



## Delaware Technology Student Association



The theme of this automaton is Sea Life. When you turn the crank, the fish takes a bath and uses her fin to scrub her back with a brush.

## Automata: A Design & Technology Toy Challenge

**2013-2014 Theme: Sea Life**

**Delaware Only Competition**

*"Serving Technology Education Students" Sponsored by the Department of Education*

## Automata Design & Technology Toy Challenge

**Introduction:** Designing and making automata covers a wide range of technical and engineering skills and processes from art, engineering, technology, science and basic laboratory skills involving the use of tools to process materials such as cardboard, wood and metal (such as for hinges, or wire used for pushrods, etc). Automata can be described as a whimsical themed or humorous mechanical figure or mechanical device that is constructed to act as if by its own power. Sometimes automata are referred to as Mechanical Toys or Kinetic Art. Automata are marvelous small machines that use most of the mechanical processes which can be found in almost every modern machine. Automata are powered through the use of a hand crank that will turn a drive shaft, and in turn the drive shaft may include cranks, cams, ratchets, levers, linkages, push rods, or gears. The mechanical systems are used as a transmission system that is engineered by the designer to transmit the input of rotary motion into the outputs of linear, rotary, reciprocal, or oscillating motion. All of these combined inputs and outputs lead to a cause and effect relationship that is used to make the automaton to move. In modern times (today) the design and creation of automata is related to the same principal mechanics involved with the design and construction of robotics.

**Overview:** Delaware TSA contestants entering the Automata Design & Technology Toy Challenge will design and construct an automaton based on a theme. Any design is acceptable as long as the device is safe to operate and the interpretation of the theme is appropriate for small children as determined by the judges. The theme for the event is posted on the front cover of this Delaware Only competition manual.

**Writing Prompt (Creative Interpretation):** Each student must submit a (no more than 1 page) interpretation of the theme that describes the creative story, setting and character(s) for which the automata is based on.

**Design Documentation (Creative Visualization):** Each student must submit a hand drawn 1 page creative visualization of the project that also details how the different mechanisms work.

**Contest Purpose:** To provide a means for TSA members to demonstrate their understanding of a practical application of mechanical engineering through the artistic design and construction of an original automaton based on the specifications and the theme.

**Eligibility for Entry:** Teams of 2 students, 1 automaton per team.

**Levels of Competition:** Level I (Middle School) and Level II (High School).

**Time Limitations:** *Home School Preparation* – automata and documentation must be submitted prior to state conference as an off-site static event.

### Specific Regulations:

- a. Automata must reflect the stated theme as determined by the judges.
- b. Each automaton must include a written creative interpretation of the theme and a creative visualization of the project.
- c. The maximum weight, height, width and length of the automata are restricted to the size of fitting within a standard shoe box (not boot box). The final project must fit within the box with the lid closed.

- d. The automata, creative interpretation, creative visualization and shoebox must be labeled with the contestant ID number.
- e. The automata must be safe to operate without sharp objects, edges or mechanisms that may hurt a small child.
- f. The automata must have at least 2 distinct motions in addition to motion of hand crank.
- g. The workings of the major mechanisms employed must be able to be observable by the judges in order to be evaluated.
- h. Schools and entrants must provide all materials for construction. Each entry must be designed to fit in, and must be submitted inside a standard shoe box (not boot box). The box may be decorated.
- i. The majority of the automata should be handmade/homemade. The judges will subjectively determine if at least 85% of the entry is homemade.
- j. No construction, modifications or major adjustments will be made by the judges. The automata should be easily operated by the judges and the entry must be constructed well enough to be transported and handled. DETSA and the event judges will not be responsible for missing or broken parts.
- k. The automata must be durable. The judges will subjectively determine if the automata is durable enough for testing and evaluation. Keep in mind that you will want the automata to be as durable as you can make it. The entry is likely to be handled and tested by a great amount of judges and fellow students.
- l. The parts of the automata may be painted or stained. Entries are not required to be painted or stained. Use your best artistic determination for use of color.
- m. External power sources will not be allowed. The entry must be hand cranked for operation of the automata.

**Procedure:**

- a. Students will work individually to design and construct the automata.
- b. The automata will be judged subjectively on humor/whimsy, quality, originality, appearance, aesthetics, mechanical operation, specifications, creative interpretation, and the one page creative visualization/design documentation.
- c. Students may research ideas about automata in books, magazines and on the web, however the final entry should appear to be original and not a direct copy that was reverse engineered as determined by the judges.

## Helpful Hints & Tips for Inspiration

**Inspiration** - Mechanical toys and automata often appear to have a life of their own, the simple mechanical parts seem to produce an almost magical response to the figures that they move. Automata come in a vast range of sizes and varying degrees of complexity. Some may keep your interest for several minutes whilst others you may just pass by. What makes an automaton "good" is very subjective. We all like different things and we don't all find the same thing funny. As the great saying goes "You can't please all of the people all of the time." So where do you start. The check list below gives some simple suggestions against which to test your ideas.

