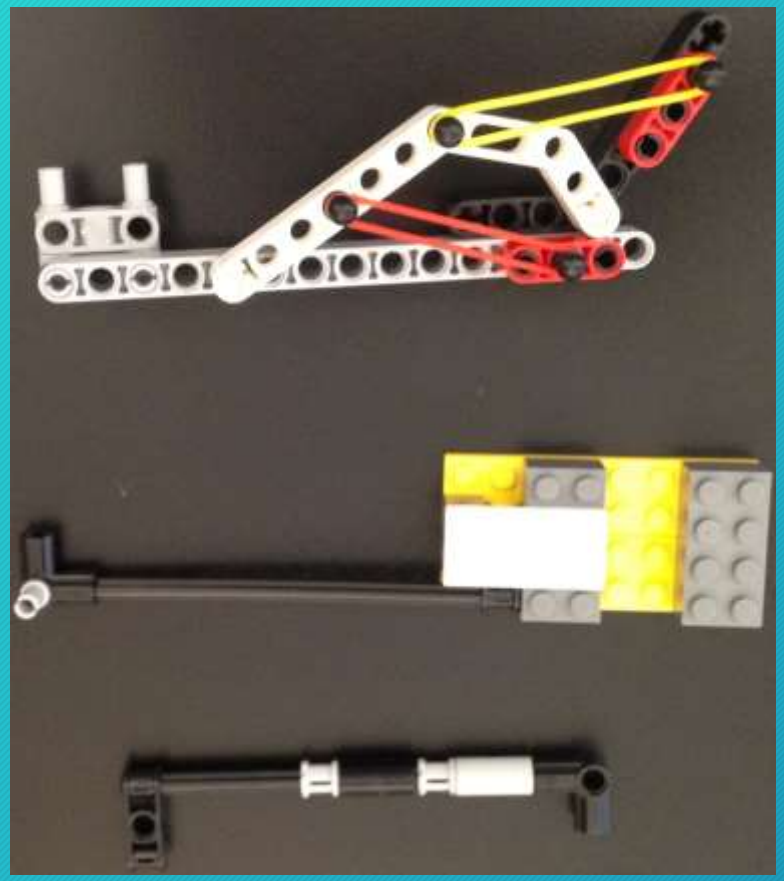
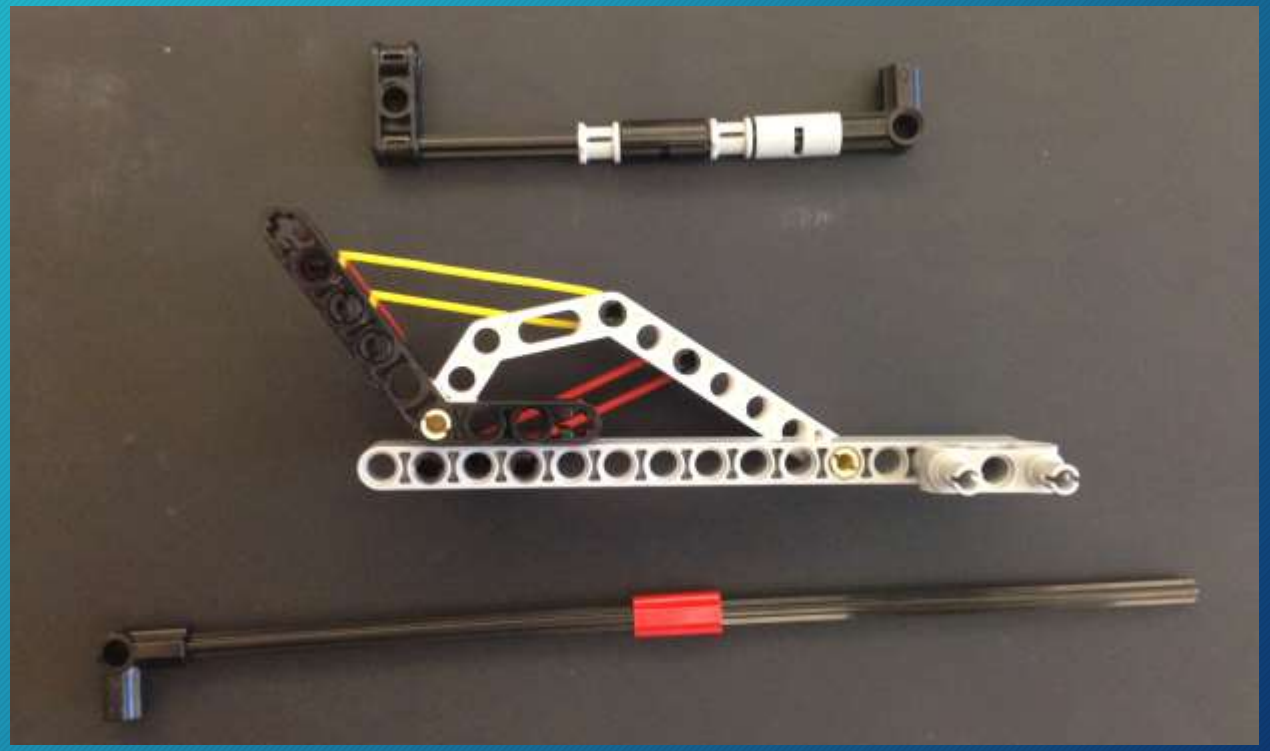
Assorted





