

The logo for North State Trajectory features a stylized 'N' shape. The left vertical bar of the 'N' is red, and the right vertical bar is blue. A blue arrow points upwards from the top of the right vertical bar. To the right of the 'N' is the text 'North State Trajectory' in a blue, italicized sans-serif font.

North State Trajectory

**A Comprehensive Strength-Based Program
to Transition Youth on the Autism Spectrum**

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Outline

- Personal Background
- Rockets & Robots (R&R) Science Club for Children on the Autism Spectrum
- North State Trajectory (NST) Introduction
- Strengths Are a Product of ASD Challenges
- Mechatronic Technology Options
- North State Trajectory Programs



Personal Background



- Retired rocket scientist
- Retired robotics developer
- Former university professor teaching NPD
- Founder of tech venture network





Rockets & Robots Science Club

- Survey in 2015 with no idea what it would lead to
- Noticed interest in STEM was universal
- Also high level of skills in STEM
- Met every other week at DAC
- Mostly ages 6-10
- Significant outcomes in socialization skills
- Desired to serve those closer to transition age





North State Trajectory

- The mission of North State Trajectory is to encourage and develop the natural technical and teamwork abilities of youth with autism and other developmental disabilities, and to assist in their transition to college or the workforce, so they may live more independent and fulfilling lives

Strength-Based

Mechatronics
Technology

Entrepreneurial
Emphasis

Transition-
Oriented



Strength-Based Hypothesis

- For those on the spectrum, strengths are a natural consequence of dealing with our challenges
- These are based on my personal experience being on the spectrum

Gather &
Organize
Information

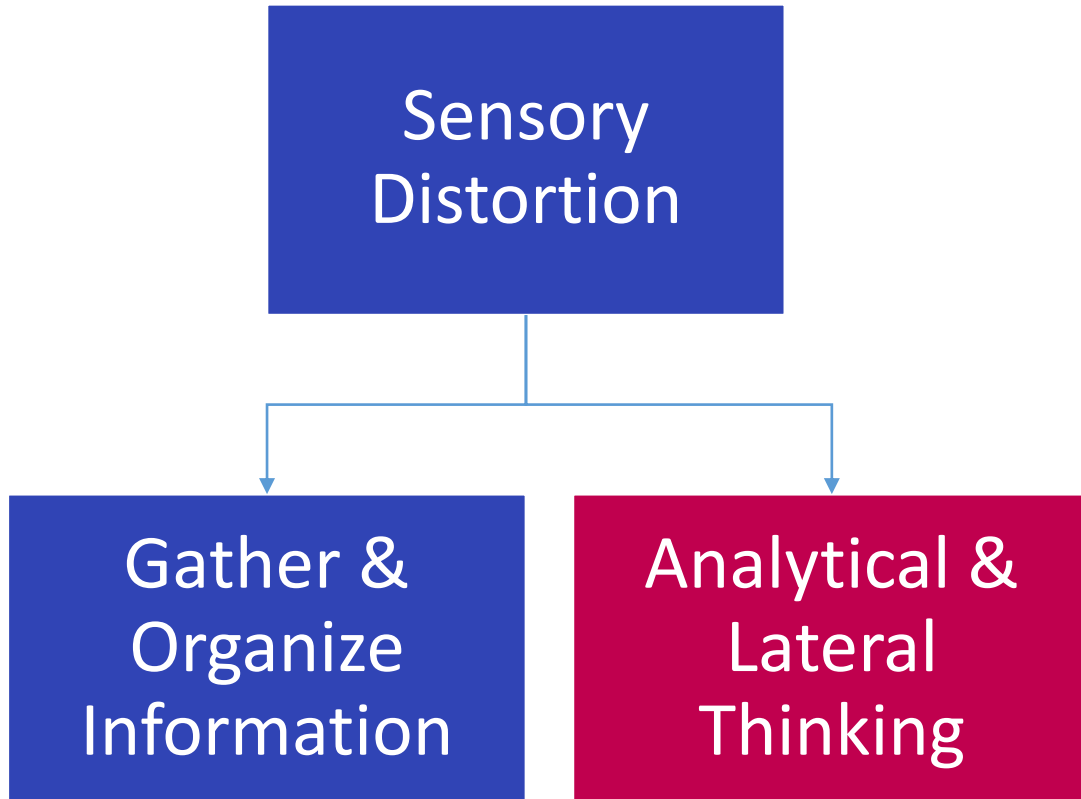
Analytical &
Lateral
Thinking

Ability to
Focus

Mechatronics



Challenge: Sensory Distortion



- ASD people are constantly immersed in a confusing world and have a strong desire to make sense of it all
- The information coming in from distorted sensors forces us to become experts at dealing with ambiguous situations and developing meaningful structure out of chaos
- We feel good when we can understand what's going on around us



