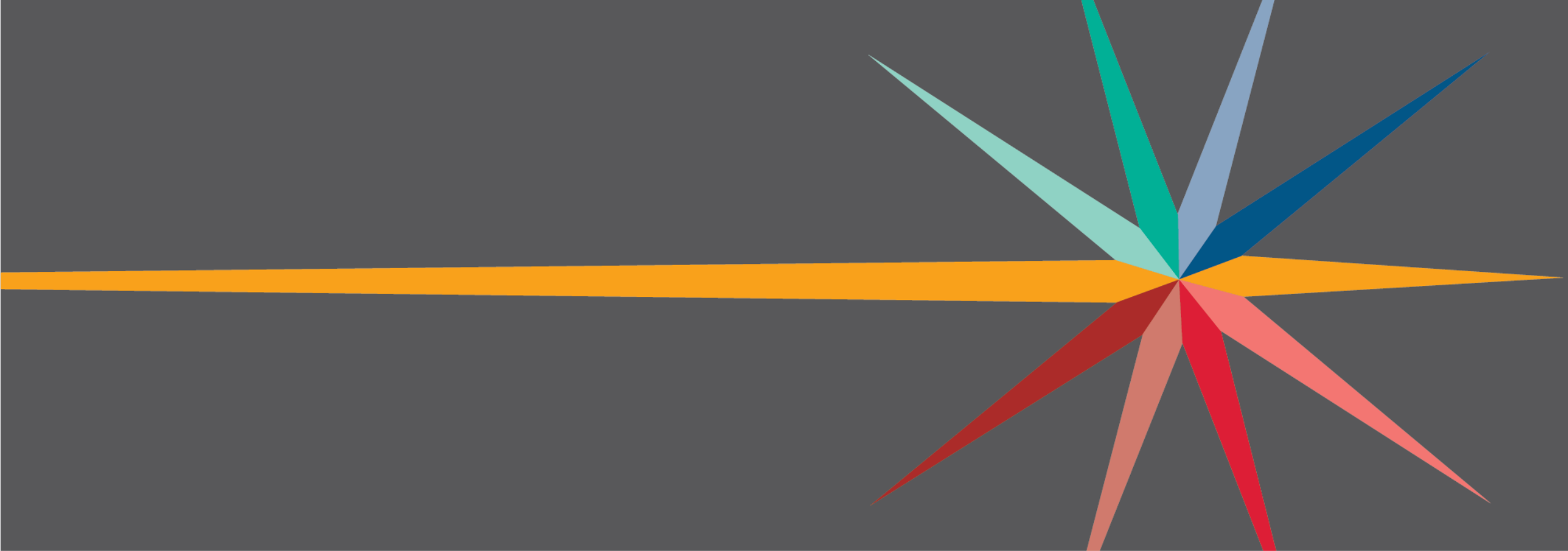
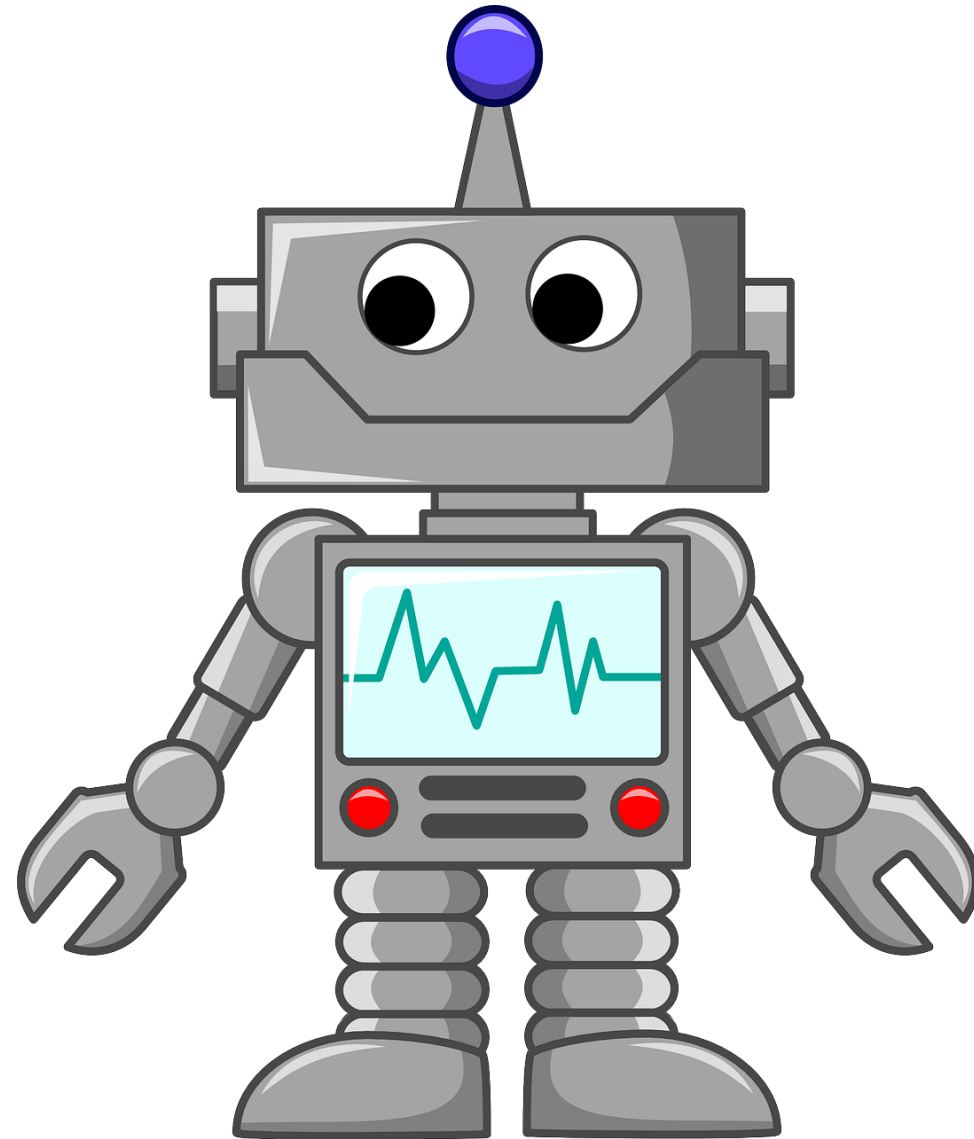




