

# TECHNOLOGY ACTIVITY

## Robotic End Effector/Gripper

### NATIONAL STANDARDS

**Standard #8:** Students will develop an understanding of the attributes of design.

**Standard #9:** Students will develop an understanding of engineering design.

**Standard #10:** Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

**Standard #11:** Students will develop abilities to apply the design process.

### NATIONAL BENCHMARKS

#### Grades 9 - 12

**#8 - H** The design process includes defining a problem, brainstorming, researching and generating ideas etc.

**#8 - J** The design needs to be continually checked and critiqued the and the ideas of design must be refined and improved.

**#8 - K** Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.

**#9 - K** A prototype is a working model used to test a design concept

**#9 - J** Engineering design is influenced by personal characteristics.

**#9 - L** The process of engineering design takes into account a number of factors.

**#10 - K** Not all problems are technological and need to be solved using technology.

**#11 - M,O,Q,R,N,P** Identify, refine, develop, Evaluate, Identify criteria, Evaluate solution

#### Grades 6 -8

**#8 - E,F,G** Creative process, No perfect design, criteria restraints

**#9 - F,G,H** Design steps, Brainstorming, Modeling & testing

**#10 - F,G,H** Troubleshooting, Invention process, Experimentation

**#11 - H,I,J,K,L** Design process applied, Specify criteria, 2-3 D representations, Test & evaluate, Document solution

### OPPORTUNITIES TO ACHIEVE

- Students will build an end effector using string, tape and Styrofoam cups
- Students will complete a series of tasks using the completed Styrofoam end effector
- Students will develop a minimum of (3) different sketches and communicate with assigned group members to develop a robotic end effector
- Students will design and build an end effector using tubing, syringes and supplied materials and completed sketches
- Students will use designed end effector to complete a given task
- Students will draw plans for a complete minimum three axis robotic arm assembly using syringes, tubing and available supplies
- Students will complete a presentation on careers in robotics

### SHOW ME STANDARDS

#### Performance Standards:

Goal #2 - 3

Goal #3 - 1,2,3,4,5,6,7

Goal #4 - 1,6

#### Knowledge Standards:

Comm Arts #3

Science - #7

### ASSESSMENT

- End effector built according to NASA guidelines handout
- Styrofoam end effector able to perform assigned tasks
- Sketches completed with minimum of three different ideas presented
- Robotic end effector built from sketch plans and supplied materials
- Tasks completed using group built syringe end effector
- Plans for a complete robotic syringe robot completed
- Presentation done for class on a robotics related career