Challenge: Hypo/Hyper Sensitivity

Hypo/Hyper
Sensitivity

Desire to
Block-Out
the World

Ability to
Focus

- Sensory Input is Painful
- Focusing on something, temporarily alleviates the pain
- Useful fixation
- “I create output to block input”

Carly Fleischmann



Challenge: Limited Control of Our World

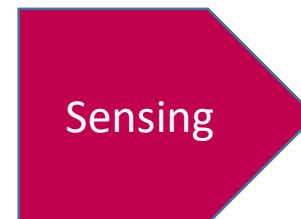
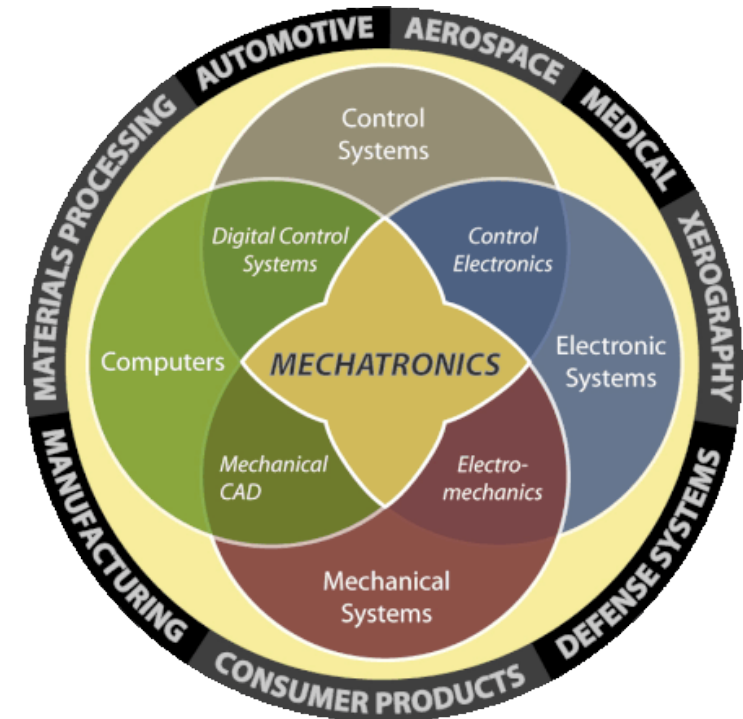


- Our many challenges make it difficult to have control over the world around us
 - *Social situations*
 - *Team work situations*
 - *Physical limitations*
- We desire opportunities to have some control



Mechatronics

- Mechatronics is an interdisciplinary area of engineering that combines mechanical and electrical engineering and computer science
- Typical devices are computer-controlled such as robotics, automated manufacturing, autonomous vehicles
- Allows the designer/user to control an environment





Mechatronics Technology For Educators

- Many good options
- Appropriate options depends on the technical skill level of the educator
- They range from complete ready-to-use kits that require no experience, to full custom designs
- Complete kits are more expensive and have limited flexibility
- Full custom is less expensive and have limitless flexibility



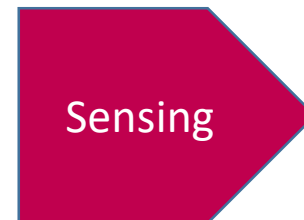
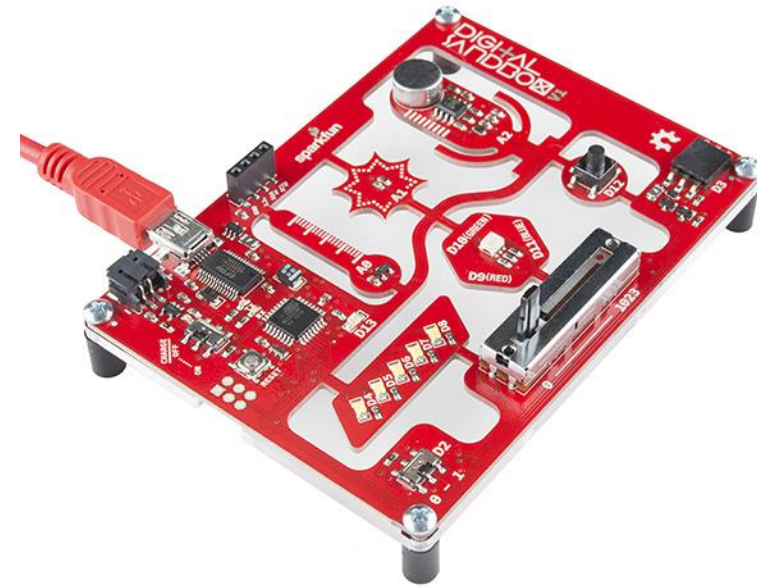


