LIVE INTERACTIVE LEARNING @ YOUR DESKTOP

Algebraic Equations: Calculator Controlled Robots

Presented by: Jordan Snyder

November 7, 2012

6:30 p.m. – 8:00 p.m. Eastern time

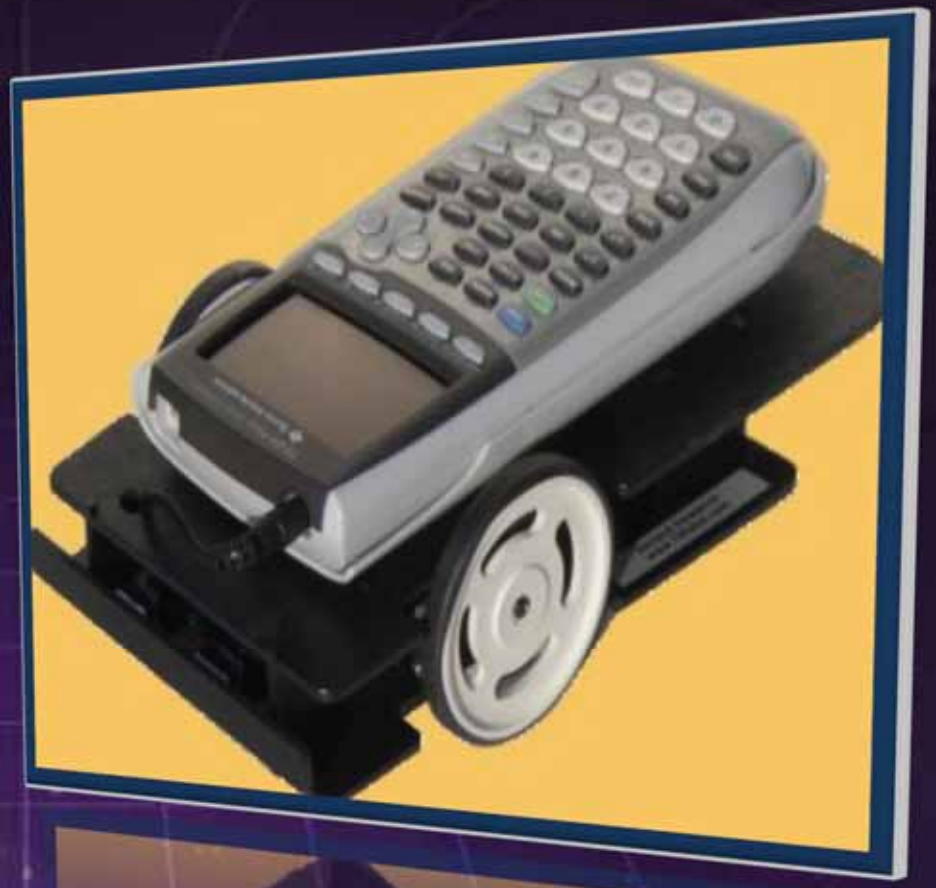
Introducing today's presenter…

Jordan Snyder
NASA Explorer Schools Education Specialist
NASA Goddard Space Flight Center
Greenbelt, MD

NSTA WEB SEMINARS

NASA Explorer Schools
Algebraic Equations

Calculator Controlled Robots



Presented by Jordan Snyder

Agenda

- Robots
- Robots at NASA
- Activity information
- Missions in detail
- Basic commands
- Extensions/links
- NASA Explorer Schools

NASA Explorer Schools

What is a robot?

