.4.1. **Completion Time:** The fastest robot (with the shortest recorded time) to finish the track within 1-minute wins.

1.4.2. The track consists of checkpoints that the robot must sequentially complete.

1.4.3. **Accuracy Penalty:** Deviating from the line or going off-track results in time penalties.

1.4.4. **Checkpoints:** Every missed checkpoint adds 10 seconds (there are 4 checkpoints).

1.4.5. **Penalty:** A penalty of 10 seconds will be added for every checkpoint missed after the 1-minute time lapse.

1.4.6. **Off-Track:** If a robot goes off-track, the player will return it to the previous checkpoint to continue the task until the time expires. The referee will validate and approve the placement of the robot.

1.5. Winning Criteria

- The robot with the shortest time and least penalties win.
- In case of a tie, a rematch or sudden-death challenge can be held.

2. Remote-Controlled Cube Sorting Challenge

2.1 Objective

Players must control their robot to pick up scattered colored cubes and place them in the correct colored bin within 1 minute.

The player who sorts the cubes in the fastest time wins.

2.2 Playfield Setup:

2.2.1. Arena Size: 8 ft x 4 ft.

Cubes: 10 small colored cubes randomly scattered.

Target Bins/Printed Squares: 4 separate printed squares, each assigned a specific color (Red, Blue, Green, Yellow).

Obstacles (optional): Barriers or ramps may be added to increase difficulty.

2.2.2. Game Rules

Start/Stop Phase:

2.2.2.1. The starting point is defined with a start sensor at the beginning of the cube sorting track.

2.2.2.2. The start sensor activates the timer. Each robot is timed until it reaches the finish line indicated by a stop sensor located after the block collection track. The maximum time, including block collection track is 90 seconds.

Robot Rules & Limitations

3. **Start Rules:** Once the robot is placed on the track, players are not allowed to hold or modify the robot except during checkpoint restart.

4. **Restart Rules:** Robots should follow the off-track rules.

5. The robot must move the colored blocks and place them within the corresponding target-colored squares. It should not cross the outside perimeter of the target square.

Scoring System:

1. **Mismatched Cubes:** Cubes placed in the wrong colored square will incur a 10-second penalty.

2. **Unsorted Cubes:** Cubes outside the colored squares will incur a 5-second penalty.

3. The robot will be halted after the allotted 90-second time even if the robot has not crossed the next track.

2.2.3. Winning Criteria

2.2.3.1. The robot with the shortest time and least penalties win.

2.2.3.2. In case of a tie, a rematch or sudden-death challenge can be held.

D. Code of Conduct:

All participants, organizers, and spectators must adhere to a code of conduct promoting sportsmanship, respect, and fair play.

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II. SUMOBOT CATEGORY

Robots per Team:	One (1)
No. of Team:	Two (2) per School
No. of Players:	3 players per team
Robot Control:	Autonomous
Event Summary:	Two robots compete in a head-to-head match following the basic system of traditional human sumo matches. Robots are NOT ALLOWED to have weapons, and are not allowed to flip each other. The sole purpose is a pushing match between the two robots to force the other from the arena. ."

Objectives: The objective of this contest is for a robot to follow a black line on a white background, without losing the lines. The robot to complete the course in the shortest period of time while accurately tracking the course line from start to finish wins.

Section 1: Definition of the Sumo Match

Article 1 A match is fought between two teams, each team having one or more contestants. Only one team member may approach the ring; other team members must watch from the audience. In accordance with the game rules (hereafter referred to as "these rules",) each team competes on a Dohyo (sumo ring) with a robot that they have constructed themselves to the specifications in Section 3. The match starts at the judge's command and continuous until a contestant earns two points. The judge determines the winner of the match.

Section 2: Requirements for the Dohyo (Sumo Ring)

Article 2 [Dohyo Interior] The Dohyo interior is defined as the playing surface surrounded by and including the border line. Anywhere outside this area is called the Dohyo exterior.

Article 3 [Dohyo Specifications]

1. The ring shall be oblong/circular in shape and of the appropriate dimensions for the given size class.
2. Shikiri lines (starting lines) consist of two painted parallel black lines centered in the ring with appropriate width and spacing for the given class. The separation distance between the lines is measured to their outside edges.
3. The border line is marked as a white ring of a width appropriate for the given class on the outer edge of the playing surface. The ring area extends to the outside edge of this circular line.

Article 4 [Dohyo Exterior] There should be a space appropriate for the given class outside the outer edge of the ring. This space can be of any color, and can be of any material or shape as long as the basic concepts of these rules are not violated. This area, with the ring in the middle, is to be called the "ring area". Any markings or parts of the ring platform outside the minimum dimensions will also be considered in the ring area.

Section 3: Requirements for Robots

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Autonomous classes: Autonomous robot operation must begin automatically no less than five seconds after being started by the user. The robot must have a name or number for registration purposes. Display this name or number on your robot to allow spectators and officials to identify your robot.

Robot Dimension and Specifications

-A maximum of 20cm x 20cm x 20cm size is allowed throughout the whole run.

-A maximum of 1Kg is allowed.

Article 5 [Robot Restrictions]

1. Jamming devices, such as IR LEDs intended to saturate the opponents IR sensors, are not allowed.
2. Parts that could break or damage the ring are not allowed. Do not use parts that are intended to damage the opponents robot or it's operator. Normal pushes and bangs are not considered intent to damage.
3. Devices that can store liquid, powder, gas or other substances for throwing at the opponent are not allowed.
4. Any flaming devices are not allowed.
5. Devices that throw things at your opponent are not allowed.
6. Sticky substances to improve traction are not allowed.
7. Devices to increase down force, such as a vacuum pump or magnets not allowed.
8. All edges, including but not limited to the front scoop, must not be sharp enough to scratch or damage the ring, other robots, or players. Judges or competition officials may require edges that they deem too sharp to be covered with a piece of tape.

Section 4: How to Carry Sumo Matches

1. One match shall consist of 1 round, within a total time of 2 minutes, unless extended by the judges.
2. The team who wins the round shall receive two points.
3. When the match is not won by either team within the time limit, an extended match may be fought. Alternatively, the winner/loser of the match may be decided by judges, by means of lots, or by a rematch.
4. One point shall be given to the winner when the judges' decision was called for or lots were employed.

Section 5: Start, Stop, Resume, End a Match

Article 6 [Start] Upon the judge's instructions, the two teams bow to each other in the outer ring, approach the ring, and place a robot within their half of the ring on or behind the Shikiri line. (A robot or a part of a robot may not be placed beyond the front edge of the Shikiri line toward the opponent. Note that is not required that a robot be placed directly behind the Shikiri line; it may be offset to the side, as long as it is behind an imaginary line collinear with the Shikiri line.) When the judge announces the start of the round, the teams start their robots. During these five seconds, players must clear out of the ring area.

Article 7 [Stop, Resume] The match stops and resumes when a judge announces so.

Article 8 [End] The match ends when the chief judge announces so. The two teams retrieve the robots from the ring area.

Section 6: Time of Match

Article 9 One Match will be fought for a total of 2 minutes, starting and ending upon the judge's command. The clock shall start ticking five seconds after the start is announced

Article 10 An extended match, if called for by the judge, shall last for a maximum of 1 minute.