SEEC YouTube Videos

Search YouTube for:

Science and Engineering Education Center

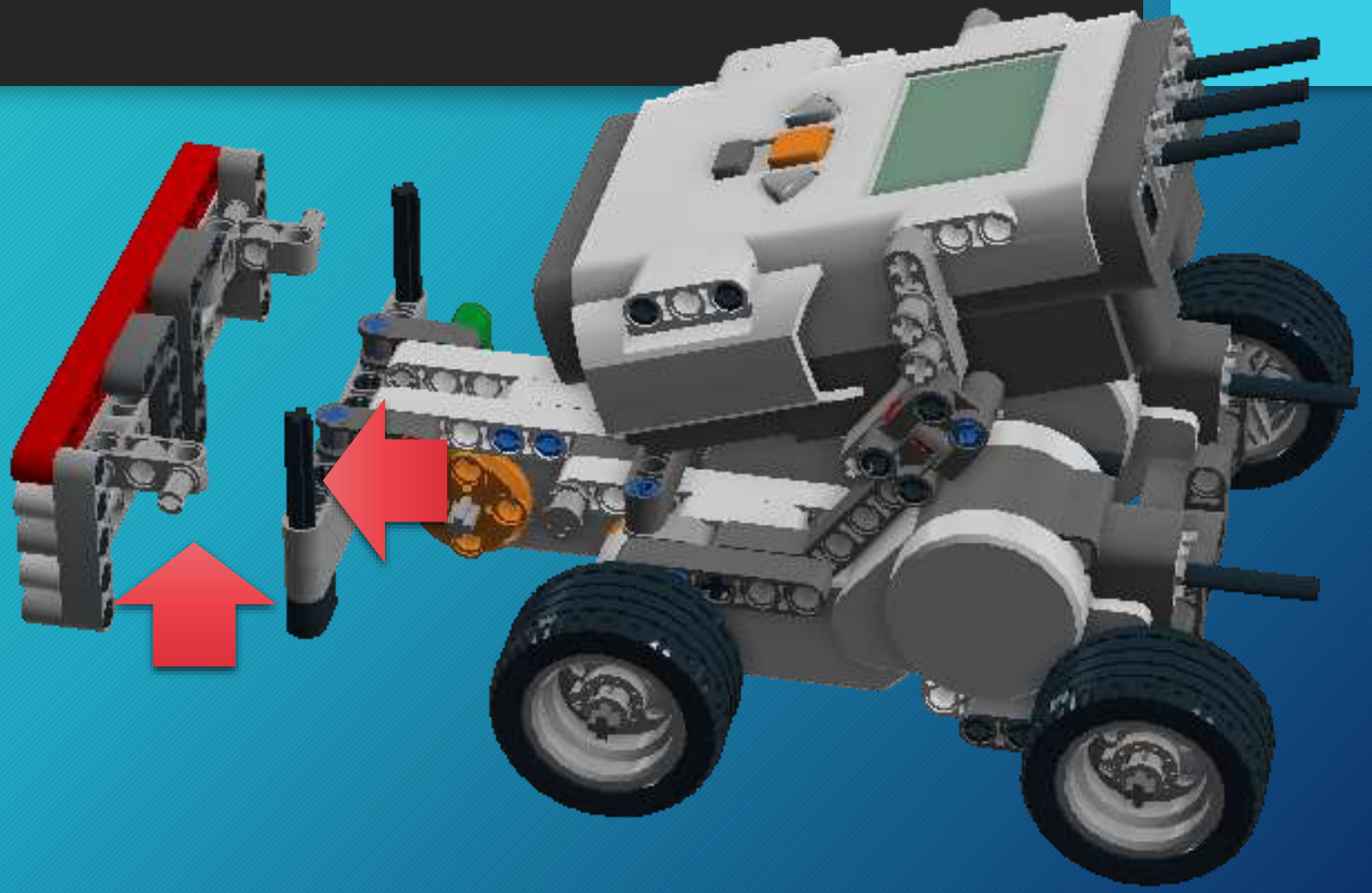
Cyrille Chiari

- http://youtu.be/5a4AYvKQUFU - One Way Gate
- http://youtu.be/X3RY7AjmTgo - Latch
- http://youtu.be/LOau4GNrei8 - Wide Touch Sensor
- http://youtu.be/EiXpqENqm1U - Light Sensor Shield