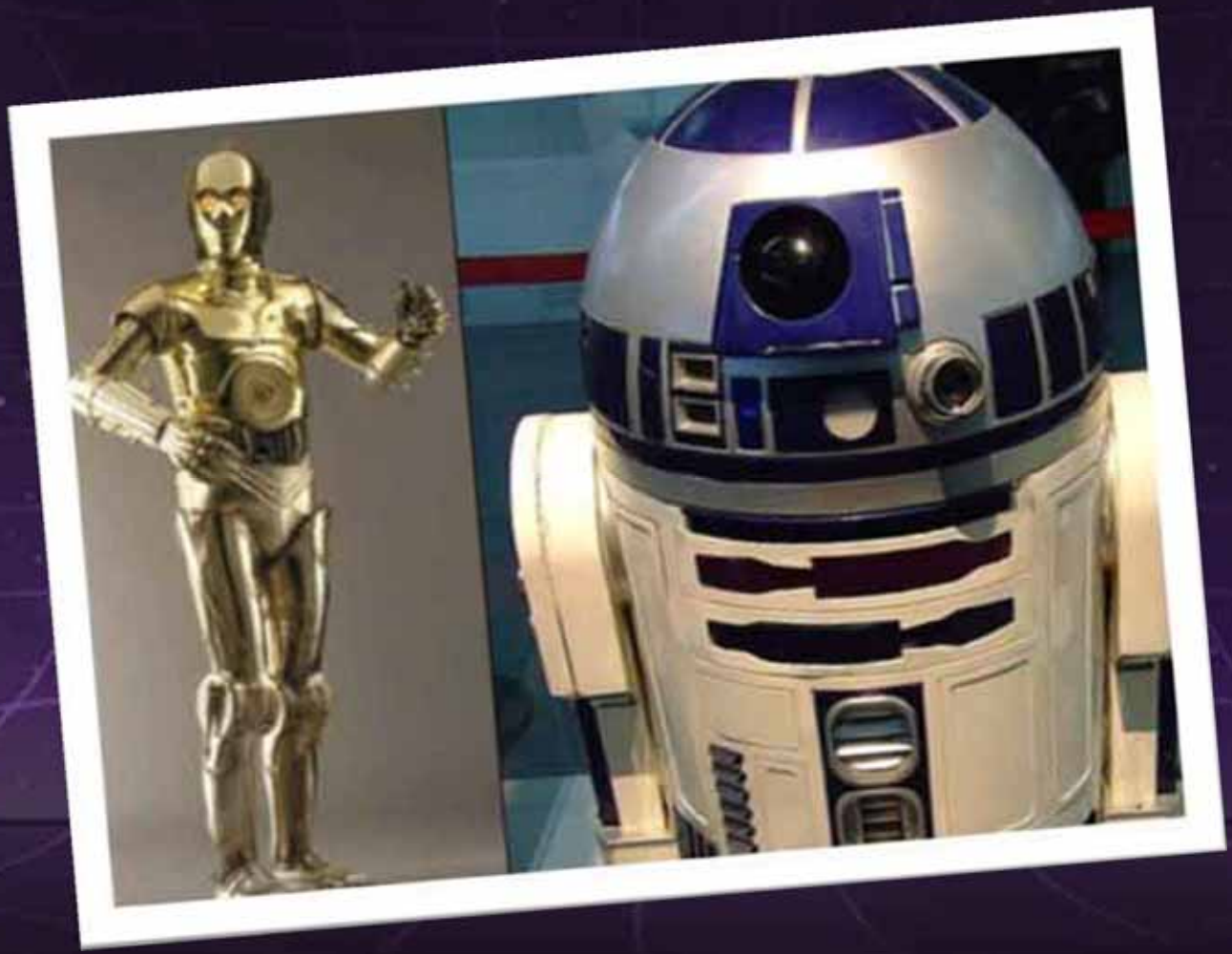
What is a robot?

- A machine
- Acts automatically
- Senses the world
- Processes information
- Responds to information

How Do Robots Gather Information?

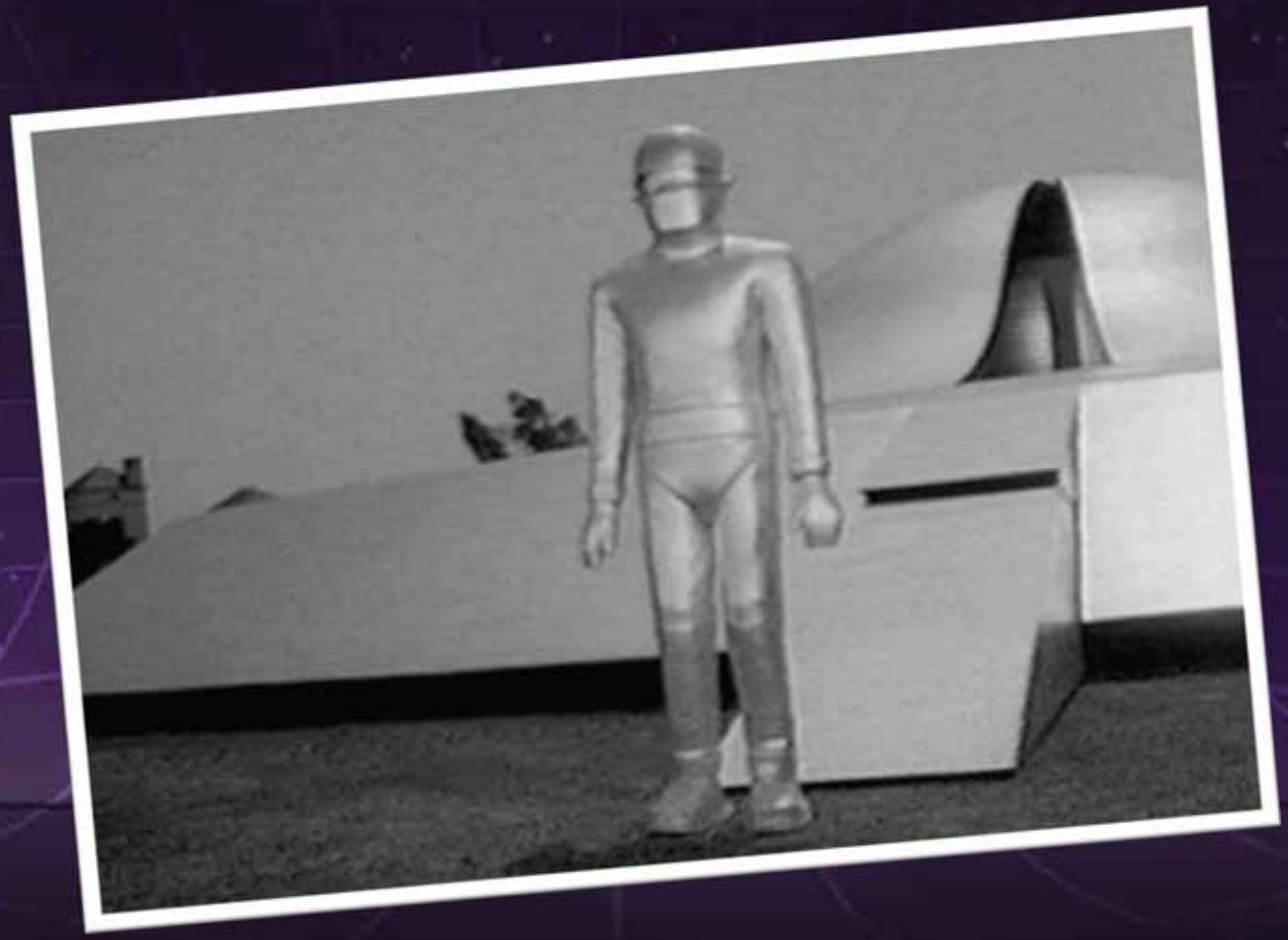
- Cameras
- GPS
- Laser rangefinders
- Light sensors
- Temperature sensors
- Touch sensors