Ready-To-Use Kits

Wowee MIP, \$100



Sparkfun Digital Sandbox, \$50





Intermediate-Level Kit

- ELEGOO UNO R3 Project Smart Robot Car Kit, \$70
- Includes computer board, sensors, motors, chassis, wiring and instructions
- Assemble and run the pre-written programs
- Can modify the programs or write your own





Full Custom Design

- Herman the robot space dog
- Walks & talks
- Can be programmed to do almost anything...
- Including a fully-functioning Alexa!
- Uses two computer boards
 - Arduino
 - Raspberry Pi





Core Trinity of Mechatronics Technology

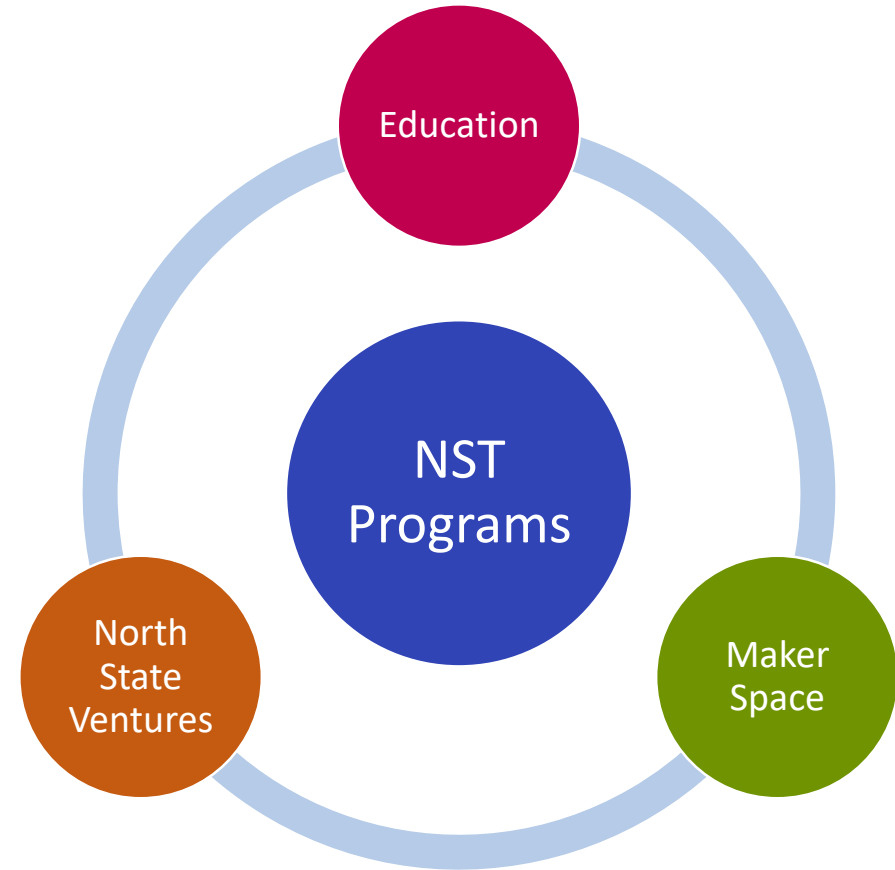
- Arduino - *\$15-25, free language*
 - A computer board and associated programming language
- *Python & the Raspberry Pi Board - \$40, free languages*
 - A miniature, affordable general purpose computer that is easily adapted to control devices
- Scratch - *Free*
 - A free graphical programming language for kids 8-16 years old
- All of these have millions of programs already written and great support
- With these three, children can rule the world!