Mounting Attachments

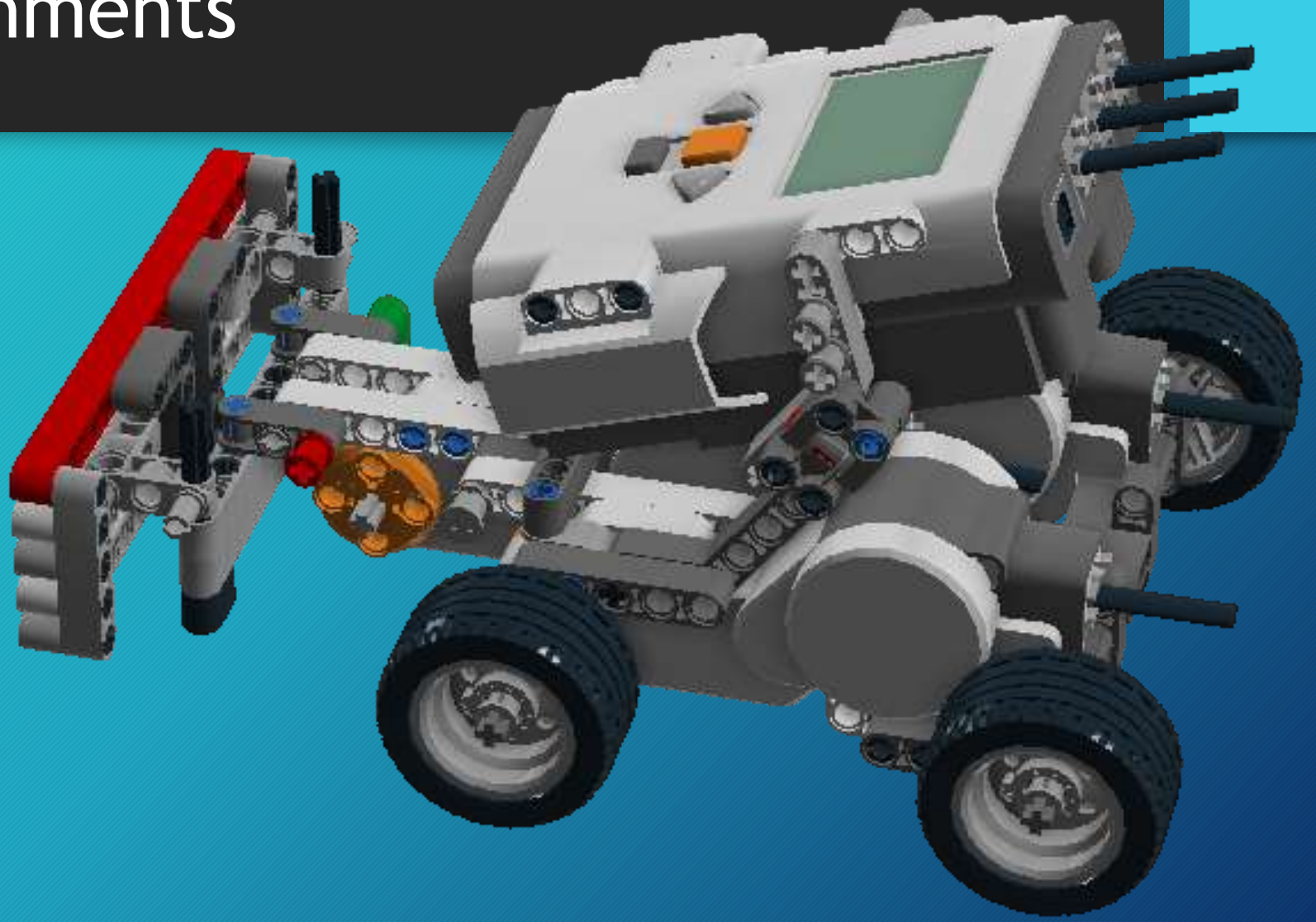
Drop-on attachments

- Drop-on attachment typically use axles and gravity to mount to the chassis.
- Quick to change.
- Multiple attachments can mount to the same bracket.

