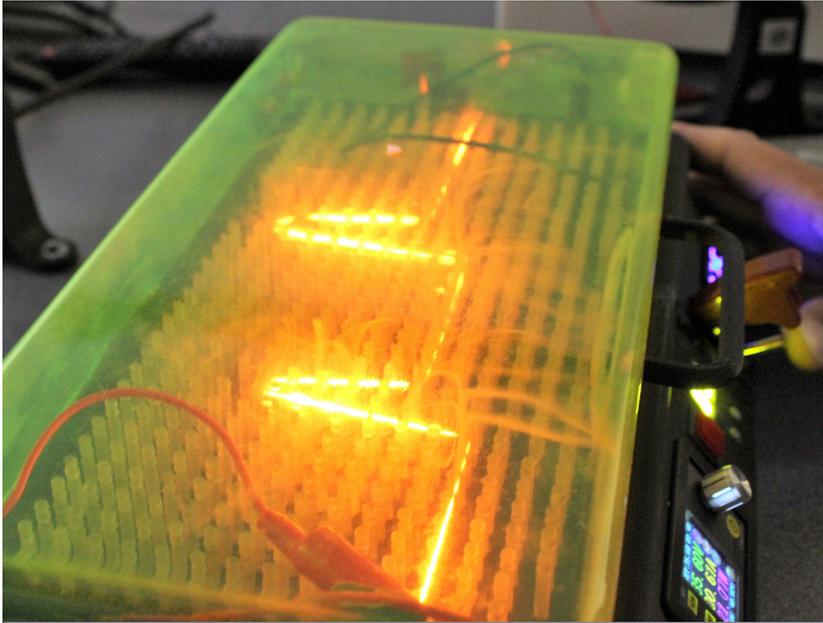




TECHNOLOGY SOLUTION

Electrical and Electronics



Shape Memory Alloy Art (SMArt)

A hands-on, educational tool highlighting the properties of SMA wire

BENEFITS

- Simple
- Educational
- Hands-on
- Versatile
- Compact & portable

Innovators at NASA's Glenn Research Center have developed an educational device and method for creating letters, numbers, characters, symbols, or a combination, using shape memory alloy (SMA) wire. The device, which is a small, portable apparatus, goes through a prescribed heating sequence which will train the shape memory alloy wire to remember the shape set by the user (e.g. a star, heart, etc.). After the heating and cooling sequence of the device is complete, the user extracts the shape then can distort the trained shape memory alloy wire. Upon application of heat, the wire will transform back into the trained shape. The innovation contributes a method for advancing science education by providing a powerful hands-on teaching tool to demonstrate cutting-edge material and science capabilities. This simple and portable tool offers adaptive, interactive, customized, and individualized shape creation for students, hobbyists, artists, and others.

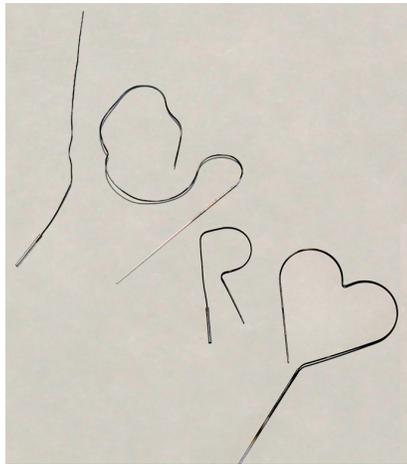


THE TECHNOLOGY

A prototype device has been developed at Glenn for creating shapes from SMA wire. The apparatus uses material feedstock in spools made of alloys that exhibit the shape memory effect (temperature-induced activation), super elasticity (stress-induced activation), and to some extent, magnetism (magnetically-induced activation). The feedstock (e.g., wire spool) is routed and positioned around a series of modular pins to create a shape outline. Once the desired shape is formed, the wire ends are clipped from the feedstock and secured into a locking mechanism, then connected to a heating circuit (e.g., joule heating, hot plate, heat gun). The programmable prescribed circuit parameters, including current or temperature and training time, are set and confirmed using the apparatus control dials and indicators to ensure safe and accurate operation of the device. Before enabling the circuit, a plastic shield is placed over the modular array to protect the operator. The final product will be a desired shape that can be deformed and recovered numerous times through heat activation.



Shapes, such as letters and logos, are formed from SMA wire using the pins in the Glenn device



The SMA wire can easily be distorted, and when heat is applied, it takes its original shape

APPLICATIONS

The technology has several potential applications:

- Consumer goods (e.g., greetings cards, crafts)
- Educational (e.g., grades K-12, STEM programs, colleges & universities, laboratories)
- Science kits
- Conferences or conventions
- Science centers
- Maker's spaces / hobbyists
- Professional societies

PUBLICATIONS

Patent No: 10,738,373