Robots From the Movies



Robots From the Movies

Robots From the Movies



Robots From the Movies

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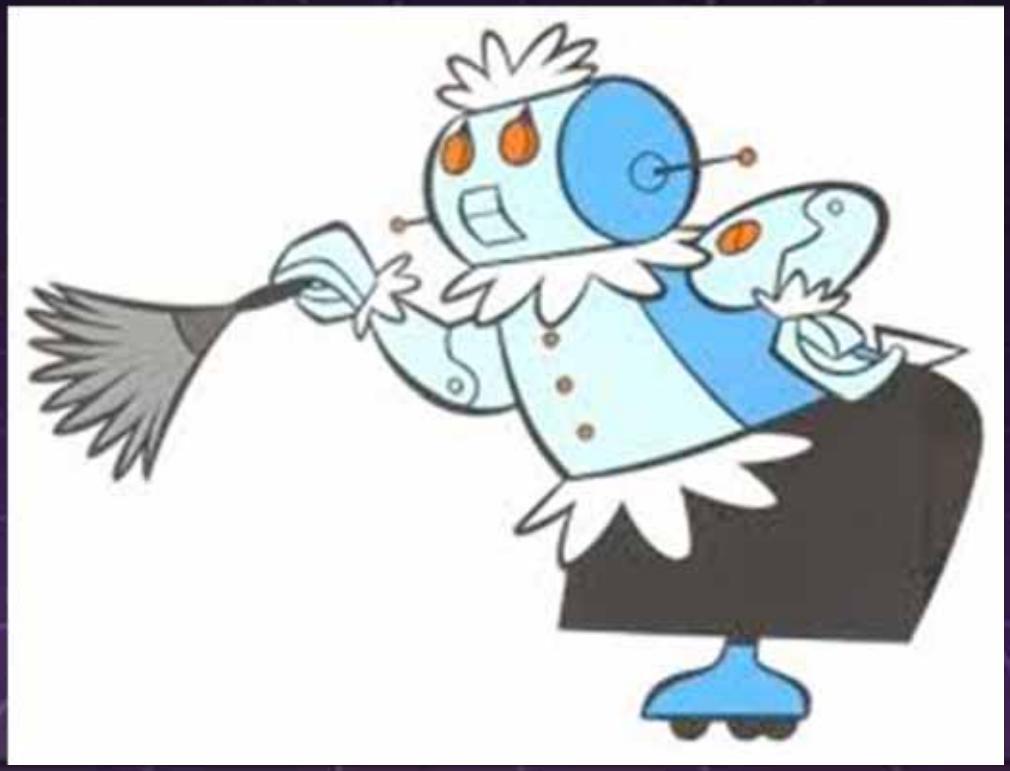