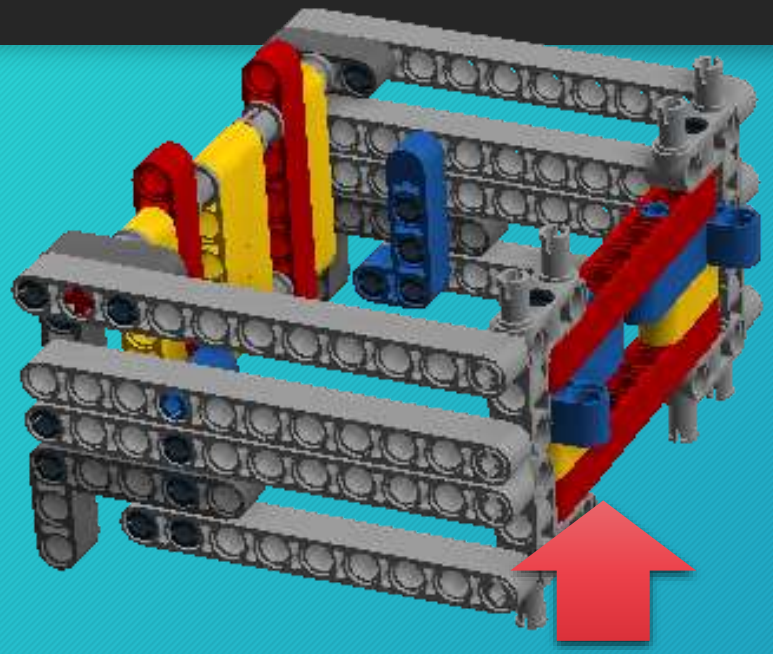


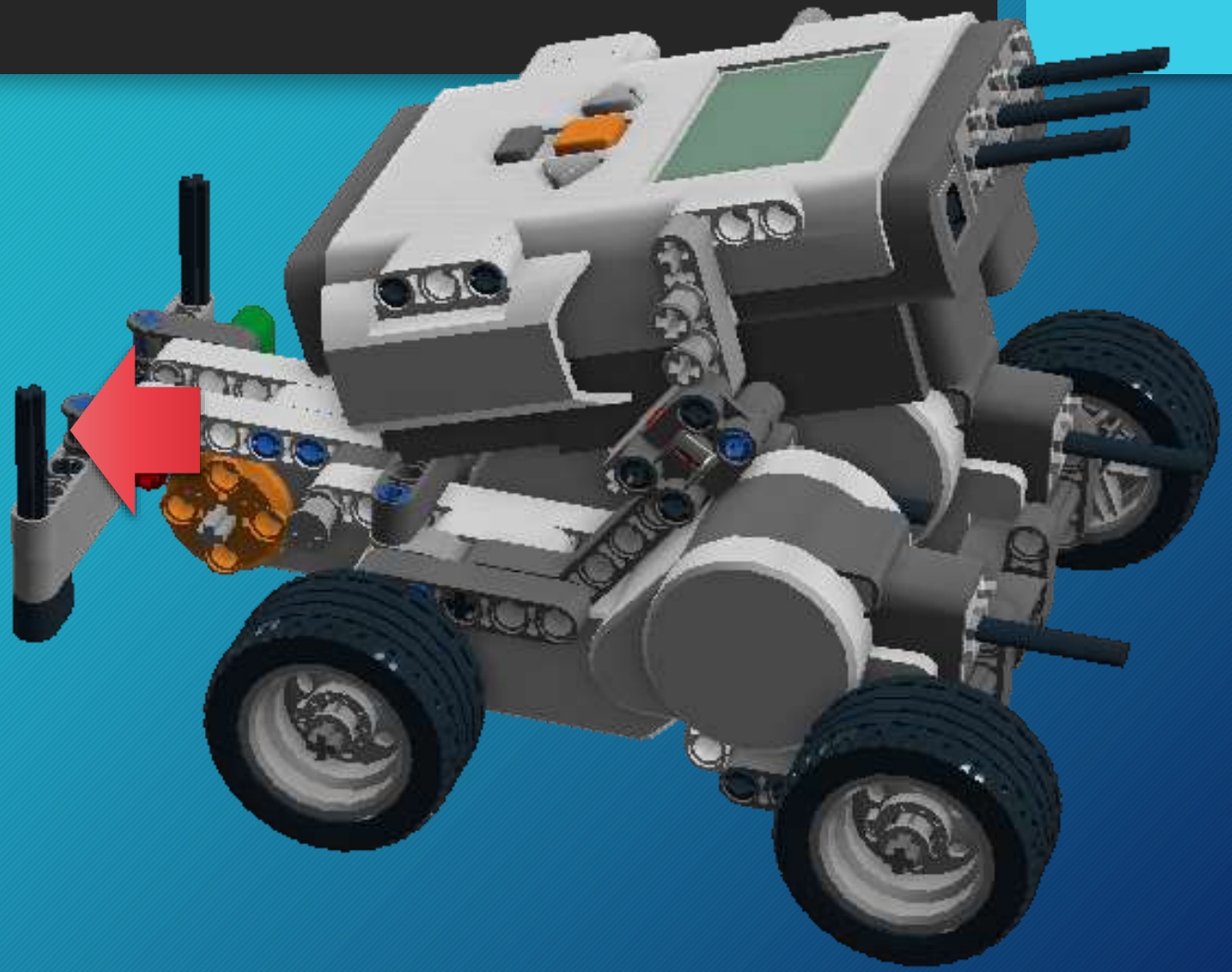
Drop-on attachments

- Here it is attached.



