



4-H STEaMpunk Invention Challenge

The STEaMpunk Invention Challenge is a celebration of STEaM (Science, Technology, Engineering, arts and Math) and human creativity, where groups of youth design and create a crazy invention to complete a simple task. STEaMpunk describes a fictional Victorian Era where modern electrical/digital technology does not exist, so society is left to create complex mechanical steam powered inventions to complete many tasks done by today's technology. The STEaMpunk Invention Challenge encourages creativity, design thinking, art and engineering by challenging youth to come up with complex inventions to complete a simple task. These fun inventions link together simple machines and quirky uses of common items in a chain reaction to complete a simple task. Imagine lots of levers, pulleys, rolling balls, falling dominos, etc. This is not a competitive event, but there will be prizes and incentives for teams to set and achieve challenging goals.

Participating Teams Are Eligible To Win Prizes!

STEaMpunk Inventions will be showcased at the NH 4-H Makers Expo on April 13, 2019. Teams will be eligible for incentives and raffle prizes based on goals that are set and reached as well as other accomplishments.

The Challenge – When Pigs Fly

Work as a team to design and build a unique invention that can complete a simple task in a complex way. The 2019 Challenge task is to make a pig fly. This can be done in any creative way. Any kind of pig may be used, but not a live one. All participating teams must end with this step, how they reach the step is up to each team.

2019 Rules

Teams:

1. Teams must have a youth group affiliation such as a 4-H club, afterschool group or other youth organization (scouts, boys and girls club etc.). Interested individuals can inquire about starting a 4-H club team in their community by contacting their county Extension office.
<https://extension.unh.edu/locations>
2. Teams can be made up of two or more youth 8 - 18 years old. Recommended team size is between 4 - 8 youth plus at least one adult mentor or coach.
3. Teams must keep an Invention Journal to record ideas, goals, changes, successes and failures. This can be in a written or digital format. The Google Science Journal App is a great tool to record observations, notes and photos of your progress. It can be used on a smartphone, tablet or Chromebook. Journals must be included with their presentation at the Makers Expo.
4. Teams must set and document achievement goals. (Required to be eligible for prizes)
Goals may be revised, but changes should be documented. Goals should include things like:
 - a. A step goal - how many unique steps the invention will complete
 - b. Learning Goals – What new skills or concepts will you learn?
 - c. A time goal – how long will the invention run. Up to 2 minutes max.

Invention Specifications:

STeAMpunk Inventions ...

- Must complete the Challenge Task and should tell a story or follow a theme
- Must complete a minimum of 5 steps, no maximum. A step is defined as a transfer of energy from one object to another. Repeating steps like cascading dominoes or marbles is considered one step
- Must have a maximum run time of up to 2 minutes in length. No longer
- Must fit within a 16 ft² footprint (4'x4', 2'x8', etc.) and be no taller than 5'
- Must be self-supporting. It may be fixed to a base and/or frame
- May use electrical components. Only one extension cord is allowed to go to the invention
- May use compressed air. Only one hose is allowed to go to the invention
- May **not** use hazardous chemicals, flammable materials, explosives or flames
- May use microcontrollers, but they must be triggered by a previous step. (no timers)
- The **Pig** may **not** be launched at such a velocity that it travels more than 3 meters (10 feet) from the Invention in any direction.

Invention Safety

When considering components that use electricity, compressed air or unconventional use consider its safety. Avoid high heat, rapid movement, sharp objects or other items that may cause harm or injury. All invention components must be deemed safe and will be checked before presentation. Questions about safety can be directed to Claes Thelemarck at claes.thelemarck@unh.edu.

Getting started:

Suggested Process:

1. Start by exploring simple machines and energy transfer
 - a. Minnesota 4-H Engineering Challenge Curriculum has some good activities to learn more about simple machines.
<https://sites.google.com/umn.edu/engineering-design-challenge/ideas-and-resources>
2. Seek out resources for ideas, materials and techniques
 - a. Advisors can help with techniques and know-how
 - b. www.YouTube.com is a great resources for ideas (search terms like "Rube Goldberg Machine")
3. Brainstorm ideas for steps, materials and how to use them
4. Plan your invention and set some goals
 - a. Number of unique steps to complete the task
 - b. New learning goals
5. Gather materials and start creating
6. Celebrate Your Invention at the 4-H Makers Expo on April 13, 2019



4-H Makers Expo STeAMpunk Invention Demonstration Guidelines and Set-up

All participating teams are expected to demo and share their STeAMpunk Inventions at the New Hampshire 4-H Makers Expo.

- The 4-H Makers Expo will be held on April 13, 2019.
- Teams may arrive and begin setting up their Inventions between 8:30 – 9:00.
- Certification of Goals will begin around 10:00. Teams will be assigned a time to meet with their Invention Master for certification.
- Teams will set up in the Maker Expo hall with other Makers and must have 2 team members with the invention at all times. At other times team members can explore the rest of the Makers Expo.
- Teams are expected to share inventions with the public and Maker Expo visitors.

STEEmpunk Invention Certification

The 4-H STEEmpunk Invention Challenge is not a competitive event. There are no winners and losers. However, to make it more challenging and provide incentives, teams will have to work to set and reach self-determined goals. Teams will present their Inventions at the 4-H Makers Expo on April 13, 2019.

Certification: To be eligible for prizes, teams will need to set goals for what they plan to achieve through building their invention. They will then meet with an Invention Master to discuss team goals, learning and verify successful completion of their goals i.e. invention tasks and number of steps. See the STEEmpunk Invention Goals Rubric for a goal setting template and clarification of goals.

- Teams will specify and record goals they plan to achieve with their invention.
- Teams may have up to 5 official tries to demonstrate their Invention for the Invention Master
- Teams must specify a goal for the number of unique steps and be prepared to discuss whether they met, exceeded or fell short of their goals and reasons.
- Specify any learning goals such as new skills, knowledge any other goals the team had planned to achieve.

Prize Eligibility

Teams will meet with Invention Masters to discuss their goals and achievements and be eligible for prizes. Each goal reached (number of steps, learning goals, time goals, etc.) will be used to qualify for raffle tickets for prizes. The more achievements a team reaches the more raffle tickets for the grand prize they will earn.

For each goal or successful step that a team completes, a team will receive raffle tickets towards a Grand Prize. There is a maximum limit of 50 tickets per team.

Invention Masters will award points for:

- Invention Journal Included, written or digital (2pts.)
- Time, less than 2 minutes (2 pts.)
- Successful steps (2 pts./step) (30 pts. max)
- Completed Goals (1 pt./goal) (6 pts max)
- Number of Run time interventions (-1 pt.)
- General awesomeness (up to 10 additional points)

General awesomeness may include thoughtful reflection and analysis of successes and failures in working towards goals, a creative visual theme and storytelling, enthusiastic team spirit and/or persistence and effort in the design/build process

Invention Masters are STEM/STEEaM professionals (Artists, Engineers, Mad Scientists, etc.) who will meet with each team to discuss their goals and achievements, certify completion of task and steps and offer coaching for future inventions. They are the Jedi of STEEmpunk Inventions. Think of them as part friend, part teacher, part referee, part Yoda.

Questions about rules, safety or for more information can be directed to Claes Thelemarck at claes.thelemarck@unh.edu or call 447-3834.