NST Programs

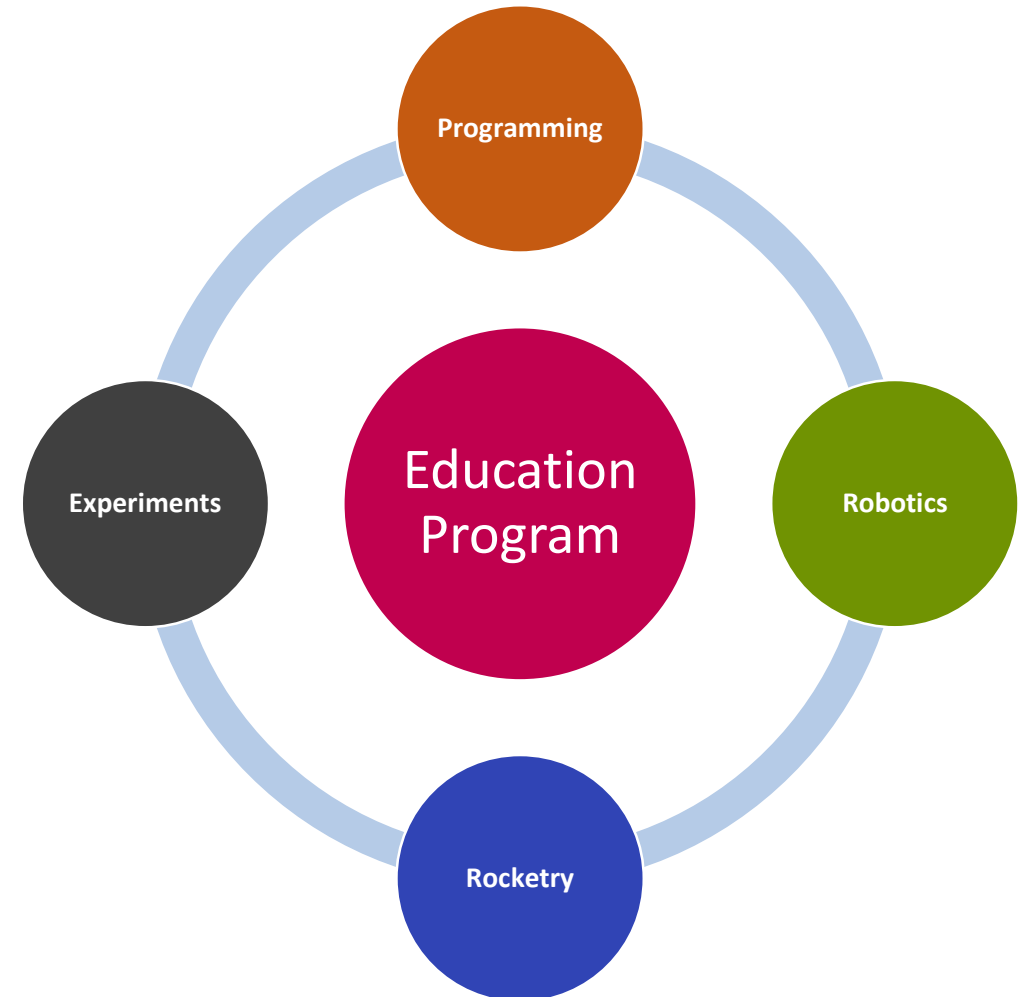
- NST is a set of synergistic programs designed to prepare your high school age child and graduate (up to 21 years) for a meaningful career in Science, Technology, Engineering and Math (STEM).





Education Program

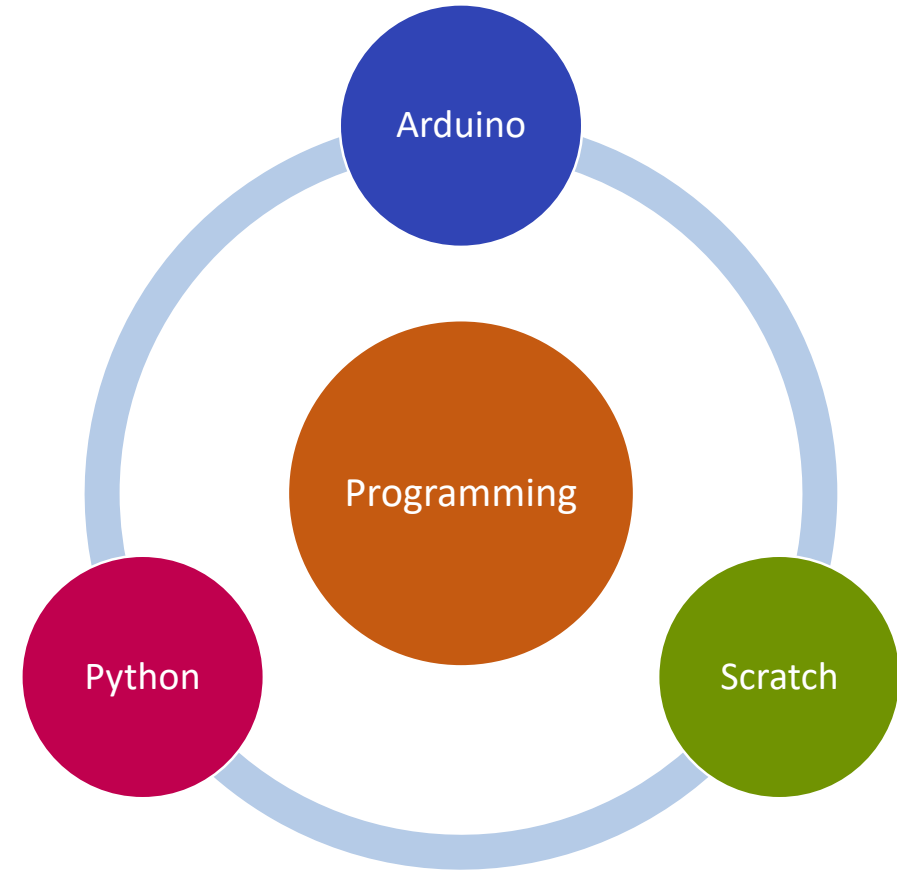
- Begins at the high school, during regular school hours, as part of students' STEM curriculum
- Once or twice a month, initially
- Can branch out to after hours or other venues, such as maker spaces
- Students participate at a level within their comfort zone