Section 7: Point System

Article 11 One point shall be given when:

1. A team legally forces the body of the opposing robot to touch the space outside the ring, which includes the side of the ring its self.
2. One point is also given in the following cases:
   A. The opposing robot has touched the space outside the ring on its own.
   A. Either of the above takes place at the same time that the end of the Match is announced.
3. When a wheeled robot has fallen over on the ring or in similar conditions, point will not be counted and the match continues.
4. When judges' decision is called for to decide the winner, the following points will be taken into considerations:
   a. Technical merits in movement and operation of a robot
   b. Penalty points during the match
   c. Attitude of the players during the match
5. The match shall be stopped and a rematch started under the following conditions:
   a. The robots are entangled or orbiting each other with no perceivable progress for five seconds. If it is unclear whether progress is being made or not, the judge can extend the time limit for observable progress for up to 30 seconds.
   b. Both robots move, without making progress, or stop (at the exact same time) and stay stopped for five seconds without touching each other. However, if one robot stops it's movement first, after five seconds it will be declared as not having the will to fight. In this case the opponent shall receive a point, even if the opponent also stops. If both robots are moving and it isn't clear if progress is being made or not, the judge can extend the time limit up to 30 seconds.
   c. If both robots touch the outside of the ring at about the same time, and it cannot be determined which touched first, a rematch is called.

Section 8: Violations

Article 12 [Violations] Players performing any of the deeds described in Articles 6, 16, or 17, shall be declared in violation of these rules.

Article 13 [Insults] A player who utters insulting words to the opponent or to the judges or puts voice devices in a robot to utter insulting words or writes insulting words on the body of a robot, or performs any insulting action, is in violation of these rules.

Article 14 [Minor Violations] A minor violation is declared if a player:

1. Enters into the ring during the match, except when the player does so to take the robot out of the ring upon the judge's announcement of point or stopping the match. To enter into the ring means:
   a. A part of the player's body is in the ring, or
   b. A player puts any mechanical kits into the ring to support his/her body.

2. Performs the following deeds:
   a. Demand to stop the match without appropriate reasons.
   b. Take more than 30 seconds before resuming the match, unless the judge announces a time extension.
   c. Start operating the robot within five seconds after the chief judge announces the start of the match.
   d. Does or says that which disgraces the fairness of the match.

Section 9: Penalties

Article 15 [Penalties] Players who violate these rules by performing the deeds described in Articles 6 and 16 shall lose the match. The judge shall give two points to the opponent and order the violator to clear out. The violator is not honored with any rights.

Article 16 Each occasion of the violations described in Article 17 shall be accumulated. Two of these violations shall give one point to the opponent.

Article 17 The violations described in Article 17 shall be accumulated throughout one match.

Section 10: Injuries and Accidents during the Match
Article 18 [Request to Stop the Match] A player can request to stop the game when he/she is injured or his/her robot had an accident and the game cannot continue.

Article 18 [Unable to Continue the Match] When the game cannot continue due to player's injury or robot's accident, the player who is the cause of such injury or accident loses the match. When it is not clear which team is the cause, the player who cannot continue the game, or who requests to stop the game, shall be declared as the loser.

Article 19 [Time Required to Handle Injury/Accident] Whether the game should continue in case of injury or accident shall be decided by the judges and the Committee members. The decision process shall take no longer than five minutes.

Section 11: Declaring Objections
Article 20 [Declaring Objections] No objections shall be declared against the judges' decisions.

Article 21 The lead person of a team can present objections to the Committee, before the match is over, if there are any doubts in the exercising of these rules. If there are no Committee members present, the objection can be presented to the judge before the match is over.

Section 12: Requirements for Identifications for Robots
Article 22 [Identifications for Robots] Some type of name or number, to identify the robot (as registered in the contest) must be easily readable on the robot's body, while the robot is in competition.

Section 13: Miscellaneous

Article 23 [Flexibility of Rules] As long as the concept and fundamentals of the rules are observed, these rules shall be flexible enough to encompass the changes in the number of players and of the contents of matches.

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III. Industry Robotic Solution Challenge

The "Industry Robotic Solutions Challenge" refers to competitions aimed at developing and showcasing robotic solutions to address real-world problems within industrial sectors. These challenges are crucial for driving innovation, bridging the gap between research and practical application, and fostering collaboration between academia, industry, and startups.

The primary goal is to find innovative robotic solutions for specific industrial pain points, such as automation of complex or hazardous tasks, improving efficiency and productivity, enhancing quality and precision, addressing labor shortages, improving worker safety, enabling flexible manufacturing, and logistics and material handling.

A. *Submission Guidelines:*

Theme: Solve it with Robots

Challenges: The primary goal is to find innovative robotic solutions for specific agriculture or food industries' pain points, such as automation of complex or hazardous tasks, improving efficiency and productivity, enhancing quality and precision, addressing labor shortages, improving worker safety, enabling flexible manufacturing, and logistics and material handling

Eligibility: Open to Junior or Senior High School students currently enrolled with a keen interest in industrial applications. All team members must have a passion for coding, robotics, and technology.

Team Composition:

- Teams consist of 2 to 3 members, excluding the coach.
- Substitute participants are allowed at least two (2) days before the conduct of the Industry Robotics Solution Boot Camp with prior notification.
- A designated coach must guide and support the team.
- Coaches can be faculty members, instructors, or experts in relevant fields.

Team Diversity:

- Teams are encouraged to promote diversity in skills, backgrounds, and perspectives.

Coach's Role and Responsibilities:

- Provide technical guidance and support collaboration.
- Ensure adherence to competition rules and guidelines.
- Facilitate team coordination and task allocation.

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Competition Format: Participating teams will demonstrate their skills, creativity, problem-solving skills, and technical prowess by developing IoT-based projects that solve specific gaps in agriculture or food industries.

B. Qualifying Round: Submission of Concept Paper

1. A call for submission of an Industry Robotics Solution concept paper based on identified gaps in agriculture and in food industries will be posted on ***July 8, 2025.*** *(Annex A: Agriculture and Food Industry Gaps)*
2. Interested teams must register and submit their Industry Robotics Solution concept paper at https://tinyurl.com/robotbootcamp
3. The guidelines for the Concept Paper are given in *Annex B. Industry Robotics Solutions Concept Paper Format.*
4. Submission Rules: Adhere to specified format and instructions. Non-compliance may result in disqualification.
5. Submission of entries will be from ***July 8 to July 22, 2025***
6. Submitted concept papers will be judged based on a set of criteria shown on the table below. T*able A. Best Industry Robotics Solution Concept Paper Criteria for Judging*
7. Top ten (10) entries will be chosen which will participate in the Industry Robotics Solution Boot Camp to be held on ***July 31, 2025 to August 1, 2025.*** They will receive an email from the organizing team announcing the results of the selection.
8. Guidelines about the Boot Camp will also be provided.

Table A. Best Industry Robotics Solution Concept Paper Criteria for Judging

Criteria	Percentage
1. Problem Understanding and Significance	25%
1.1 Clarity of Problem Identification (0 to 5 points) *How clearly and specifically is the agricultural or food industry gap/problem articulated? Is it well-defined and easy to understand?*	
1.2 Magnitude & Relevance of the Problem (0-5 points) *Is the identified problem significant enough to warrant a robotic solution? Does the paper provide compelling evidence (data, statistics, industry trends) to demonstrate its importance and impact on the sector (e.g., economic loss, food waste, labor shortage, safety hazard)?*	
1.3 Justification for Robotic Solution (0-5 points) *Does the paper convincingly explain why a robotic solution is the most appropriate or superior approach compared to existing methods or other non-robotic alternatives? Are the limitations of current solutions well-addressed?*	
2. Robotic Solution Concept	30%
2.1 Clarity and Cohesion of Solution (0-5 points): *Is the proposed robotic solution clearly described? Are its main components, functionalities, and the step-by-step operational sequence easy to follow and logically structured?*	
2.2 Innovation & Novelty (0-5 points): *Does the robotic concept present genuinely innovative ideas or a novel application of existing technology to solve the problem? Does it differentiate itself from (or significantly improve upon) current or known robotic attempts in the sector?*	