Robots From the Movies

Robots in the Home

- Roomba
- Litter Robot
- Aibo
- Lawnbot
- Hexbug

NASA Robots

Curiosity

Mars Rovers

Spirit/Opportunity
2004

Sojourner
1997

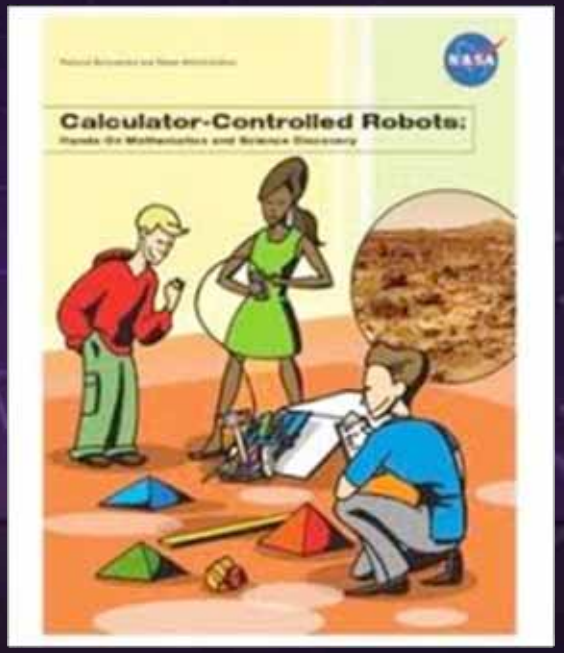
Curiosity
2011

NASA Now – Mars Month

Questions?

Calculator Controlled Robots

- Ten missions
- Three extension missions
- Hands on
- Sequential
- Math application



Subject Area

- Math and technology
- Grade Levels: 6th – 8th

What Do They Learn?

- Learn to program robots
- Use technology to solve problems
- Apply math concepts
- Work as a team

Materials

- Calculator
- Robot kit
- http://www.smallrobot.com/scimath.html
- Educator Guide

Preparation

- Download the guide: www.nasa.gov/pdf/239512main_Calculator_Controlled_Robots.pdf
- Read the guide
- Program your robot

Common Core Standards

- Calculator
- Robot kit
- http://www.smallrobot.com/scimath.html

Questions?

Calculator Controlled Robots

Grade Level 6 - 8

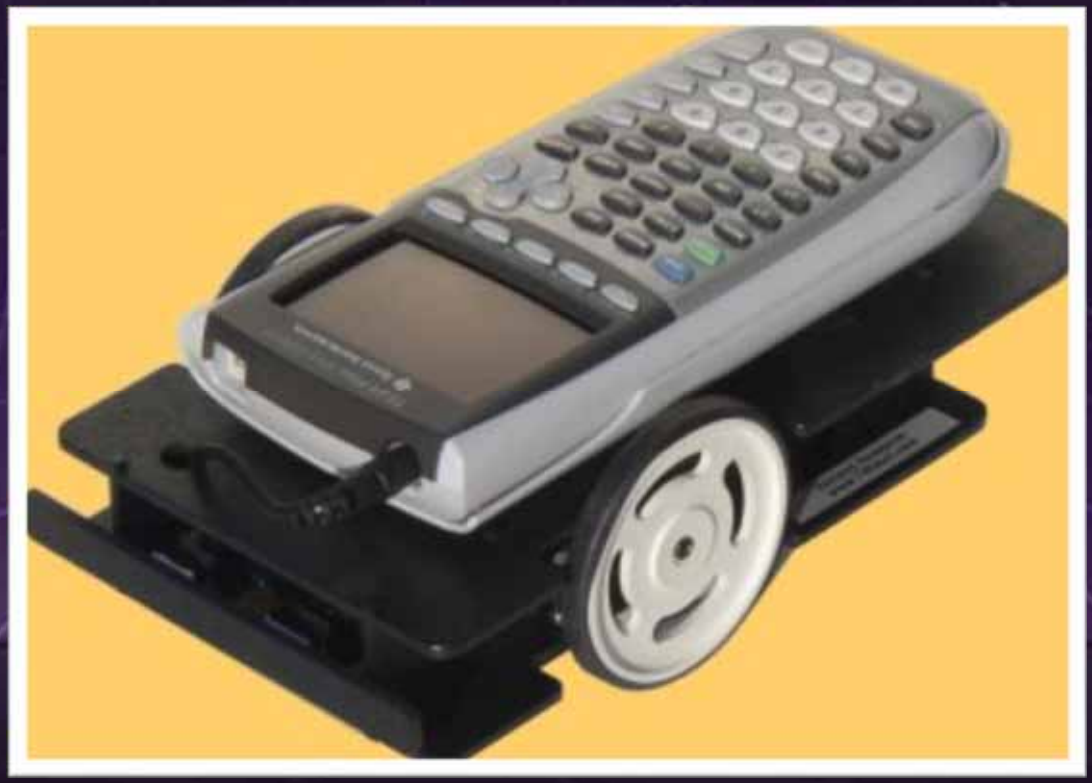
Primary Materials

- Norland calculator robot
- Graphing calculator
- Meter stick
- Graph paper
- Safety goggles

Robot

Touch Sensor

Programming Instructions



Questions?

Introduction

Engagement!