Getting Started with Robots

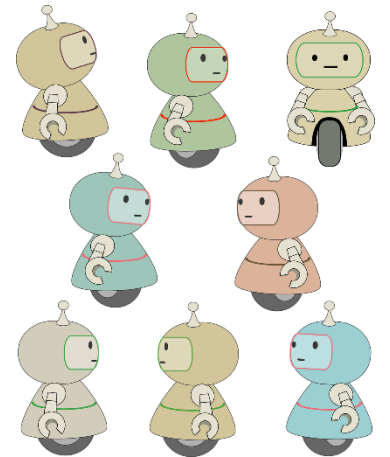
Introductions

Stephen King, PhD PMP is the Computer Science Education Program Consultant for the Kansas State Department of Education. With a doctorate in education and a masters in telecommunications management, he has over twenty years of experience leading and teaching IT and computer science to high school and college students.



What Will Our Takeaways Be Today?

- Understand four main categories of robots
- Become familiar with options at different grade/age levels
- Suggest a classroom use for each one
- Share ideas for learning activities using robots



What Isn't Included

- Industrial robots (Chris Wyant – cwyant3@wsutech.edu)
 - Fanuc, Yaskawa, Kawasaki, etc.
 - Fixed or track based arm with 1 or more attachments
 - Important in several CTE programs
- Drones
 - Used in surveying, agriculture, insurance, and many other occupations
 - Require FCC license (Part 107) in most outdoor applications
 - Educationally similar to the robots discussed
- Custom robots
- Virtual robots