2.3 Appropriateness of Robotic Approach (0-5 points): *Can the chosen type of robot and its proposed mechanisms/technologies be suitable for the specific tasks and environment within agriculture or food industry (e.g., handling delicate produce, operating in harsh conditions, maintaining hygiene standards)?*	
2.4 Preliminary Technical Feasibility (0-5 points): *Does the paper briefly address the technical viability of the proposed solution? Does it acknowledge potential technical challenges and offer high-level ideas for overcoming them, without getting into excessive detail?*	
3. Anticipated Impact & Benefits	25%
3.1 Quantifiable Benefits (0-5 points): *Does the paper clearly articulate specific, measurable benefits of the solution (e.g., % increase in yield, % reduction in waste, % decrease in labor costs, improved processing speed, energy savings)?*	
3.2 Qualitative Benefits (0-5 points): *Does the paper identify other significant benefits such as improved food safety/traceability, enhanced worker safety, reduced environmental footprint, better product quality, or increased market competitiveness?*	
3.3 Alignment with Industry Needs & Trends (0-5 points): *How well does the proposed solution align with broader industry goals, market demands, or sustainability initiatives within the agricultural or food sector?*	
4. Feasibility & Team Capability	10%
4.1 Operational Feasibility (0-5 points): *Does the paper briefly consider the practical aspects of implementing the solution within an agricultural or food industry setting (e.g., space requirements, integration with existing infrastructure, power supply)?*	
4.2 Team or Proposer's Capability (0-5 points): *Does the paper demonstrate that the proposer(s) have the foundational knowledge or relevant expertise (e.g., robotics, agriculture, food science, engineering) to develop this concept further?*	
5. Overall Presentation & Communication	10%
5.1 Clarity of Writing & Language (0-5 points): *Is the paper well-written, free of jargon (or clearly explains it), and easy to understand for a diverse audience (technical and non-technical)? Is the language precise and professional?*	
5.2 Structure, Cohesion & Conciseness (0-5 points): Is the paper well-organized with a logical flow? Is it concise, adhering to the typical length recommendations for a concept paper?	
TOTAL	**100%**

B. Industry Robotics Solution (IRS) Challenge Boot Camp

Event Overview

The IoT Skills Competition aims to foster creativity, problem-solving skills, and technical prowess among the young minds poised to shape the future. Participants will demonstrate their technical skills, creativity, and problem-solving abilities by developing IoT-based projects and developing a prototype that solve specific gaps in agriculture or food industries.

Project Development:

- Projects should focus on using IoT technology to address specific challenges of an agriculture or a food industry.
- Utilize provided IoT Kits and Snacksbox for project development.
- Emphasize innovation, feasibility, and potential impact.

Participant Requirement:

1. Laptops with Arduino IDE
2. Knowledge in Arduino Programming
3. Tools:
   a. Scissors/Cutters
   b. Glue/Paste
   c. Colored Papers
   d. Duct tape or masking tape

Presentation:

- Each team presents their project within a 10-minute time frame.
- Includes a demonstration of the IoT prototype and explanation of its relevance to the selected challenge.

Evaluation Criteria:

- Innovation, technical feasibility, and potential impact on agriculture and/or food industries.
- Alignment with the theme, quality of documentation, and presentation skills.
- Judges' scores will be based on the criteria presented below. ***Table B. Presentation Scoring Rubrics.***

Intellectual Property:

- No intellectual property rights granted for projects.
- Participants grant organizers rights to share project information for promotional purposes.

Table B. Presentation Scoring Rubrics

Criteria	1-5 Points	6-10 points	11-15 Points	16-20 Points	SCORE

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INNOVATION	Limited to no innovative ideas; project lacks creativity	Some innovative elements, but lacks uniqueness and originality.	Some innovative elements, but lacks uniqueness and originality.	Highly innovative solution with original concepts and novel ideas.	
TECHNICAL FEASIBILITY	Inadequate understanding of IoT concepts; technical implementation is flawed.	Basic understanding of IoT principles; technical implementation needs improvement.	Sound technical implementation; demonstrates understanding of IoT components	Highly effective technical implementation; all IoT components work seamlessly.	
POTENTIAL IMPACT ON AGRICULTURE AND/OR FOOD INDUSTRIES	Limited consideration for industries; impact is negligible.	Some consideration for industries; impact is minimal.	Project shows potential to positively affect industries	Clear and substantial potential for significant positive impact on industries	
ALIGNMENT WITH THEME: *SOLVE IT WITH ROBOTS*	No clear alignment with the theme	Vague alignment with the theme	Clearly aligned with the theme; demonstrates understanding of their importance	Strong alignment with the theme; project effectively addresses relevant industry gaps.	
QUALITY OF DOCUMENTATION	Documentation is incomplete, disorganized, and lacks essential details	Documentation is partially complete; lacks clarity and structure.	Documentation is organized and includes most necessary details.	Comprehensive and wellstructured documentation with clear explanations.	
PRESENTATION SKILLS	Poor presentation; unclear communication; lacks confidence	Below-average presentation; some aspects of the project are unclear	Good presentation with clear communication; engages the audience	Excellent presentation; confident, engaging, and effectively conveys project details.	

Grounds for Disqualification:

- Misconduct, unethical behavior, or violation of academic integrity.
- Submissions containing offensive or inappropriate content.

IRS Challenge Boot Camp Proposed Program

	Activity	
Day 1		
8:00AM	Registration	
9:00AM	Preliminaries - National Anthem	

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	- Prayer - Welcome remarks	**Ms. Emelita P. Bagsit** *Regional Director*
9:15AM	Orientation and Familiarization with IoT Kits and Snacksbox for project development	**Mr. Jasper Meynard P. Araña** ACUBE Technologies, Inc.
12:00PM	Lunch	
1:00 PM to 5:00PM	Prototyping and Creating Presentation	
Day 2		
8:00AM to 12:00PM	*Continuation*: Prototyping and Creating Presentation	
12:00 PM	Lunch	
1:00 PM	Criteria for Judging Introduction of Judges	*Emcee*
1:15 PM	Team Presentation *(10 minutes each plus 5 minutes for Question and Answer)*	
3:45 PM to 4:30PM	Judges Deliberation	
4:30 PM	• Awarding of Certificates of Participation • Awarding of Certificates of Appreciation • Awarding of **Top 3** (in no particular order)	*Emcee*

Announcement of Winners

The Top 3 Winners of the Industry Robotics Solutions Challenge will be announced at the end of the Booth Camp. However, their **Championship Spot** will be announced ***during the RSTW Awarding Ceremony on August 16, 2025 at the Ynares Event Center, Antipolo City, Rizal***.

Prizes

Industry Robotics Solutions Challenge	
First Prize	Php 20,000 + Plaque of Recognition
Second Prize	Php 15,000 + Plaque of Recognition
Third Prize	Php 10,000 + Plaque of Recognition
Participating Entries	Certificate of Participation

Note: Cash prizes will be subject to 20% tax based on the Final Withholding Tax Guidelines.

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ANNEX A. AGRICULTURE AND FOOD INDUSTRIES GAPS NEEDING INDUSTRY ROBOTICS SOLUTION

The agriculture and food industries in the Philippines face numerous challenges that robotic solutions can address. These gaps often stem from the nature of the work itself, economic pressures, and evolving consumer demands.

These are some common gaps where robotics can provide significant solutions:

In Agriculture:

1.) *Labor Shortages and High Labor Costs:*

Gap: Many agricultural tasks (planting, weeding, harvesting, spraying) are highly labor-intensive, often seasonal, and involve difficult or undesirable working conditions. This leads to labor shortages, rising wages, and reliance on transient workers.