- 1) Is the automata visually exciting?
- 2) Is the automata funny?
- 3) Will the automata intrigue the viewer?
- 4) Will the automata hold the viewers attention for at least a minute?
- 5) Is the automata too complex?
- 6) Is the humor of the automata too obscure?
- 7) Can the judges tell that you enjoyed making the automata?

This is just a general check list and is by no means a full proof system for producing the perfect automata, but it does provide you with a list of things to think about prior to designing your automata. As a general rule, you should start your ideas based on the theme and then create a list of creative ideas that are whimsical or humorous. Determining best basic idea in order to interpret the theme is likely to be one of the hardest parts of the design process when creating an automaton.

**Research & Design** - Once you have come up with an idea the next stage is to research it. The purpose of research is to get as much information as you can about your subject. This helps you to work out how something moves, the colors, the scale etc. Research can be broken down into two areas.

**1) Primary Research: This is where you make drawings of your subject from life.** - For example you may draw a camel at a zoo. You don't have to be a great artist. Just looking and observing helps you understand your subject. You may not always be able to draw from life and the temptation is always to work from the easiest sources. But the best and most creative works always evolve out of good observation. This is true for all the arts and crafts and is the reason why so many artists spend so much time in drawing.

**2) Secondary Research: Refers to things such as photos, pictures, photocopies etc.** - This is usually the most accessible material to get hold of. The library is a good place to start and you can often photocopy relevant pages from books. Designers often put together a "mood board" or "Ideas Sheet" which is made up from a range of material that reflects the theme. It includes colors, textures, surroundings etc. They are often used in the fashion industry but are of great benefit to any designers. Remember your ideas sheet is there to inspire you so make it interesting.

**Designing** - When you have got your research material, you need to start thinking about developing it into a working solution. A good idea is to start off by writing a "Statement of Intent". This is simply a few sentences about the automata you want to make. It's a great way of focusing your thoughts and in effect is the basis for a design brief. The following headings should help as a guideline as to the sort of things you should be thinking about.

- 1) Whom is my automaton intended for? Is it a small child, 12-14 year old or adult etc?
- 2) What size will it be?
- 3) Simple or complex? One golden rule is to keep things simple but even simple automata can get complicated.
- 4) What materials do I want to work in? Automata can be made in paper, cardboard, wood, or metal. Often you will work in a range of materials.
- 5) Dead lines: How long have I got to make it?

## Helpful Hints & Tips for Creative Visualization

**Creative Visualization** - Creative visualization shows the ideas upon which the automaton is based. The creative visualization (such as the sample below) is used to describe and illustrate how the basic idea from the creative interpretation of the theme was used to inspire the work. The creative visualization should illustrate and document how the project is to be built and operate. This document should look and feel almost like a cartoon/comic strip in how the basic construction and operation details are shared. All creative visualization documents should be signed and dated in order to help protect the idea should you have developed something so unique that you would like to apply for a patent. For the purposes of this Delaware Only TSA contest, only the contestant number and the date should be added.

### Ronnie the *Ride of Life* ROBOT

one page short form realization

A ROBOT that can be used in the shopping precinct to advertise the RIDE OF LIFE or used in the vide to act as a security man (via TV video link) or to cause amusement or havoc. Radio Control with operator or pre-programmed to follow sofa rail

operator disguised as innocent bystander so public dont know how Robot is controlled

Muls flashes in sync with talk from operator

PLAYS music of your choice between speech AUTO FADER

An endoscope is built into one hand so that contents of shopping/hand bag can be inspected and displayed on monitor - with talk from operator giving lots of laughs

nose sniffs for smoke, centex etc sounds alarm if positive

the operator stand nearby and controls robot via R/C link in camera bag - A TV Radio mike is hidden in his hand so that robot can have conversations with shoppers

patrolling the Ride of Life

patrolling the precinct with operator disguised as innocent bystander

INDUSTRIAL ROBOT MECHANICS

Quite fast on pavements - turns on a dime  
approx cost \$16,000 start Aug 90 finish Aug 91

Delaware TSA State Conference

Competitive Event Evaluation

**Automata Design & Technology Toy Challenge**

Student ID: \_\_\_\_\_ Level: \_\_\_\_\_

Chapter/School Number \_\_\_\_\_

Reflects stated theme	Yes	No
All items fit within standard shoe box supplied by student (not boots)	Yes	No
All items submitted include contestant ID number	Yes	No
Safe to operate	Yes	No
At least 2 distinct motions	Yes	No
Mechanics are easily observable by judges	Yes	No
At least 85% of the entry is handmade/homemade	Yes	No
Durable after repeated trials	Yes	No
Hand cranked operation	Yes	No
Overall quality, appearance & aesthetics	0-----30	
Humor/whimsy	0-----20	
Originality	0-----20	
Quality of creative visualization design documentation	0-----10	
Quality of written creative interpretation of theme	0-----10	
Smooth mechanical operation	0-----10	