Computer Programming

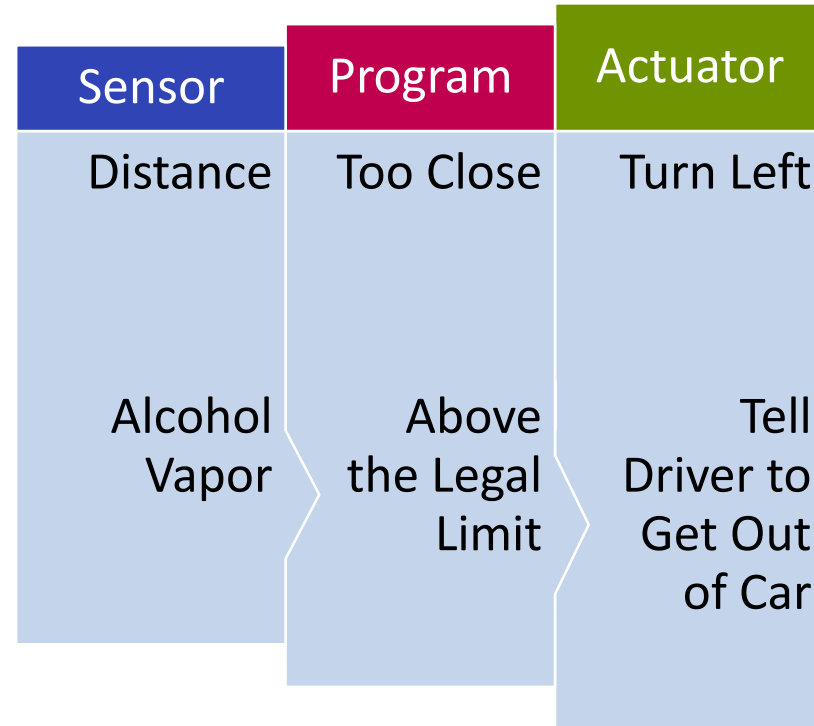
- Arduino program runs on Arduino board
- Python runs on any PC and the Raspberry Pi board
- Scratch runs on any computer and the Raspberry Pi board
- Scratch can be used to program the Arduino board