4 Main Types of Educational Robots

- Physically coded robots
 - Generally, the easiest to start out with
- Introductory programmable robots
 - Toylike, foundational programming, often in GUI or blocks
- Computer-programmable robots
 - Greater range of abilities, often greater range of sensors
- Kit-based robots
 - Modular and flexible
 - Middle/high school, student club activities
 - Can teach engineering as well



Physically Coded Robots

- KIBO (Kinderlab Robotics)
 - Based on pedagogy research out of Amherst
 - Programmed by pointing robot at string of blocks
 - Starts at \$220 per kit, retail, discounts for multiple
 - Comes with curriculum ideas
- KUBO
 - Exclusive through PITSCO **
 - Programmed by snapping together puzzle pieces
 - Starts at \$179 per kit
 - Curriculum ideas available online

** KSDE does not promote specific vendors, but PITSCO is a Kansas vendor



More Physically Coded

- mTiny (MakeBlock)
 - Looks like an e-pet
 - Coded via cards
 - Retail for \$149
- “Play based learning”
- Generally younger students



Introductory Programmable Robots

- Mix of play-based and activity-based learning
- Probably the largest category
- Dash/Dot/Cue family
 - Dash – mobile unit; Dot – immobile unit
 - GUI, Blockly, Wonder programming
 - Cue can be programmed in Javascript or Swift
 - Dot - \$80
 - Dash - \$150
 - Cue - \$200



More Intro Programmable Robots

- Sphero family
 - Mini, Bolt, Sprk+ “STEAM”
 - Varying level of sensors
 - Programmable with block based or Javascript, C++, Python, Ruby
 - Mini: \$50, Sprk+ \$130, Bolt: \$150
 - Also Ollie (tube shaped, much faster)
 - Also BB-8, BB-9, R2D2, etc.



More Intro Programmable Robots

- Winky (“your new friend”)
 - Ages 5-12
 - Proprietary programming language
 - Spins, eyes change, ears swing
 - AI robot
 - 199 Euro retail
- Roybi (“personalized learning”)
 - Private tutor in robot form (chemistry, languages, etc.)
 - Cloud-based educational curriculum
 - Parents can track activities
 - Still in development; retail <\$200



More Intro Programmable Robots

- Miko 2
 - Age 5-10
 - AI interaction with face on screen, dancing, sounds
 - Telephone interface
 - Parent control app
 - Retails for \$249
- Smart Buddies (PITSCO)
 - Lessons include topics on diversity and conflict resolution
 - Interactive storytelling
 - Grades 3-5



Computer Controllable Robots

- Families cross lines (like Sphero)
- Edison
 - Programmable through
 - Bar codes
 - “EdBlocks” (graphical language)
 - “EdScratch” (block codes)
 - “EdPy” (text based coding)
 - Assembled (expansion sets available)
 - \$49 single
 - \$114 starter pack
 - \$990 classroom 30 pack



More Computer Controllable Robots

- Robomaster S1
 - Battlebot
 - Scratch and Python coding
 - Multi-directional motion
 - IR and plastic bead cannon
 - First-person camera
 - 31 sensors including sound and gesture readers
 - Retails for \$549
 - Add-ons available
 - Some assembly required



Kit-Based Robots

- Some(/much) Assembly Required
- Prices range from really inexpensive to – the other end
- Complexity ranges greatly
- mBot (makeBlock)
 - Metal-framed assembly
 - Wireless control
 - Programmed in Scratch
 - 30-45 minute assembly
 - Retail \$69 and up
 - Expansion kits available



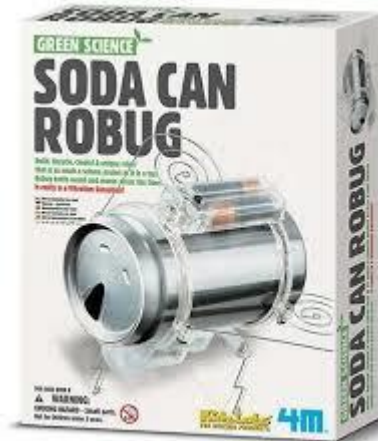
More Kit-Based Robots

- LEGO
 - One of the bigger players in the market
 - Boost (Creative Toolbox)
 - 5 robots in one
 - Requires tablet or Android device
 - Proprietary block-based coding
 - Age 7-12
 - Retails \$159
 - Mindstorm
 - EV3 controller
 - Ages 10+
 - Retails \$349