Judges Comments

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Judge's Signature \_\_\_\_\_

## FAQ (Frequently Asked Questions)

- 1. Can I use pre-existing parts (such as an action figure or toy) to bring the automaton to life?** - The use of pre-existing parts such as toys or action figures must be critically analyzed by the designer. This project does not specifically exclude the use of toys or action figures. However, the judges will be looking for originality. They will also be asked to estimate if (in their opinion) if at least 85% of the total entry is handmade/homemade. Generally speaking, if you are in doubt, you are better off in making the item rather than using a purchased toy. The best automata typically have a folk art look and feel to them.
- 2. What is this about a shoe box?** - Each entry must be submitted inside a shoe box with a lid. **Both the creative interpretation & the creative visualization should fit inside the box without being damaged.** The shoe box should be of a typical standard size as determined by the judges and not huge / oversize (such as a box for a pair of cowboy boots). The purpose of the shoe box is for safe transportation of the entry. The shoe box should have the entry number on it. It is advisable for the shoe box to be painted or decorated (yet it is not required). As a tip, in order to determine how big to make your entry, design it to fit within the shoe box you will transport it in. Note if the box is modified, or if the lid does not close then the item does not fit in the shoe box! **Be reasonable in size!**
- 3. How do I interpret the theme?** - The theme is the basic idea that the project should address through its form and function. Otherwise, the theme is open ended and only limited to your imagination. For instance, if the theme was "Dog Fight" your ideas for the theme could be anything imaginative such as: a cat that is stealing food from a dog, to a dog whose credit card is declined at a checkout line when buying dog food, or maybe even a dog flying a WWI airplane. The theme is to be interpreted by you! The more creative you are in interpreting the theme the more likely you will be to come up with an original idea. *For instance, Snoopy (who is in the Peanuts cartoons) has already done the dog fight theme where he is flying a WWI stylized dog house into combat against the Red Baron.*
- 4. What is the 1 page creative interpretation of theme?** - The creative interpretation of the theme is a (no more than) 1 page short story that describes the setting and character(s) for which the automata is based on. The 1 page creative interpretation of the theme will help the judges to determine how original your idea is as well as provide them with an inside view as to how and why the automaton operates as it does.
- 5. Please explain to me what is the Creative Visualization?** - The creative visualization shows the ideas upon which the automaton is based. The creative visualization is used to describe and illustrate how the basic idea from the creative interpretation of the theme was used to inspire the work. The creative visualization should illustrate and document how the project is to be built and operate. This document should look and feel almost like a cartoon/comic strip in how the basic construction and operation details are shared. All creative visualization documents should be signed and dated in order to help protect the idea should you have developed something so unique that you would like to apply for a patent. For the purposes of this Delaware Only TSA contest, only the contestant number and the date should be added.
- 6. How will the automata entries be judged?** - In this challenge the judges will primarily look at the entries in a **subjective way**. This means most of the judging will be determined from their personal perspective and feelings. The Helpful Hints & Tips: Inspiration (on page 4 of this packet) has many ideas and tips to help you. Keep in mind that the judges may have an entire table full of entries. The more appealing the entry is, the more likely it will gain the attention of the judges. Also keep in mind that the best automata will often have a folk art look and feel to them. The typical materials used include paper, cardboard, wood, or metal. Finally, keep in mind durability. The judges may adjust it slightly to make it work if needed, but they will not be making any major repairs.

## Helpful Web Resources

Automata and Mechanical Toys	<a href="http://www.mechanical-toys.com">http://www.mechanical-toys.com</a>
Barking Dogs Automata	<a href="http://barkingdogsautomata.homestead.com/home.html">http://barkingdogsautomata.homestead.com/home.html</a>
Flying Pig	<a href="http://www.flying-pig.co.uk/">http://www.flying-pig.co.uk/</a>
Automata Art by Dug North	<a href="http://www.dugnorth.com/automata.aspx">http://www.dugnorth.com/automata.aspx</a>
Cabaret Mechanical Theater	<a href="http://www.cabaret.co.uk/">http://www.cabaret.co.uk/</a>
Timberkits	<a href="http://www.timberkitsus.com/">http://www.timberkitsus.com/</a>
Paper Automata	<a href="http://www.walterruffler.de/index1.html">http://www.walterruffler.de/index1.html</a>
Gallery of Automata	<a href="http://www.sidestreetbannerworks.com/automata/gallery.html">http://www.sidestreetbannerworks.com/automata/gallery.html</a>
Tom Haney Crank Operated Work	<a href="http://www.tomhaney.com/portfolio_crank.htm">http://www.tomhaney.com/portfolio_crank.htm</a>
Animated Wooden Models Kits	<a href="http://www.dugnorth.com/automaton_kits.aspx">http://www.dugnorth.com/automaton_kits.aspx</a>