Robotics

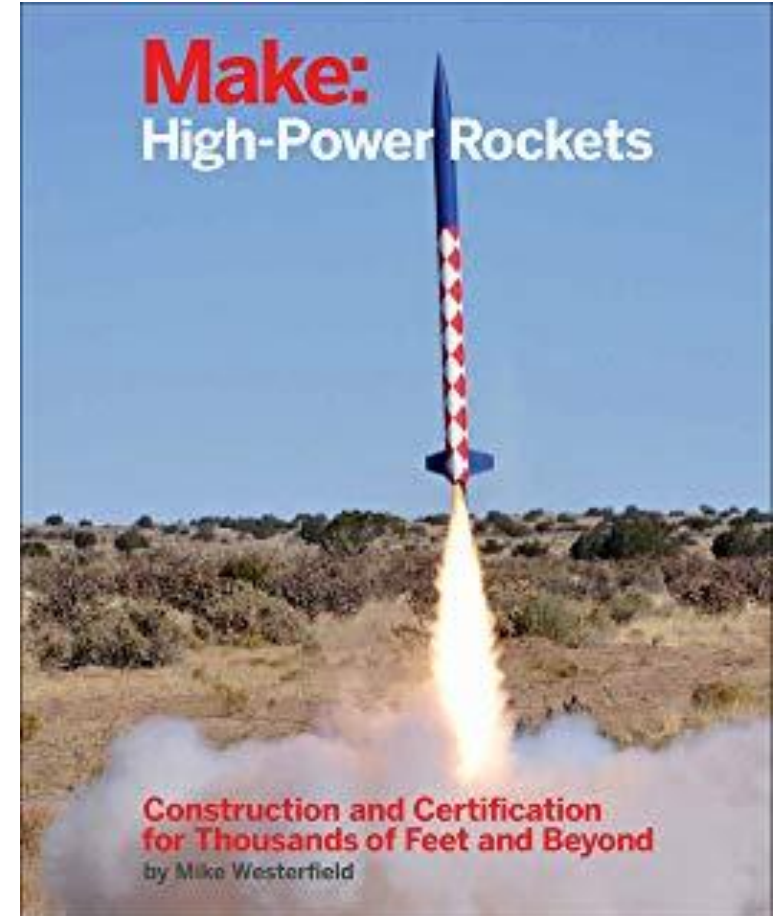
- Can use either Arduino or Raspberry Pi or both
- Write a program that reads a sensor(s) and generates command(s) to actuator(s), such as a motor
- Many affordable sensors and actuators available





Model Rocketry & Aircraft

- Model rockets from Estes and others
- Firings from Redding RC & Hobby field
 - Fire only during winter weather when the field is wet
- Just received a donated Carbon Cub S+ RC aircraft





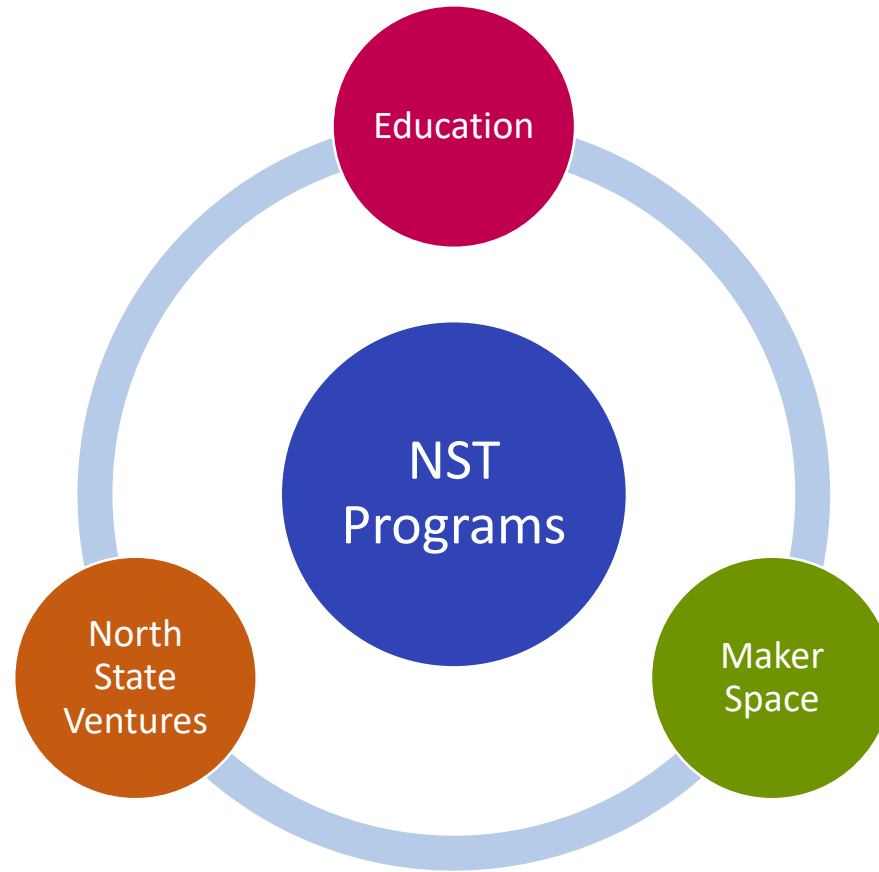
Experiments

- Provides short-term results to hold interest during sessions
- Explores many different fields
 - Cymatics
 - LASERs
 - Non-Newtonian fluids
 - Many others





NST Programs: Makerspace





Makerspace Program

- A makerspace is a collaborative work space inside a school, library or separate public/private facility for making, learning, exploring and sharing that uses high tech to no tech tools
- These spaces are open to kids, adults, and entrepreneurs and have a variety of maker equipment including 3D printers, laser cutters, CNC machines, soldering irons and hand tools