More Kit-Based Robots

- Tin Can Robot
 - Requires assembly and one used soda can
 - Doesn't do a lot but move forward, but it's cute
 - Retails \$10
 - Same company sells Soda Can Robug and Brush Robot



©2020



More Kit-Based Robots

- Sparki “The Easy Robot for Everyone”
 - Arcbotics
 - Block-based or C++ programming
 - Arduino based
 - Middle school and up
 - \$149 retail
- MITU MI
 - Similar to Mindstorm but more parts
 - >1000 parts
 - \$80 retail



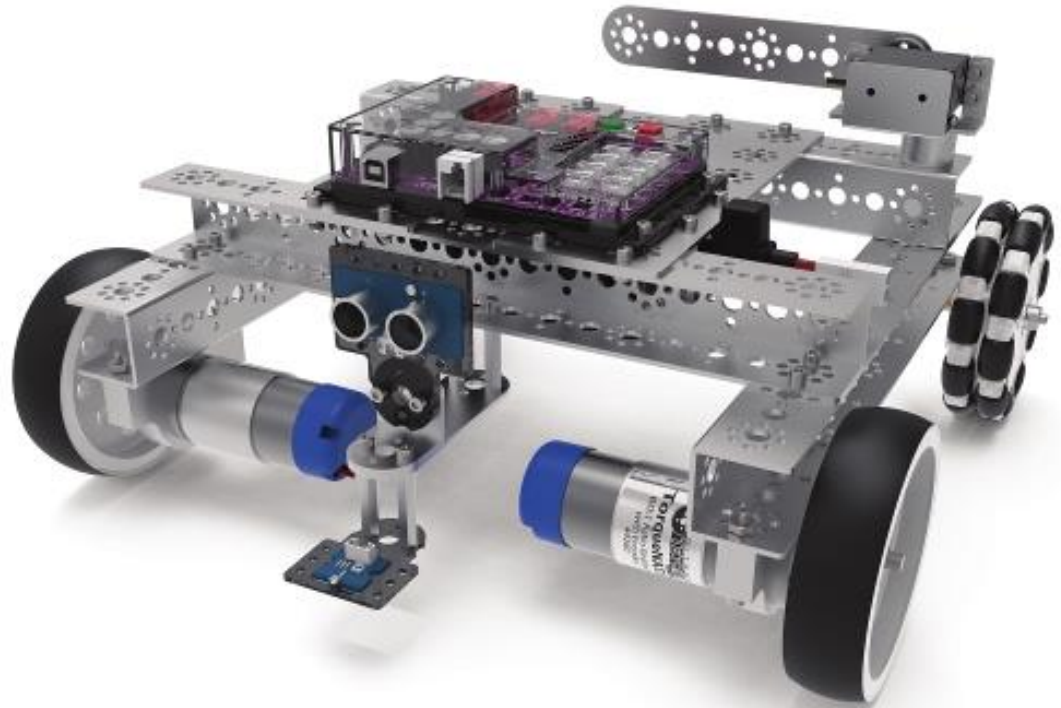
More Kit-Based Robots

- MicroDuino Mix Kits (PITSCO)
 - Grades 3-8
 - Magnetic, snap-together pieces
 - Scratch based programming
 - \$199 and up
- Tetrix Prime (PITSCO)
 - Grades 6-12
 - EV3 or proprietary controller
 - Curriculum Available
 - Flexible modularity
 - \$499 retail



More Kit-Based Robots

- TETRIX MAX (PITSCO)
 - Grades 9-12
 - Engineering required
 - \$595 retail for basic set
 - EV3 or proprietary brain