At its core, agriculture, despite technological advancements, remains heavily reliant on manual labor for numerous essential tasks. Planting, weeding, harvesting, and spraying often require repetitive motions, long hours, and significant physical exertion. These tasks are frequently performed outdoors, exposing workers to harsh weather conditions—intense heat, cold, rain, or humidity. Furthermore, some tasks can involve exposure to pesticides or other chemicals, raising health and safety concerns. This combination of labor-intensive and undesirable working conditions makes agricultural jobs less attractive compared to other employment opportunities, particularly in economies with growing service or industrial sectors.

The inherent seasonality of crop cycles means that the demand for labor fluctuates dramatically throughout the year. There are peak seasons requiring a large influx of workers for a short period, followed by times of significantly reduced need. This seasonality creates a challenge for both employers and employees. Farmers struggle to secure a consistent workforce, often relying on transient workers who may migrate between regions or even countries to follow harvest cycles.

2.) *Precision and Efficiency in Resource Management:*

Gap: Traditional farming often involves uniform application of water, fertilizers, and pesticides, leading to waste, environmental impact, and suboptimal crop yields.

Traditional irrigation methods, such as flood irrigation or broad-coverage sprinklers, often apply a fixed amount of water across the entire field. This fails to account for areas with different soil water retention capacities (e.g., sandy vs. clayey soils), areas that naturally receive more rainfall, or areas where crops have varying water needs due to growth stage or plant density. The result is significant water wastage through runoff, deep percolation/leaching, and evaporation,

Applying the same amount of fertilizer everywhere overlooks the fact that nutrient levels can vary greatly across a field. Some areas might be naturally richer in certain nutrients, while others are deficient. Uniform application leads to over-fertilization or under-fertilization, leaching and/or runoff.

Broadcast application of pesticides assumes a uniform distribution of pests or weeds across the field. This is rarely the case. Pesticides are applied to areas where pests are absent or in low numbers, leading to waste of expensive chemicals. Broad application increases the likelihood of harming beneficial insects (like pollinators or natural pest predators), soil microorganisms, and other non-target organisms in the ecosystem. Overuse of pesticides can accelerate the development of pest resistance, making the chemicals less effective over time and necessitating stronger, more toxic alternatives.

The waste generated by uniform application has severe environmental consequences such as water pollution (eutrophication), groundwater contamination, soil degradation, biodiversity loss, greenhouse gas emissions.

Despite the intention to maximize yields, uniform application often results in suboptimal outcomes such as nutrient deficiencies/toxicities, water stress, uneven growth and maturity: increased vulnerability.

3.) *Environmental Challenges and Climate Change Adaptation:*

Gap: Extreme weather, heat, and water scarcity impact crop health and yield.

"Extreme weather" encompasses a wide range of events that deviate significantly from typical weather patterns, often with devastating consequences for crops. Rising global temperatures mean that heat stress is becoming a more prevalent and damaging factor for agriculture. Plants have optimal temperature ranges for growth and development, and exceeding these can have a cascade of negative effects such as physiological disruption, reduced water uptake and wilting. Drought, characterized by prolonged periods of insufficient precipitation, is arguably the most widespread and devastating impact on crop health and yield.

It's crucial to understand that these factors often don't occur in isolation. Extreme heat frequently accompanies drought, creating a "compound event" that amplifies the negative impacts. For example, a heatwave during a drought will exacerbate water stress and accelerate crop failure.

4.) *Data Collection and Analysis for Decision Making:*

Gap: Farmers often lack real-time, granular data about their fields, making it difficult to make informed decisions for optimal yield and resource use.

This gap identifies a critical deficiency in traditional farming practices: the absence of real-time, granular data about field conditions. Farmers often rely on generalized knowledge, historical trends, visual inspections, and intuition to make crucial decisions about their crops. While valuable, this traditional approach increasingly falls short in optimizing yields and resource utilization in modern agriculture.

5.) *Quality and Consistency:*

Gap: Manual harvesting and sorting can lead to inconsistencies in product quality and increased damage.

While manual labor offers flexibility and a nuanced touch for certain delicate crops, its scalability and consistency are increasingly challenged. Manual harvesting and sorting results in inconsistencies in product quality such as subjectivity in maturity/ripeness assessment, variability in size and appearance, visual fatigue, subjective standards, hidden defects and pest and disease detection.

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Increased damage in farm produce are due to physical handling. Human hands, even skilled ones, can exert inconsistent pressure leading to bruising, scratches and abrasions, crushing or tearing, inefficient picking techniques, packing inefficiencies, fatigue and rushing, and other environmental factors.

In the Food Industry (Processing and Manufacturing):

1.) Labor Shortages and High Turnover in Repetitive/Hazardous Tasks:

Gap: Many tasks in food processing (cutting, sorting, packaging, heavy lifting, working in cold/wet environments) are repetitive, ergonomically challenging, or even dangerous, leading to high employee turnover and difficulty finding staff.

This gap precisely identifies the fundamental challenges associated with many roles within the food processing industry, stemming from the nature of the tasks themselves and the environments in which they are performed. These challenges collectively contribute to significant human resource issues, notably high employee turnover and difficulty in recruiting and retaining staff.

Many food processing jobs involve highly repetitive motions performed for hours on end, such as cutting, trimming, deboning, sorting, or placing items on a conveyor belt leading to profound mental fatigue and boredom. The lack of varied stimulation or problem-solving opportunities can decrease job satisfaction and employee engagement over time, making workers feel like cogs in a machine.

The repetitive nature of tasks, combined with awkward postures, forceful exertions, and vibration, makes workers highly susceptible to a range of MSDs. These include carpal tunnel syndrome, tendonitis, back injuries, shoulder pain, and knee problems. Injured workers are less productive, require time off for medical appointments or recovery, and may eventually be unable to perform their duties, contributing to absenteeism and a reduced workforce.

2.) Food Safety and Hygiene:

Gap: Manual handling increases the risk of cross-contamination and foodborne illnesses. Maintaining strict hygiene is paramount and labor-intensive.

This gap identifies a critical vulnerability in food processing, particularly where manual handling is extensive: the heightened and inherent risk of cross-contamination and subsequent foodborne illnesses. It also underscores the immense, labor-intensive, and paramount efforts required to mitigate these risks. This challenge is especially pertinent in operations where automation is less prevalent and human hands are deeply involved in every step of food preparation.

While manual labor offers flexibility and cultural familiarity, it inherently introduces a greater risk of contamination. Bridging this gap requires not only stringent adherence to hygiene protocols, which are intrinsically labor-intensive and costly, but also a continuous exploration of automation and process re-engineering to reduce human contact with food, thereby creating safer, more consistent, and ultimately more sustainable food production systems.

3.) Consistency and Quality Control:

Gap: Human error in repetitive tasks can lead to inconsistencies in product quality, weight, or appearance.

This highlights a fundamental trade-off. While manual labor provides flexibility and employment, its inherent susceptibility to error in repetitive tasks creates significant challenges in achieving the precision, consistency, and scalability demanded by modern markets.

Repetitive tasks are characterized by performing the same action or series of actions over and over again. This could be cutting, sorting, packing, assembling, or weighing. Many repetitive tasks require little critical thinking or decision-making beyond the initial learning phase. Even the most diligent and skilled workers are prone to error in repetitive tasks due to fatigue, mental monotony, distraction, subjectivity and judgement calls, relying solely on visual cues, pressure to meet quotas, and environmental stress.