Makerspace





Makerspace Activities

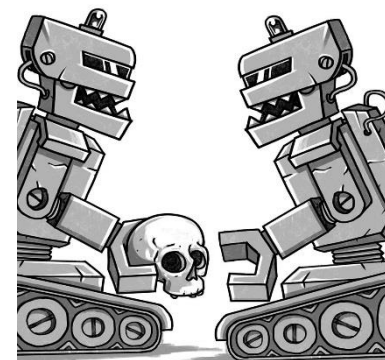
- Students can use for projects or prototyping new product ideas
- Help is available for learning how to use equipment
- Provides an inspiring environment that encourages people to think creatively





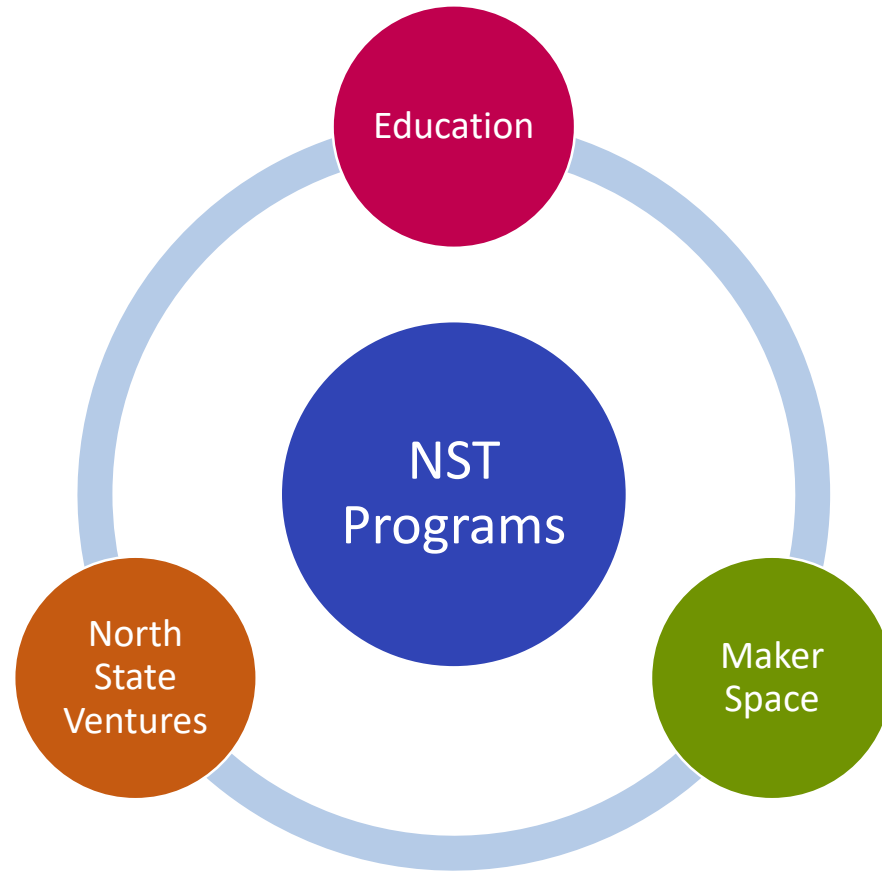
NST & Makerspaces

- NST works with Makerspaces to provide affordable access to their facilities
- Tehama County Makerspace
- Bay Area Robotic Combat (has a presence in Redding)
- Working on others