Drop-on attachments

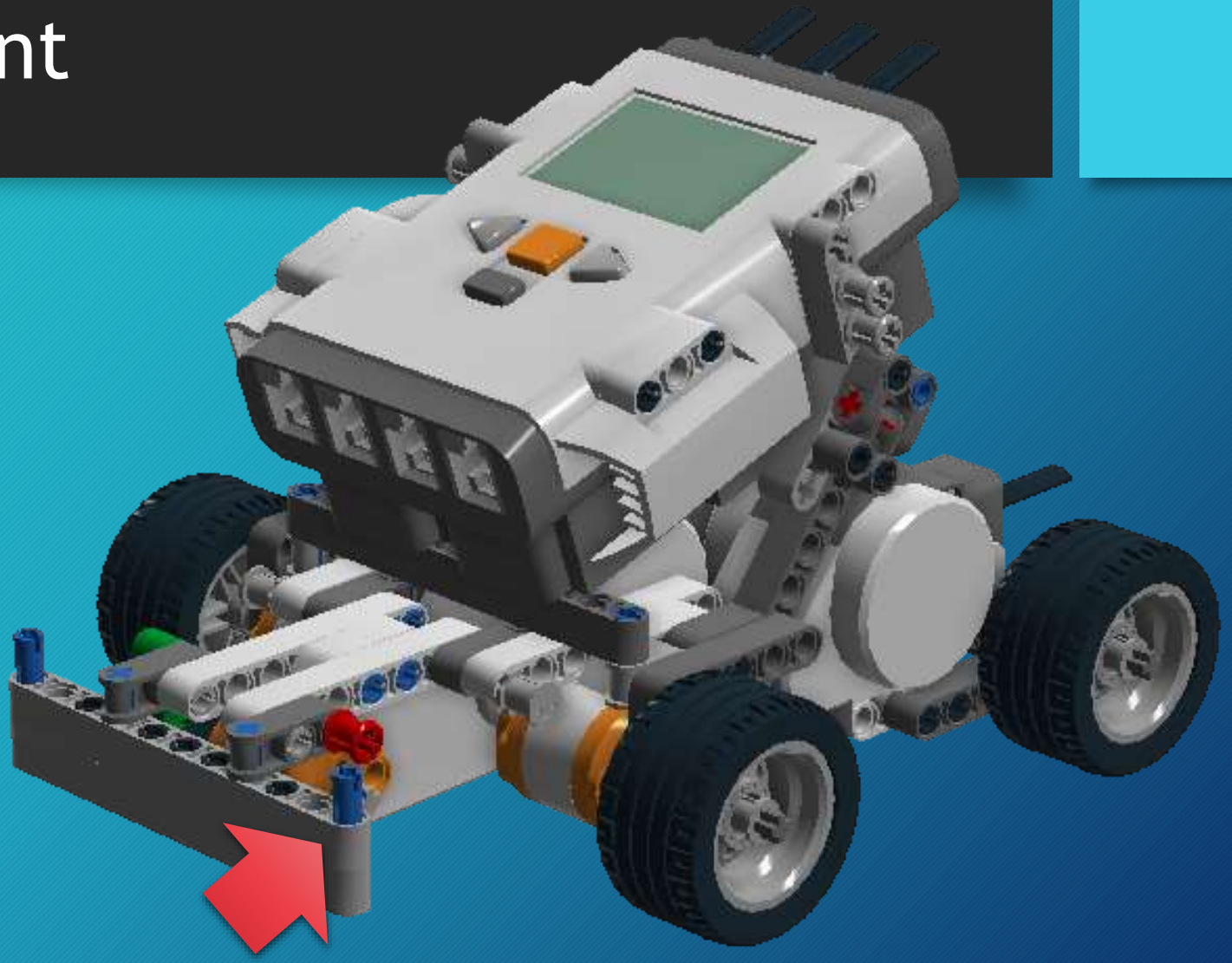




- Different attachment, same mount points to the chassis.