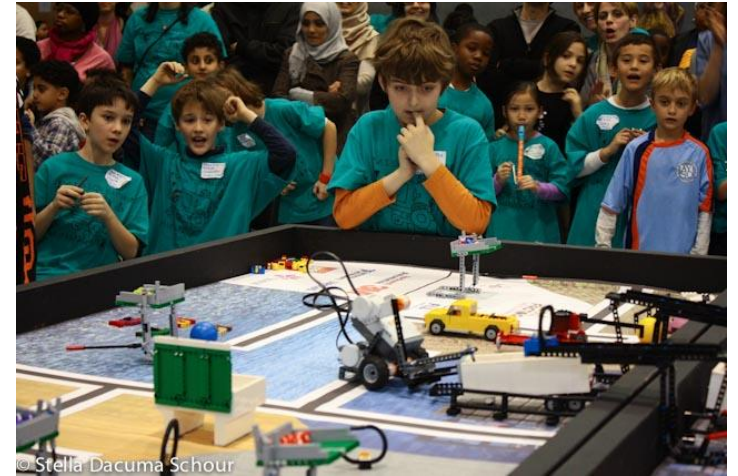
More Kit-Based Robots

- VEX (Classroom and/or Competition)
 - VEX 123
 - Pre-K through 3rd grade
 - \$100 retail
 - Physical coding or GUI on portable devices
 - VEX GO
 - 3-6 grade
 - \$149 retail
 - Block based coding
 - VEX IQ
 - 6 grade and up
 - \$347 retail for kit



More Kit-Based Robots

- FIRST (Classroom and/or Competition)
 - FLL (First Lego League)
 - Based on LEGO robots
 - Also include science and teamwork challenges
 - PK-8
 - FTC (First Tech Challenge)
 - Robots require construction
 - 7-12
 - FRC (First Robotics Competition)
 - Robots require engineering
 - 9-12
 - International competition



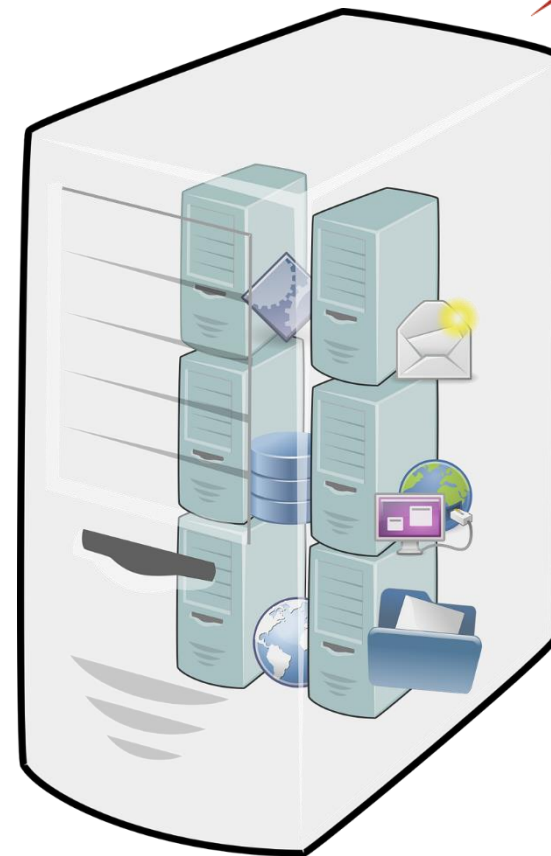


Please take a moment and complete an Evaluation:

https://docs.google.com/forms/d/e/1FAIpQLSfO1uVliwGLWW7Uj88O5ESB8eIjbOI8BDk227wAM8fID6Sdw/viewform?usp=sf_link

<https://forms.gle/V1CA9vo8Uwfma7Fh7>

Let's DO THIS!





Stephen King, PhD PMP
Education Program Consultant – Computer Science
(785) 296-1893
sking@ksde.org

The Kansas State Department of Education does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities and provides equal access to the Boy Scouts and other designated youth groups. The following person has been designated to handle inquiries regarding the nondiscrimination policies: KSDE General Counsel, Office of General Counsel, KSDE, Landon State Office Building, 900 S.W. Jackson, Suite 102, Topeka, KS 66612, (785) 296-3201.