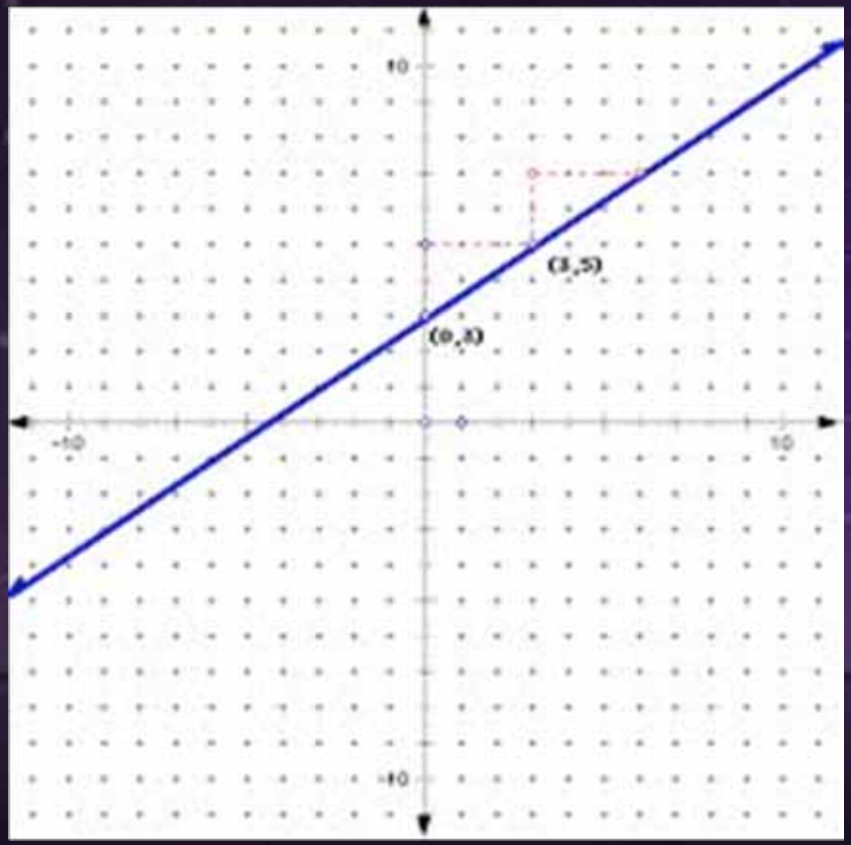
Mission 1 - Measure

- Determine speed
- Determine duration
- Calculate distance
- Extension

Mission 2 – Graph and Predict

- Make table
- Graph linear function
- Predict
- Extension

Mission 2 – Graph and Predict



Mission 3 – Turns and Mazes

- Turns and basic commands
- Pythagorean Theorem
- Rocket math

Mission 4 – Circles

- Geometry Challenge
- Discover Pi
- Circumference

Mission 5 – Game Spinner

- Probability
- Integers
- Finding unknowns

Mission 6 – Game Day

- Fun applications
- Experimentation

Mission 7 – $E=MC^2$

- Standard notation
- Scientific notation
- Exponents
- Formulae

Mission 8 – Cool Stuff

- Graph Functions
  - Linear
  - Quadratic
  - Absolute value
  - Radical
- Create solution table

Mission 9 – Mission to Mars

- Preprogramming
- Samples
- Curiosity connection

Mission 10 – Popbots

- Final assessment
- 10 problems to solve

Questions?

Basic Programming

http://mste.illinois.edu/resources/ti/robot/docs/DrivingTIRobot.pdf

Meaning of Numbers in Command

Command = 123

- 1= Move for a certain amount of time
- 2= Move until the front bumper hits something
- 3= Move for a certain time unless the front bumper hits something first

Meaning of Numbers in Command

Command = 123

- 0 = Rotate backward
- 1 = No motion
- 2 = Rotate forward

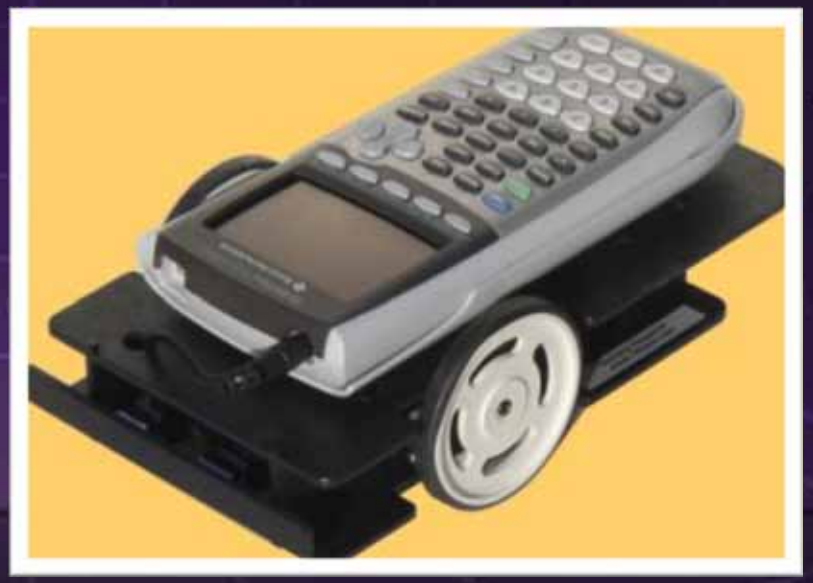
Meaning of Numbers in Command

Command = 123

- 0 = Rotate backward
- 1 = No Motion
- 2 = Rotate forward

What will the robot do?