Inconsistent products often fetch lower prices, are rejected by discerning buyers (e.g., supermarkets, international markets with strict standards), or are relegated to discount channels. Imperfect products may need to be discarded, reprocessed, or downgraded, leading to material waste and additional labor costs. Consumers expect consistency, especially from branded products. Inconsistencies lead to disappointment, complaints, and a loss of repeat business. A brand known for inconsistent quality will struggle to compete in competitive markets.

4.) Operational Efficiency and Throughput:

Gap: Bottlenecks in production lines, slow manual processes, and inefficiencies can limit overall output and responsiveness to demand.

Bottlenecks act like a narrow part in a pipe, restricting the flow of work. Even if other parts of the production line are fast, the slowest point dictates the overall speed. This leads to lower production volume than the theoretical maximum capacity.

When processes are slow or get stuck, the time it takes for a product to move from raw materials to a finished good significantly increases. This translates to longer delivery times for customers, potentially leading to dissatisfaction, lost sales, and a damaged reputation. Products pile up at bottleneck points, tying up capital and requiring storage space. Errors from manual processes or rushed work due to bottlenecks can lead to defective products, requiring costly rework or disposal.

5.) Traceability and Inventory Management:

Gap: Manual tracking of ingredients and products can be prone to error, impacting traceability and inventory accuracy.

Manual counts and entries are highly susceptible to human error (typos, miscounts, skipped items). This leads to a disconnect between what's physically on hand and what the records show. Manual tracking results in inefficient space utilization, inaccurate financial reporting, compromised traceability, difficulty in product recall, and lack of quality control insight..

Manual tracking requires significant human effort for counting, writing down, entering data, and reconciling discrepancies. This is time-consuming and expensive. Information flow is slow. Manual data entry is inherently error-prone. Correcting these errors (investigating discrepancies, recounting, re-entering data) consumes valuable time and resources. Without precise tracking, ingredients might expire on shelves or be used inefficiently. Employees spend valuable time searching for misplaced items or manually verifying inventory, rather than on value-added tasks.

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ANNEX B. INDUSTRY ROBOTIC SOLUTION CONCEPT PAPER FORMAT

TOPIC: ***Robotic Solution for Agricultural/Food Industry Gap***

A concept paper for a robotic solution addressing gaps in the agricultural or food industry needs to be clear, concise, and compelling.

1. Title Page- *Clear and Concise Title: E.g., "Autonomous Disinfection Robot for Food Processing Facilities."*
Your Name/Team Name & Affiliation/School *(Location-specific)*:
Date:

2. Executive Summary (Max of 100 words)

Hook: Start with a bold statement about the core problem you're addressing.
Solution Overview: Briefly introduce your robotic solution and its core functionality.
Key Benefits: Highlight the most significant advantages and impact

Example: "The escalating labor costs and inherent inefficiencies in manual strawberry harvesting are severely impacting farm profitability. This concept paper outlines an autonomous robotic system designed to precisely identify and pick ripe strawberries, aiming to increase harvest yield by 30% and reduce labor dependency by 50%, thereby enhancing food security and farmer resilience."

3. Introduction / Problem Statement (Max of 100 words)

Industry Context: Briefly describe the current state of the agricultural or food industry sector you are focusing on.
The "Gap" / Problem Identification:
Clearly articulate the specific, pressing problem or inefficiency your robotic solution aims to address. You may provide quantifiable data or compelling qualitative evidence to support the existence and severity of the problem (e.g., "manual harvesting leads to 20% post-harvest loss," "foodborne illness outbreaks cost the industry billions annually," "lack of skilled labor in meat packing plants").
Explain the causes of this problem (e.g., repetitive tasks, hazardous environments, labor shortages, lack of precision, high cost of current methods).
Discuss the consequences of not addressing this gap (e.g., reduced profitability, food waste, safety risks, supply chain instability).
Why a Robotic Solution? Briefly justify why robotics is the most suitable approach to solve this problem, highlighting the limitations of current non-robotic solutions or existing inadequate robotic attempts.

4. Proposed Robotic Solution (Max of 200 words)

Concept Overview: Provide a detailed description of your proposed robotic system.
What type of robot is it (e.g., mobile manipulator, stationary arm, drone-based system)?
What are its main components (e.g., robotic arm, end-effector/gripper, vision system, sensors, mobile platform)?
How does it work step-by-step to address the identified problem? (Describe the operational sequence).
Key Technologies/Innovations:

What specific technologies will be utilized (e.g., AI/Machine Learning for object recognition, advanced manipulators, force sensors, custom gripper designs, autonomous navigation, cloud connectivity)? Highlight what makes your solution novel or superior to existing approaches (even if they are manual or semi-automated).

Functional Specifications: What will the robot be able to do? (e.g., pick 10 fruits per minute, sort by 3 ripeness levels, navigate uneven terrain, operate for 12 hours on a single charge).

Scalability & Adaptability: Briefly touch upon how the solution could be scaled for larger operations or adapted for similar problems in the industry.

5. Anticipated Benefits and Impact (Maximum of 75 words)

Direct Benefits (Quantifiable):
Economic: e.g Cost savings
Operational:e.g Increased efficiency/speed
Safety: e.g.Reduced human exposure to hazardous tasks/environments,
Environmental: e.g. Reduced waste

Indirect Benefits (Qualitative):
e.g. Improved product quality and shelf life.
Enhanced traceability and food safety.

Alignment with Industry Trends/Goals: How does your solution support broader industry objectives (e.g., Industry 4.0, sustainable agriculture, food security)?

6. Feasibility & Capabilities (Maximum of 50 words)

Technical Feasibility: Briefly address why your proposed solution is technically achievable with current or near-future technologies. Mention any potential technical challenges and how you envision overcoming them.

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TOURNAMENT GUIDELINES

III. Industry Robotic Solution Challenge

The "Industry Robotic Solutions Challenge" refers to competitions aimed at developing and showcasing robotic solutions to address real-world problems within industrial sectors. These challenges are crucial for driving innovation, bridging the gap between research and practical application, and fostering collaboration between academia, industry, and startups.

The primary goal is to find innovative robotic solutions for specific industrial pain points, such as automation of complex or hazardous tasks, improving efficiency and productivity, enhancing quality and precision, addressing labor shortages, improving worker safety, enabling flexible manufacturing, and logistics and material handling.

A. *Submission Guidelines:*

Theme: Solve it with Robots

Challenges: The primary goal is to find innovative robotic solutions for specific agriculture or food industries' pain points, such as automation of complex or hazardous tasks, improving efficiency and productivity, enhancing quality and precision, addressing labor shortages, improving worker safety, enabling flexible manufacturing, and logistics and material handling

Eligibility: Open to Junior or Senior High School students currently enrolled with a keen interest in industrial applications. All team members must have a passion for coding, robotics, and technology.

Team Composition:

- Teams consist of 2 to 3 members, excluding the coach.
- Substitute participants are allowed at least two (2) days before the conduct of the Industry Robotics Solution Challenge Boot Camp with prior notification.
- A designated coach must guide and support the team.
- Coaches can be faculty members, instructors, or experts in relevant fields.

Team Diversity:

- Teams are encouraged to promote diversity in skills, backgrounds, and perspectives.

Coach's Role and Responsibilities:

- Provide technical guidance and support collaboration.
- Ensure adherence to competition rules and guidelines.
- Facilitate team coordination and task allocation.

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Competition Format: Participating teams will demonstrate their skills, creativity, problem-solving skills, and technical prowess by developing IoT-based projects that solve specific gaps in agriculture or food industries.