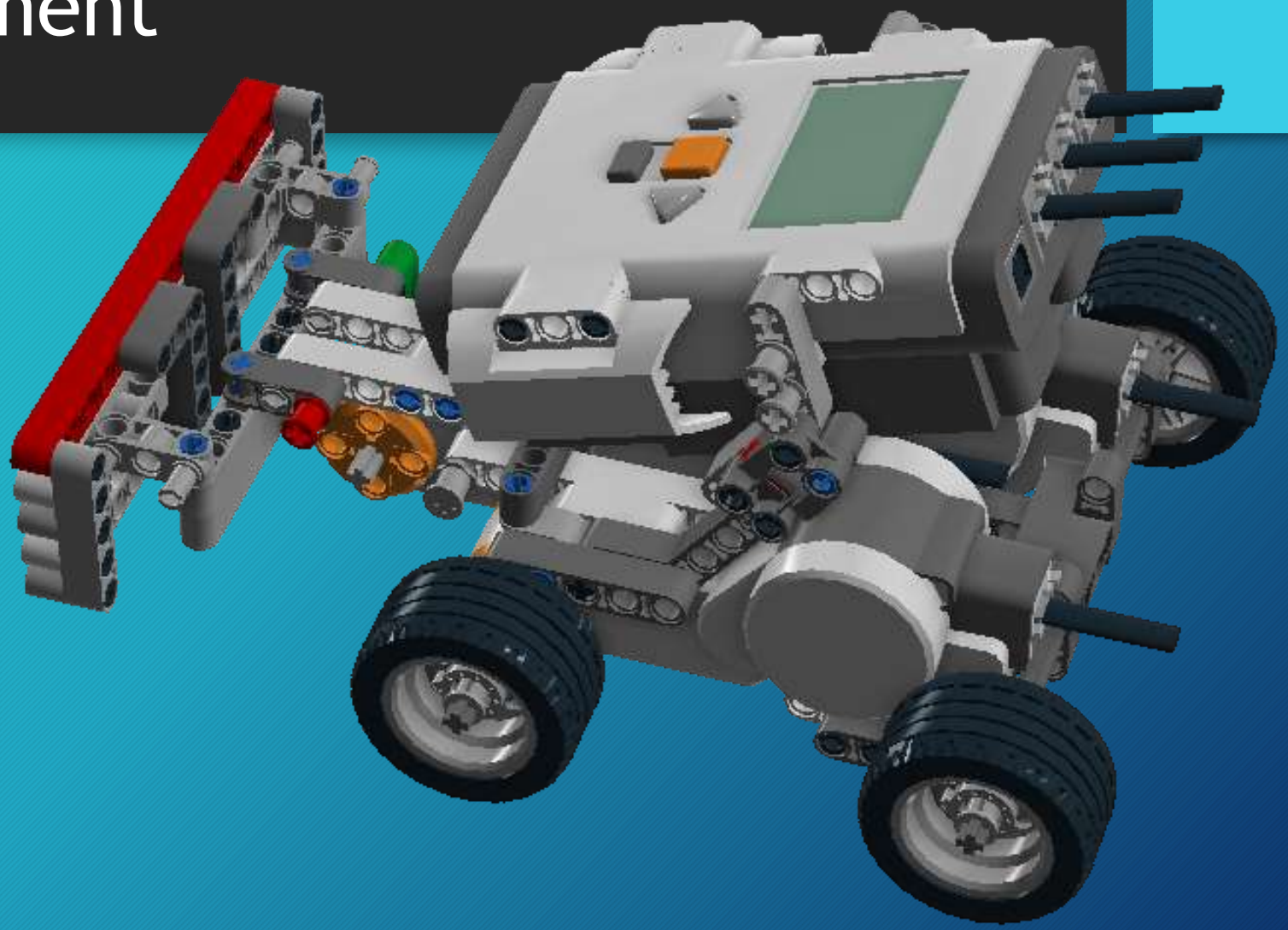
Mounted attachment

- Mounted attachment typically use pegs and/or other Lego® pieces to mount to the chassis.
- Not as easily changed.
- Best when structural strength is required.



Mounted attachment

- Here it is attached.



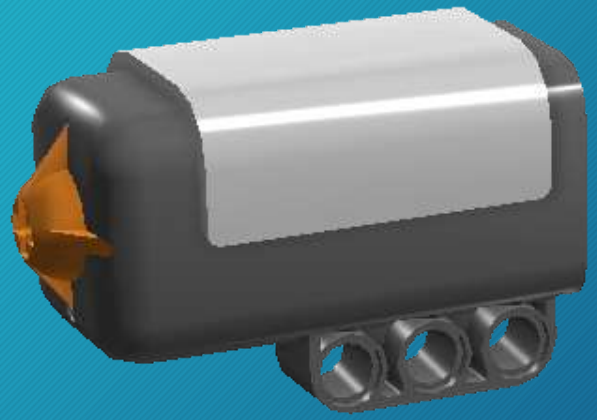
Senor Mounting

Why use sensors?