- Send ({100})
- Send ({222})
- Send ({102})
- Send ({221})



Questions?

Where is everything?

TI Robot Application

- http://mste.illinois.edu/resources/ti/robot/about/index.html

Educator Guide

- http://www.nasa.gov/pdf/239512main_Calculator_Controlled_Robots.pdf

TI Connect Software

- http://education.ti.com/educationportal/sites/US/productDetail/us_ti_connect.html

Robot Kits

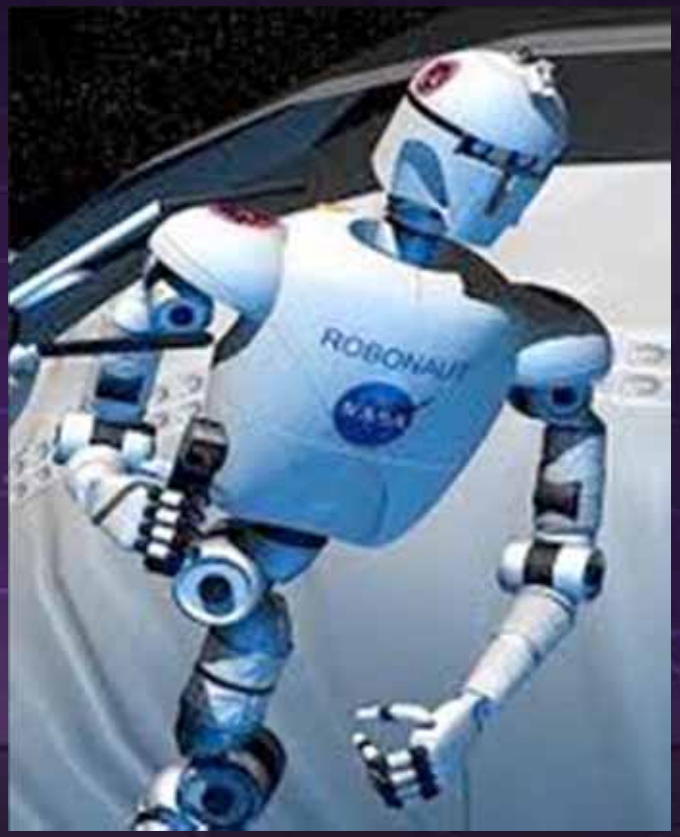
- http://www.smallrobot.com/scimath.html

Extensions and Resources

Calculator Controlled Robots

Preloaded Programs

- DEMO
- EXPLORE2
- GAME1
- MACER



DEMO Program

- Demonstrates basic capabilities of the CCR
  - Forward
  - Backward
  - Circular motions
  - Bumper switch responses