B. Qualifying Round: Submission of Concept Paper

1. A call for submission of an Industry Robotics Solution concept paper based on identified gaps in agriculture and in food industries will be posted on ***July 8, 2025.*** *(Annex A: Agriculture and Food Industry Gaps)*
2. Interested teams must register and submit their Industry Robotics Solution concept paper at https://tinyurl.com/robotbootcamp
3. The guidelines for the Concept Paper are given in *Annex B. Industry Robotics Solutions Concept Paper Format.*
4. Submission Rules: Adhere to specified format and instructions. Non-compliance may result in disqualification.
5. Submission of entries will be from ***July 8 to July 22, 2025***
6. Submitted concept papers will be judged based on a set of criteria shown on the table below. T*able A. Best Industry Robotics Solution Concept Paper Criteria for Judging*
7. Top ten (10) entries will be chosen which will participate in the Industry Robotics Solution Boot Camp to be held on ***July 31, 2025 to August 1, 2025.*** They will receive an email from the organizing team announcing the results of the selection.
8. Guidelines about the Boot Camp will also be provided.

Table A. Best Industry Robotics Solution Concept Paper Criteria for Judging

Criteria	**Percentage**
1. Problem Understanding and Significance	25%
1.1 Clarity of Problem Identification (0 to 5 points) *How clearly and specifically is the agricultural or food industry gap/problem articulated? Is it well-defined and easy to understand?*	
1.2 Magnitude & Relevance of the Problem (0-5 points) *Is the identified problem significant enough to warrant a robotic solution? Does the paper provide compelling evidence (data, statistics, industry trends) to demonstrate its importance and impact on the sector (e.g., economic loss, food waste, labor shortage, safety hazard)?*	
1.3 Justification for Robotic Solution (0-5 points) *Does the paper convincingly explain why a robotic solution is the most appropriate or superior approach compared to existing methods or other non-robotic alternatives? Are the limitations of current solutions well-addressed?*	
2. Robotic Solution Concept	30%
2.1 Clarity and Cohesion of Solution (0-5 points): *Is the proposed robotic solution clearly described? Are its main components, functionalities, and the step-by-step operational sequence easy to follow and logically structured?*	
2.2 Innovation & Novelty (0-5 points): *Does the robotic concept present genuinely innovative ideas or a novel application of existing technology to solve the problem? Does it differentiate itself from (or significantly improve upon) current or known robotic attempts in the sector?*	
2.3 Appropriateness of Robotic Approach (0-5 points):	

Can the chosen type of robot and its proposed mechanisms/technologies be suitable for the specific tasks and environment within agriculture or food industry (e.g., handling delicate produce, operating in harsh conditions, maintaining hygiene standards)?	
2.4 Preliminary Technical Feasibility (0-5 points): *Does the paper briefly address the technical viability of the proposed solution? Does it acknowledge potential technical challenges and offer high-level ideas for overcoming them, without getting into excessive detail?*	
3. Anticipated Impact & Benefits	25%
3.1 Quantifiable Benefits (0-5 points): *Does the paper clearly articulate specific, measurable benefits of the solution (e.g., % increase in yield, % reduction in waste, % decrease in labor costs, improved processing speed, energy savings)?*	
3.2 Qualitative Benefits (0-5 points): *Does the paper identify other significant benefits such as improved food safety/traceability, enhanced worker safety, reduced environmental footprint, better product quality, or increased market competitiveness?*	
3.3 Alignment with Industry Needs & Trends (0-5 points): *How well does the proposed solution align with broader industry goals, market demands, or sustainability initiatives within the agricultural or food sector?*	
4. Feasibility & Team Capability	10%
4.1 Operational Feasibility (0-5 points): *Does the paper briefly consider the practical aspects of implementing the solution within an agricultural or food industry setting (e.g., space requirements, integration with existing infrastructure, power supply)?*	
4.2 Team or Proposer's Capability (0-5 points): *Does the paper demonstrate that the proposer(s) have the foundational knowledge or relevant expertise (e.g., robotics, agriculture, food science, engineering) to develop this concept further?*	
5. Overall Presentation & Communication	10%
5.1 Clarity of Writing & Language (0-5 points): *Is the paper well-written, free of jargon (or clearly explains it), and easy to understand for a diverse audience (technical and non-technical)? Is the language precise and professional?*	
5.2 Structure, Cohesion & Conciseness (0-5 points): Is the paper well-organized with a logical flow? Is it concise, adhering to the typical length recommendations for a concept paper?	
TOTAL	**100%**

B. Industry Robotics Solution (IRS) Challenge Boot Camp

Event Overview

The IoT Skills Competition aims to foster creativity, problem-solving skills, and technical prowess among the young minds poised to shape the future. Participants will demonstrate their technical skills, creativity, and problem-solving abilities by developing IoT-based projects and developing a prototype that solve specific gaps in agriculture or food industries.

Project Development:

- Projects should focus on using IoT technology to address specific challenges of an agriculture or a food industry.
- Utilize provided IoT Kits and Snacksbox for project development.
- Emphasize innovation, feasibility, and potential impact.

Participant Requirement:

1. Laptops with Arduino IDE
2. Knowledge in Arduino Programming
3. Tools:
    a. Scissors/Cutters
    b. Glue/Paste
    c. Colored Papers
    d. Duct tape or masking tape

Presentation:

- Each team presents their project within a 10-minute time frame.
- Includes a demonstration of the IoT prototype and explanation of its relevance to the selected challenge.

Evaluation Criteria:

- Innovation, technical feasibility, and potential impact on agriculture and/or food industries.
- Alignment with the theme, quality of documentation, and presentation skills.
- Judges' scores will be based on the criteria presented below. ***Table B. Presentation Scoring Rubrics.***

Intellectual Property:

- No intellectual property rights granted for projects.
- Participants grant organizers rights to share project information for promotional purposes.

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Table B. Presentation Scoring Rubrics

Criteria	1-5 Points	6-10 points	11-15 Points	16-20 Points	SCORE
INNOVATION	Limited to no innovative ideas; project lacks creativity	Some innovative elements, but lacks uniqueness and originality.	Some innovative elements, but lacks uniqueness and originality.	Highly innovative solution with original concepts and novel ideas.	
TECHNICAL FEASIBILITY	Inadequate understanding of IoT concepts; technical implementation is flawed.	Basic understanding of IoT principles; technical implementation needs improvement.	Sound technical implementation; demonstrates understanding of IoT components	Highly effective technical implementation; all IoT components work seamlessly.	
POTENTIAL IMPACT ON AGRICULTURE AND/OR FOOD INDUSTRIES	Limited consideration for industries; impact is negligible.	Some consideration for industries; impact is minimal.	Project shows potential to positively affect industries	Clear and substantial potential for significant positive impact on industries	
ALIGNMENT WITH THEME: *SOLVE IT WITH ROBOTS*	No clear alignment with the theme	Vague alignment with the theme	Clearly aligned with the theme; demonstrates understanding of their importance	Strong alignment with the theme; project effectively addresses relevant industry gaps.	
QUALITY OF DOCUMENTATION	Documentation is incomplete, disorganized, and lacks essential details	Documentation is partially complete; lacks clarity and structure.	Documentation is organized and includes most necessary details.	Comprehensive and wellstructured documentation with clear explanations.	
PRESENTATION SKILLS	Poor presentation; unclear communication; lacks confidence	Below-average presentation; some aspects of the project are unclear	Good presentation with clear communication; engages the audience	Excellent presentation; confident, engaging, and effectively conveys project details.	

Grounds for Disqualification:

- Misconduct, unethical behavior, or violation of academic integrity.
- Submissions containing offensive or inappropriate content.