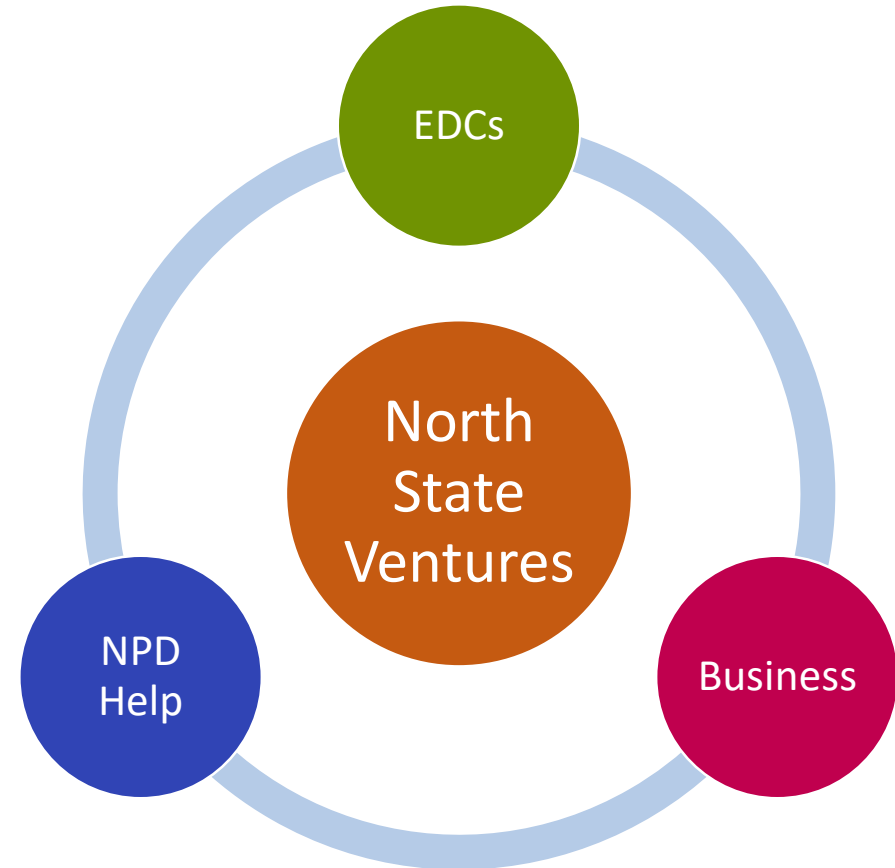
NST Programs: Venture Program





North State Ventures Program

- Encourages entrepreneurship and new product development
- Work with local EDCs and businesses to create awareness of ASD skills and new product development projects
- Founder of Tech Venture Network of Ridgecrest
- NPD consultant, 17 years teaching NPD at Santa Clara University





Ventures Precedence

- University of Washington has a program where those on the spectrum develop assistive technology products for those on the spectrum
- Koyi internal project at NST
 - Interactive AT for those on the spectrum

What KOYI does

Plays audio files interactively which can be used for

- Games
- Stories /songs /music
- Educational sessions
- Calming
- etc

How is KOYI different?

The audio and interactivity can be customized for each child's sensory characteristics

Who creates the content?

- Professionals
- The KOYI maker (that's us)
- You

Content you create can be shared with others

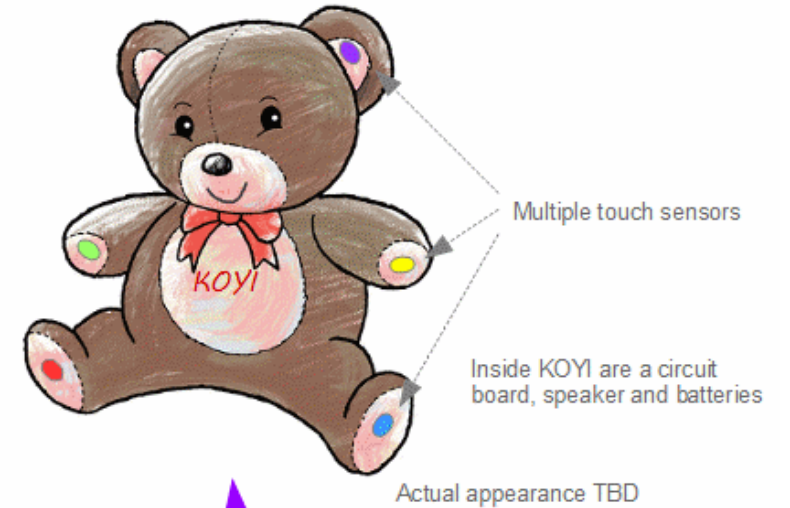
How do we make money?

- There will be a charge for some content
- Any content you generate can be freely shared with others
- Or you can charge for your content

How does it work?

Just like iTunes: You purchase KOYI then go to our website to select content; some free, some paid. You can also record your own content. KOYI syncs with your computer via a USB interface, just like an iPod.

KOYI does not understand speech or contain a video camera



Inside KOYI are a circuit board, speaker and batteries

Syncs with your computer, just like an iPod





NST Status, Plans & Desired Results

- Commence working with high schools this fall with education program
- Develop relationships with students and assess their interests
- Next year start to introduce entrepreneurial activities such as makerspaces and new product development
- Desired Results
 - Students with ASD getting into college because they have valuable experience/skills from NST activities
 - High school students getting jobs because...
 - They have relationships with local businesses
 - They have a great resume containing valuable skill/experience gained through NST
- Youth pursuing new product development ventures with support from local resources



Questions?

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