EXPLORE2 Program

- Missions 9 & 10
- Remote control

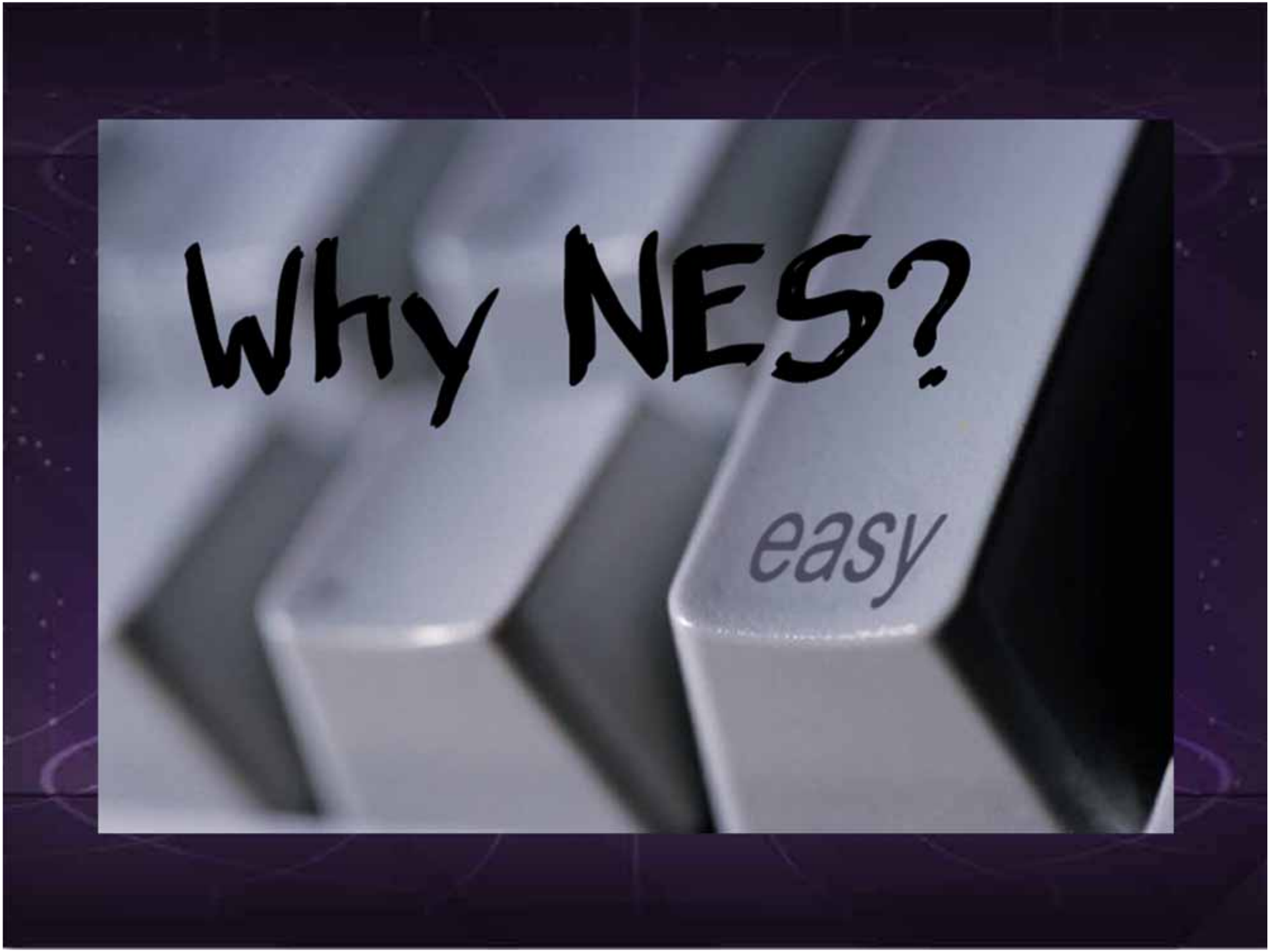
GAME1 Program

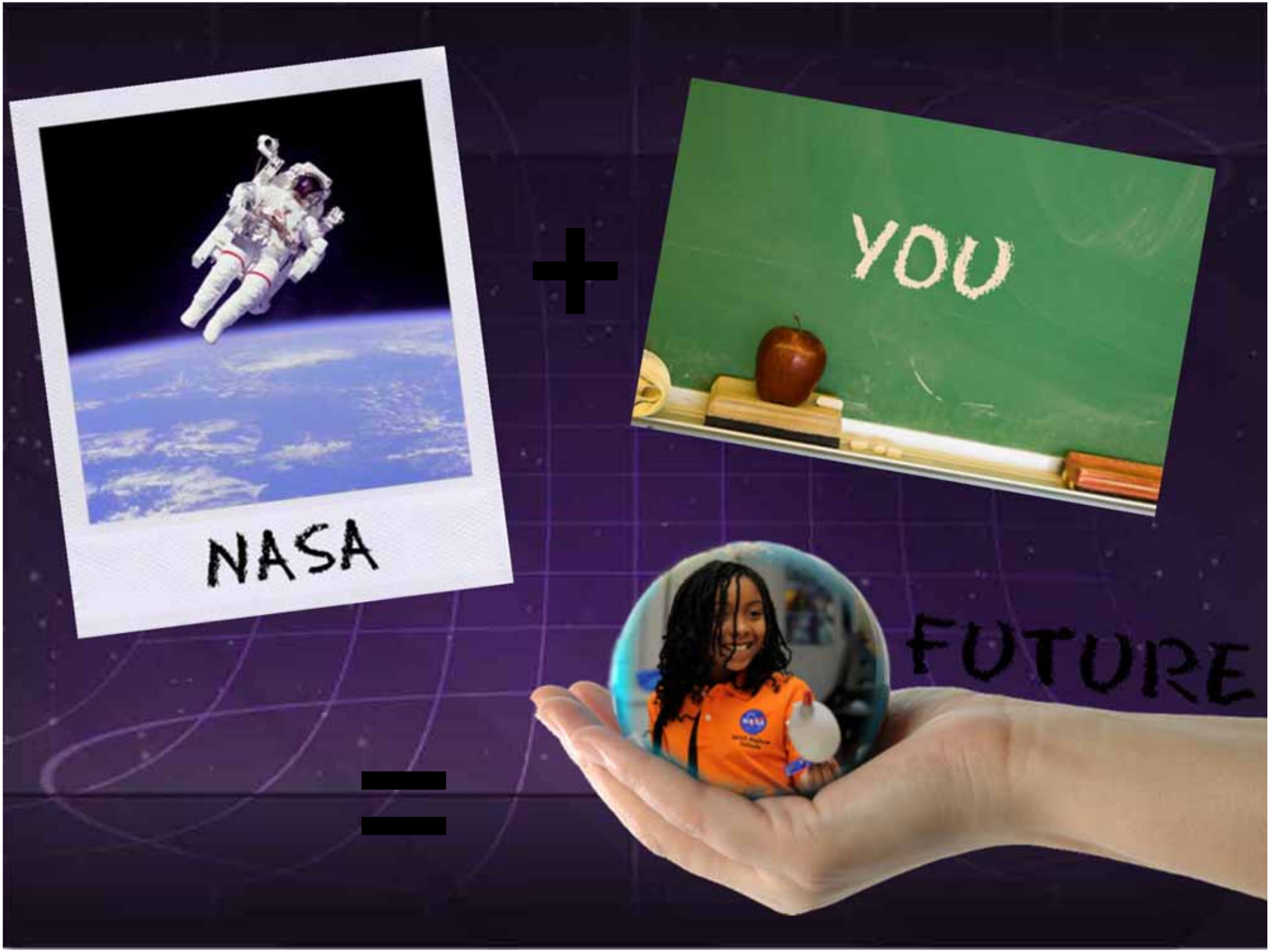
MACER Program

- Race
- Math practice

Mars for Kids Web Tour

http://marsprogram.jpl.nasa.gov/participate/funzone/


Why NES?
easy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FUTURE