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Proposed Program

	Activity	
Day 1		
8:00AM	Registration	
9:00AM	Preliminaries - National Anthem - Prayer - Welcome remarks	**Ms. Emelita P. Bagsit** *Regional Director*
9:15AM	Orientation and Familiarization with IoT Kits and Snacksbox for project development	**Mr. Jasper Meynard P. Araña** ACUBE Technologies, Inc.
12:00PM	Lunch	
1:00 PM to 5:00PM	Prototyping and Creating Presentation	
Day 2		
8:00AM to 12:00PM	*Continuation*: Prototyping and Creating Presentation	
12:00 PM	Lunch	
1:00 PM	Criteria for Judging Introduction of Judges	*Emcee*
1:15 PM	Team Presentation *(10 minutes each plus 5 minutes for Question and Answer)*	
3:45 PM to 4:30PM	Judges Deliberation	
4:30 PM	• Awarding of Certificates of Participation • Awarding of Certificates of Appreciation • Awarding of **Top 3** (in no particular order)	*Emcee*

Announcement of Winners

The Top 3 Winners of the Industry Robotics Solutions Challenge will be announced at the end of the Booth Camp. However, their Championship Spot will be announced ***during the RSTW Awarding Ceremony on August 15, 2025 at the Ynares Event Center, Antipolo City, Rizal.***

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Prizes

Industry Robotics Solutions Challenge	
First Prize	Php 20,000 + Plaque of Recognition
Second Prize	Php 15,000 + Plaque of Recognition
Third Prize	Php 10,000 + Plaque of Recognition
Participating Entries	Certificate of Participation

Note: Cash prizes will be subject to 20% tax based on the Final Withholding Tax Guidelines.

ANNEX A. AGRICULTURE AND FOOD INDUSTRIES GAPS NEEDING INDUSTRY ROBOTICS SOLUTION

The agriculture and food industries in the Philippines face numerous challenges that robotic solutions can address. These gaps often stem from the nature of the work itself, economic pressures, and evolving consumer demands.

These are some common gaps where robotics can provide significant solutions:

In Agriculture:

1.) *Labor Shortages and High Labor Costs:*

Gap: Many agricultural tasks (planting, weeding, harvesting, spraying) are highly labor-intensive, often seasonal, and involve difficult or undesirable working conditions. This leads to labor shortages, rising wages, and reliance on transient workers.

At its core, agriculture, despite technological advancements, remains heavily reliant on manual labor for numerous essential tasks. Planting, weeding, harvesting, and spraying often require repetitive motions, long hours, and significant physical exertion. These tasks are frequently performed outdoors, exposing workers to harsh weather conditions—intense heat, cold, rain, or humidity. Furthermore, some tasks can involve exposure to pesticides or other chemicals, raising health and safety concerns. This combination of labor-intensive and undesirable working conditions makes agricultural jobs less attractive compared to other employment opportunities, particularly in economies with growing service or industrial sectors.

The inherent seasonality of crop cycles means that the demand for labor fluctuates dramatically throughout the year. There are peak seasons requiring a large influx of workers for a short period, followed by times of significantly reduced need. This seasonality creates a challenge for both employers and employees. Farmers struggle to secure a consistent workforce, often relying on transient workers who may migrate between regions or even countries to follow harvest cycles.

2.) *Precision and Efficiency in Resource Management:*

Gap: Traditional farming often involves uniform application of water, fertilizers, and pesticides, leading to waste, environmental impact, and suboptimal crop yields.

Traditional irrigation methods, such as flood irrigation or broad-coverage sprinklers, often apply a fixed amount of water across the entire field. This fails to account for areas with different soil water retention capacities (e.g., sandy vs. clayey soils), areas that naturally receive more rainfall, or areas where crops have varying water needs due to growth stage or plant density. The result is significant water wastage through runoff, deep percolation/leaching, and evaporation,

Applying the same amount of fertilizer everywhere overlooks the fact that nutrient levels can vary greatly across a field. Some areas might be naturally richer in certain nutrients, while others are deficient. Uniform application leads to over-fertilization or under-fertilization, leaching and/or runoff.

Broadcast application of pesticides assumes a uniform distribution of pests or weeds across the field. This is rarely the case. Pesticides are applied to areas where pests are absent or in low numbers, leading to waste of expensive chemicals. Broad application increases the likelihood of harming beneficial insects (like pollinators or natural pest predators), soil microorganisms, and other non-target organisms in the ecosystem. Overuse of pesticides can accelerate the development of pest resistance, making the chemicals less effective over time and necessitating stronger, more toxic alternatives.

The waste generated by uniform application has severe environmental consequences such as water pollution (eutrophication), groundwater contamination, soil degradation, biodiversity loss, greenhouse gas emissions.

Despite the intention to maximize yields, uniform application often results in suboptimal outcomes such as nutrient deficiencies/toxicities, water stress, uneven growth and maturity: increased vulnerability.

3.) *Environmental Challenges and Climate Change Adaptation:*

Gap: Extreme weather, heat, and water scarcity impact crop health and yield.

"Extreme weather" encompasses a wide range of events that deviate significantly from typical weather patterns, often with devastating consequences for crops. Rising global temperatures mean that heat stress is becoming a more prevalent and damaging factor for agriculture. Plants have optimal temperature ranges for growth and development, and exceeding these can have a cascade of negative effects such as physiological disruption, reduced water uptake and wilting. Drought, characterized by prolonged periods of insufficient precipitation, is arguably the most widespread and devastating impact on crop health and yield.

It's crucial to understand that these factors often don't occur in isolation. Extreme heat frequently accompanies drought, creating a "compound event" that amplifies the negative impacts. For example, a heatwave during a drought will exacerbate water stress and accelerate crop failure.

4.) *Data Collection and Analysis for Decision Making:*

Gap: Farmers often lack real-time, granular data about their fields, making it difficult to make informed decisions for optimal yield and resource use.

This gap identifies a critical deficiency in traditional farming practices: the absence of real-time, granular data about field conditions. Farmers often rely on generalized knowledge, historical trends, visual inspections, and intuition to make crucial decisions about their crops. While valuable, this traditional approach increasingly falls short in optimizing yields and resource utilization in modern agriculture.

5.) *Quality and Consistency:*

Gap: Manual harvesting and sorting can lead to inconsistencies in product quality and increased damage.

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While manual labor offers flexibility and a nuanced touch for certain delicate crops, its scalability and consistency are increasingly challenged. Manual harvesting and sorting results in inconsistencies in product quality such as subjectivity in maturity/ripeness assessment, variability in size and appearance, visual fatigue, subjective standards, hidden defects and pest and disease detection.

Increased damage in farm produce is due to physical handling. Human hands, even skilled ones, can exert inconsistent pressure leading to bruising, scratches and abrasions, crushing or tearing, inefficient picking techniques, packing inefficiencies, fatigue and rushing, and other environmental factors.

In the Food Industry (Processing and Manufacturing):

1.) ***Labor Shortages and High Turnover in Repetitive/Hazardous Tasks:***

Gap: Many tasks in food processing (cutting, sorting, packaging, heavy lifting, working in cold/wet environments) are repetitive, ergonomically challenging, or even dangerous, leading to high employee turnover and difficulty finding staff.

This gap precisely identifies the fundamental challenges associated with many roles within the food processing industry, stemming from the nature of the tasks themselves and the environments in which they are performed. These challenges collectively contribute to significant human resource issues, notably high employee turnover and difficulty in recruiting and retaining staff.

Many food processing jobs involve highly repetitive motions performed for hours on end, such as cutting, trimming, deboning, sorting, or placing items on a conveyor belt leading to profound mental fatigue and boredom. The lack of varied stimulation or problem-solving opportunities can decrease job satisfaction and employee engagement over time, making workers feel like cogs in a machine.

