



NextGA Youth Innovation Challenge

Overview

Agricultural processing can benefit from automation to improve product quality, increase productivity, reduce waste, and enhance worker safety. Automated systems can transport products, inspect quality, make decisions, and package value-added products with little or no human intervention.

In this challenge, each team will become a group of automation innovators. Using only the materials provided at the start of the competition, teams will design and build an automated system capable of transporting an agricultural product through select stages of processing (think sorting, packing, transporting, etc.).

The objective is not to build a machine - it is to think creatively “on the fly” and design an “automated” process that is reliable, repeatable, and efficient. Remember that teamwork is important – the best outcomes are achieved when the talents of the entire team have been tapped.

Team Structure

Teams may consist of 3–4 students in 9th-12th grade.

Student teams from any youth organization or combination of organizations are welcome to apply; STEM teams or team members are highly encouraged.

Each school is limited to one team application.

Teams will be accepted in the order the applications are received.

Time Limit

- Build Time: 90 minutes
- Testing Period: Included within the build time
- Competition Run: One official judged run (unless otherwise stated by judges)

Materials

At the beginning of the competition, each team will receive an identical mystery supply kit.

The contents of the kit will **not** be announced prior to the event. Teams may use only the materials provided in their kit. The material includes inexpensive, commonly available

classroom or household items that can be safely modified and assembled. Prior experience in programming and electronics will not be needed.

No outside materials, tools, or pre-built components may be used unless specifically provided by the judges.

The challenge is designed to reward creativity, adaptability, and innovative problem-solving—not prior knowledge of the materials.

The Challenge

Each team must build an “automated” manufacturing system that:

1. Begins with one competition-supplied product at the designated Start Area.
2. Requires only one human action to begin operation.
3. Moves the product through at least two distinct processing stations.
4. Completes one automated operation.
5. Delivers the finished product into the designated Shipping Area.
6. Operates without any human assistance after the initial start (excluding “robot” assist designated areas).

Additional challenge details, including the competition product and the supply kit, will be provided when the event begins.

Processing Stations

A station is a location within the processing line where one distinct operation is performed on the product.

Operation examples include:

- Inspection
- Sorting
- Triggering another mechanism
- Opening or closing a gate
- Activating an indicator
- Packaging
- Changing direction
- Transferring between sections of the processing line

Each station represents a meaningful step in the automated process. Simply moving through a long ramp or track counts as transportation, not a station operation.

Processing Operation

A process must perform at least two automated operations in addition to transporting the product. Teams will be given station designations at which the operations must occur.

Examples include:

- Activating a quality-control indicator
- Releasing another mechanism
- Opening or closing a gate
- Triggering a secondary action
- Depositing the product into a package or shipping container
- Performing another clearly identifiable processing task

Teams are encouraged to be creative while demonstrating the principles of automation.

Competition Rules

1. Teams may use only the materials provided by the judges.
2. Materials may be cut, folded, bent, taped, or otherwise modified unless prohibited by the judges.
3. The completed system must fit entirely within the designated competition workspace.
4. Only one team member may initiate the automated process.
5. After the machine starts, no team member may touch any part of the machine or product until the run is complete.
6. Human intervention (other than the robot) after the initial start will result in the run ending, unless approved by the judge.
7. Each team will receive one official judged run unless otherwise announced by the judges.
8. Each team will be allowed to write instructions (=an algorithm, e.g. "if/else" logic statements) for a human, who will act as a robot to execute the algorithm in response to conditions in your packing facility. The robot will be limited to actions defined in the specific challenge. The robot will not be able to act outside the station (e.g. will not be able to retrieve product that has accidentally left the station). Robot friendly zones will be clearly marked. A robot will be assigned to each team; robots are not team members.

9. All designs must operate safely.

10. Teams may not look at competitor processes until allowed by the judges, after the designated build period.

Judging Criteria

Judges will evaluate:

- Successful completion of the processing stations
- Level of automation
- Engineering design
- Reliability
- Creativity
- Team explanation

Competition Scoring (highest scoring team will be designated the *NextGA* Gold Innovators; recognition will also be given for Silver and Bronze. Special Judges Awards will be given for team play and for persistence).

CATEGORY	POINTS
Works successfully	40
Fully automatic	20
Creative engineering	15
Reliability	10
Fastest run	10
Team Explanation	5

Tie Breakers

- If two teams finish with the same score, the judges will reach consensus on overall engineering design and teamwork and designate a winner accordingly.

Design Tips

Successful automation systems are:

- Reliable
- Simple
- Repeatable
- Efficient
- Easy to troubleshoot

Remember that product automation is designed to perform the same task consistently and efficiently. A simple, dependable solution is often better than a complicated one.

Team Presentation

Following the official run, each team will have approximately two minutes to explain:

- Their automated process
- The purpose of each processing station
- The innovation/engineering decisions they made
- Challenges encountered during construction
- Improvements they would make with additional time

FAQs:

How can I prepare? There is no preparation required, but here are some ideas to familiarize yourself with the concept of automation and creative thinking:

- Observe the board game Mousetrap set up for inspiration (reminder, this is just an example of simple automation and does not consider a product. See a video of the game set up at <https://consumercare-howto.hasbro.com/detail/videos/mouse-trap/video/5762467930001/mouse-trap?autoStart=true>)
- Watch Rube Goldberg videos for inspiration (reminder these are geared to show achieving an action in an overly complicated way...one of your goals is simplicity...and the Goldberg examples do not include all the important criteria of product automation that you will be considering. See example at <https://www.youtube.com/watch?v=ga4MZyzqyeM>)
- Play around with a marble run. (See example run at <https://www.youtube.com/watch?v=4u13n2gxt88>)
- Consult YouTube for automation video examples.
- Most importantly, come to the Challenge with a creative mindset and enthusiasm to problem solve!

What will the judges reward?

- ✓ Repeatable operation
- ✓ Well-organized workflow
- ✓ Clever engineering
- ✓ Reduced human effort
- ✓ Quality over complexity
- ✓ Process speed and efficiency
- ✓ Teamwork and good sportsmanship

What will the judges NOT reward?

- X Team members doing the work manually
- X Unsafe designs
- X Processes requiring constant adjustment
- X Designs that leverage only limited number of team members
- X Processes requiring constant adjustment
- X Designs that only leverage a limited number of team member talents

Good luck - start thinking like automation innovators!