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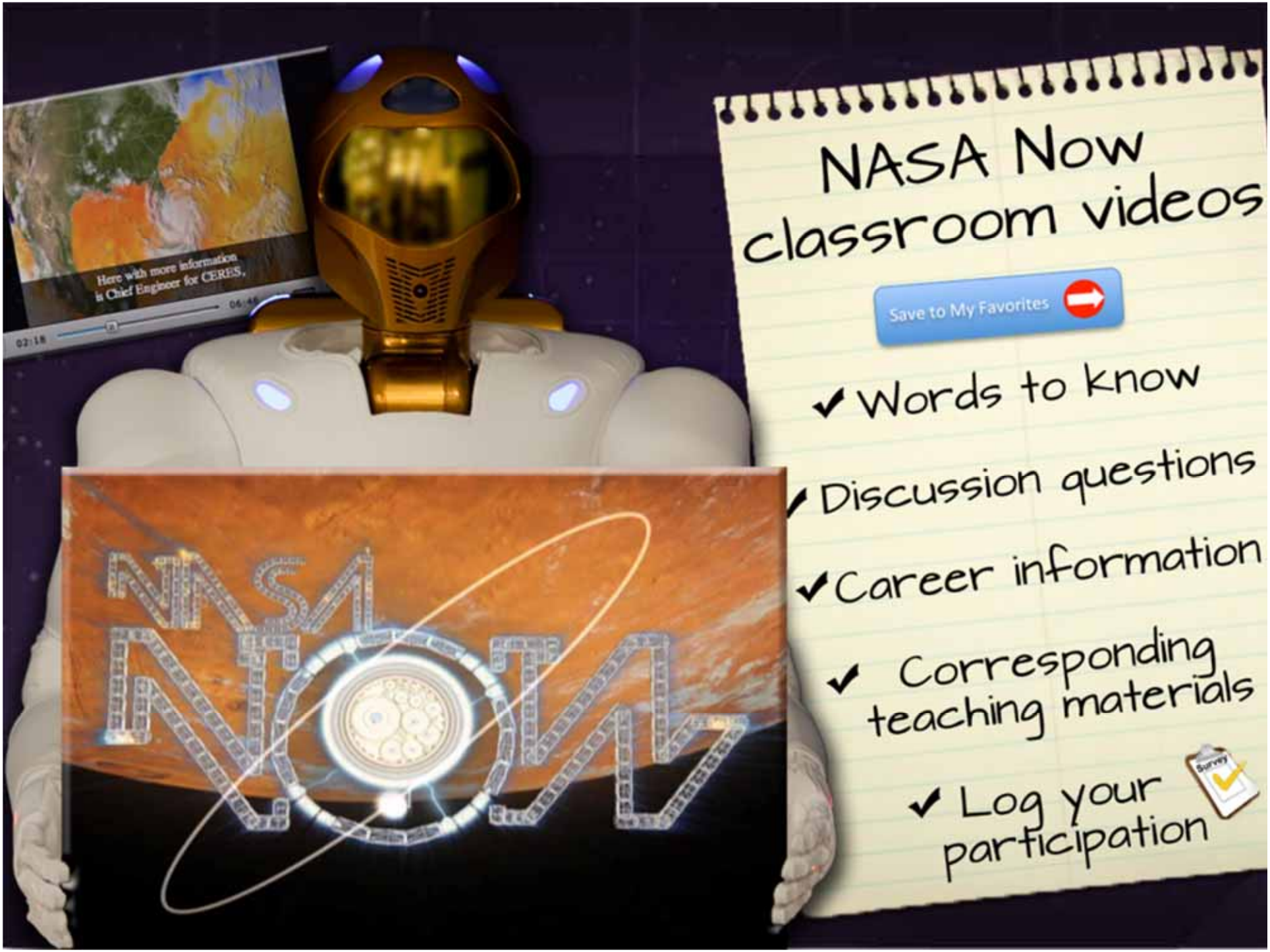
00001 **TEACHER**

http://explorerschools.nasa.gov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explorerschools.nasa.gov


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Thanks to today's presenter!

Jordan Snyder
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