The repetitive nature of tasks, combined with awkward postures, forceful exertions, and vibration, makes workers highly susceptible to a range of MSDs. These include carpal tunnel syndrome, tendonitis, back injuries, shoulder pain, and knee problems. Injured workers are less productive, require time off for medical appointments or recovery, and may eventually be unable to perform their duties, contributing to absenteeism and a reduced workforce.

2.) ***Food Safety and Hygiene:***

Gap: Manual handling increases the risk of cross-contamination and foodborne illnesses. Maintaining strict hygiene is paramount and labor-intensive.

This gap identifies a critical vulnerability in food processing, particularly where manual handling is extensive: the heightened and inherent risk of cross-contamination and subsequent foodborne illnesses. It also underscores the immense, labor-intensive, and paramount efforts required to mitigate these risks. This challenge is especially pertinent in operations where automation is less prevalent and human hands are deeply involved in every step of food preparation.

While manual labor offers flexibility and cultural familiarity, it inherently introduces a greater risk of contamination. Bridging this gap requires not only stringent adherence to hygiene protocols, which are intrinsically labor-intensive and costly, but also a continuous exploration of automation and process re-engineering to reduce human contact with food, thereby creating safer, more consistent, and ultimately more sustainable food production systems.

3.) ***Consistency and Quality Control:***

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Gap: Human error in repetitive tasks can lead to inconsistencies in product quality, weight, or appearance.

This highlights a fundamental trade-off. While manual labor provides flexibility and employment, its inherent susceptibility to error in repetitive tasks creates significant challenges in achieving the precision, consistency, and scalability demanded by modern markets.

Repetitive tasks are characterized by performing the same action or series of actions over and over again. This could be cutting, sorting, packing, assembling, or weighing. Many repetitive tasks require little critical thinking or decision-making beyond the initial learning phase. Even the most diligent and skilled workers are prone to error in repetitive tasks due to fatigue, mental monotony, distraction, subjectivity and judgement calls, relying solely on visual cues, pressure to meet quotas, and environmental stress.

Inconsistent products often fetch lower prices, are rejected by discerning buyers (e.g., supermarkets, international markets with strict standards), or are relegated to discount channels. Imperfect products may need to be discarded, reprocessed, or downgraded, leading to material waste and additional labor costs. Consumers expect consistency, especially from branded products. Inconsistencies lead to disappointment, complaints, and a loss of repeat business. A brand known for inconsistent quality will struggle to compete in competitive markets.

4.) Operational Efficiency and Throughput:

Gap: Bottlenecks in production lines, slow manual processes, and inefficiencies can limit overall output and responsiveness to demand.

Bottlenecks act like a narrow part in a pipe, restricting the flow of work. Even if other parts of the production line are fast, the slowest point dictates the overall speed. This leads to lower production volume than the theoretical maximum capacity.

When processes are slow or get stuck, the time it takes for a product to move from raw materials to a finished good significantly increases. This translates to longer delivery times for customers, potentially leading to dissatisfaction, lost sales, and a damaged reputation. Products pile up at bottleneck points, tying up capital and requiring storage space. Errors from manual processes or rushed work due to bottlenecks can lead to defective products, requiring costly rework or disposal.

5.) Traceability and Inventory Management:

Gap: Manual tracking of ingredients and products can be prone to error, impacting traceability and inventory accuracy.

Manual counts and entries are highly susceptible to human error (typos, miscounts, skipped items). This leads to a disconnect between what's physically on hand and what the records show. Manual tracking results in inefficient space utilization, inaccurate financial reporting, compromised traceability, difficulty in product recall, and lack of quality control insight.

Manual tracking requires significant human effort for counting, writing down, entering data, and reconciling discrepancies. This is time-consuming and expensive. Information flow is slow. Manual data entry is inherently error-prone. Correcting these errors (investigating discrepancies, recounting, re-entering data) consumes valuable time and resources. Without precise tracking, ingredients might expire on shelves or be used inefficiently. Employees spend valuable time searching for misplaced items or manually verifying inventory, rather than on value-added tasks.

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ANNEX B. INDUSTRY ROBOTIC SOLUTION CONCEPT PAPER FORMAT

TOPIC: ***Robotic Solution for Agricultural/Food Industry Gap***

A concept paper for a robotic solution addressing gaps in the agricultural or food industry needs to be clear, concise, and compelling.

1. Title Page- *Clear and Concise Title: E.g., "Autonomous Disinfection Robot for Food Processing Facilities."*
Your Name/Team Name & Affiliation/School *(Location-specific)*:
Date:

2. Executive Summary (Max of 100 words)

Hook: Start with a bold statement about the core problem you're addressing.
Solution Overview: Briefly introduce your robotic solution and its core functionality.
Key Benefits: Highlight the most significant advantages and impact

Example: "The escalating labor costs and inherent inefficiencies in manual strawberry harvesting are severely impacting farm profitability. This concept paper outlines an autonomous robotic system designed to precisely identify and pick ripe strawberries, aiming to increase harvest yield by 30% and reduce labor dependency by 50%, thereby enhancing food security and farmer resilience."

3. Introduction / Problem Statement (Max of 100 words)

Industry Context: Briefly describe the current state of the agricultural or food industry sector you are focusing on.
The "Gap" / Problem Identification:
Clearly articulate the specific, pressing problem or inefficiency your robotic solution aims to address. You may provide quantifiable data or compelling qualitative evidence to support the existence and severity of the problem (e.g., "manual harvesting leads to 20% post-harvest loss," "foodborne illness outbreaks cost the industry billions annually," "lack of skilled labor in meat packing plants").
Explain the causes of this problem (e.g., repetitive tasks, hazardous environments, labor shortages, lack of precision, high cost of current methods).
Discuss the consequences of not addressing this gap (e.g., reduced profitability, food waste, safety risks, supply chain instability).
Why a Robotic Solution? Briefly justify why robotics is the most suitable approach to solve this problem, highlighting the limitations of current non-robotic solutions or existing inadequate robotic attempts.

4. Proposed Robotic Solution (Max of 200 words)

Concept Overview: Provide a detailed description of your proposed robotic system.
What type of robot is it (e.g., mobile manipulator, stationary arm, drone-based system)?
What are its main components (e.g., robotic arm, end-effector/gripper, vision system, sensors, mobile platform)?
How does it work step-by-step to address the identified problem? (Describe the operational sequence).
Key Technologies/Innovations:

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What specific technologies will be utilized (e.g., AI/Machine Learning for object recognition, advanced manipulators, force sensors, custom gripper designs, autonomous navigation, cloud connectivity)? Highlight what makes your solution novel or superior to existing approaches (even if they are manual or semi-automated).

Functional Specifications: What will the robot be able to do? (e.g., pick 10 fruits per minute, sort by 3 ripeness levels, navigate uneven terrain, operate for 12 hours on a single charge).

Scalability & Adaptability: Briefly touch upon how the solution could be scaled for larger operations or adapted for similar problems in the industry.

5. Anticipated Benefits and Impact (Maximum of 75 words)

Direct Benefits (Quantifiable):
Economic: e.g Cost savings
Operational:e.g Increased efficiency/speed
Safety: e.g.Reduced human exposure to hazardous tasks/environments,
Environmental: e.g. Reduced waste

Indirect Benefits (Qualitative):
e.g. Improved product quality and shelf life.
Enhanced traceability and food safety.

Alignment with Industry Trends/Goals: How does your solution support broader industry objectives (e.g., Industry 4.0, sustainable agriculture, food security)?

6. Feasibility & Capabilities (Maximum of 50 words)

Technical Feasibility: Briefly address why your proposed solution is technically achievable with current or near-future technologies. Mention any potential technical challenges and how you envision overcoming them.