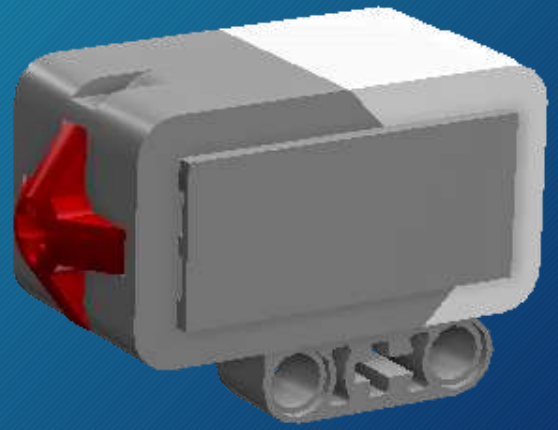
- Sensors provide input to the program to accomplish the particular mission programmed.
- A sensor should be used if it enables the robot to accomplish its mission faster, more accurately, more reliably, more efficiently, or safer than with some other resource like power, weight or time.
- To create the best possible robot for a task, it’s important to fully understand all the available sensor options, and how each sensor type can help the robot in achieving its mission.

General senor mounting

- Lego® sensors have mounting interfaces on “bottom”.
  - NXT sensors have three holes.
  - EV3 sensors have a cross mount in-between two holes.
- These holes align with beams and other Lego® pieces.
- To function constantly, sensor must not be loose or wobble.



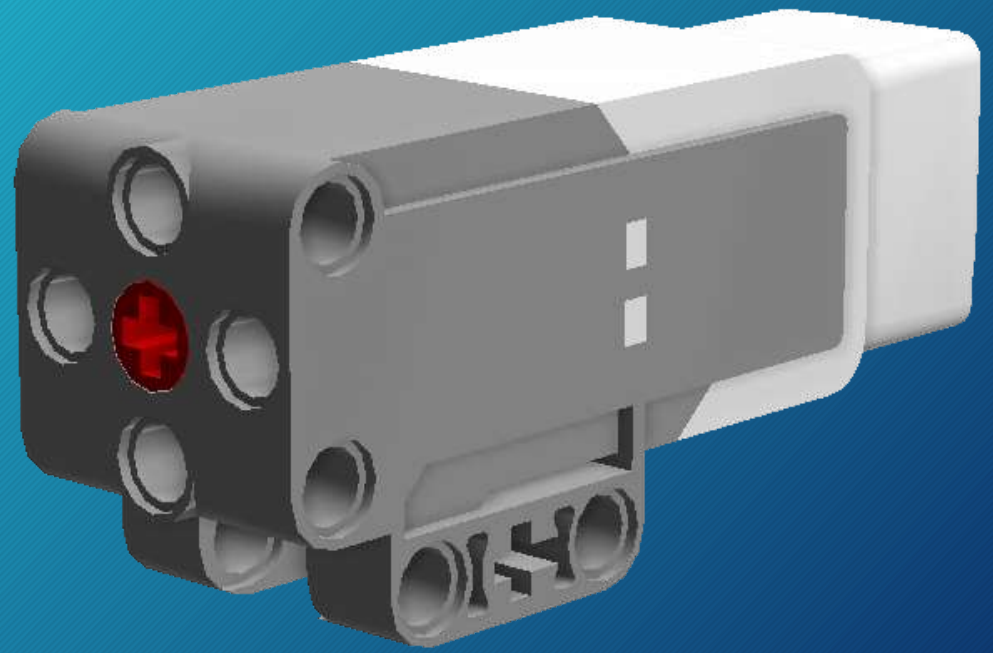
NXT Touch Sensor



EV3 Touch Sensor

Motors

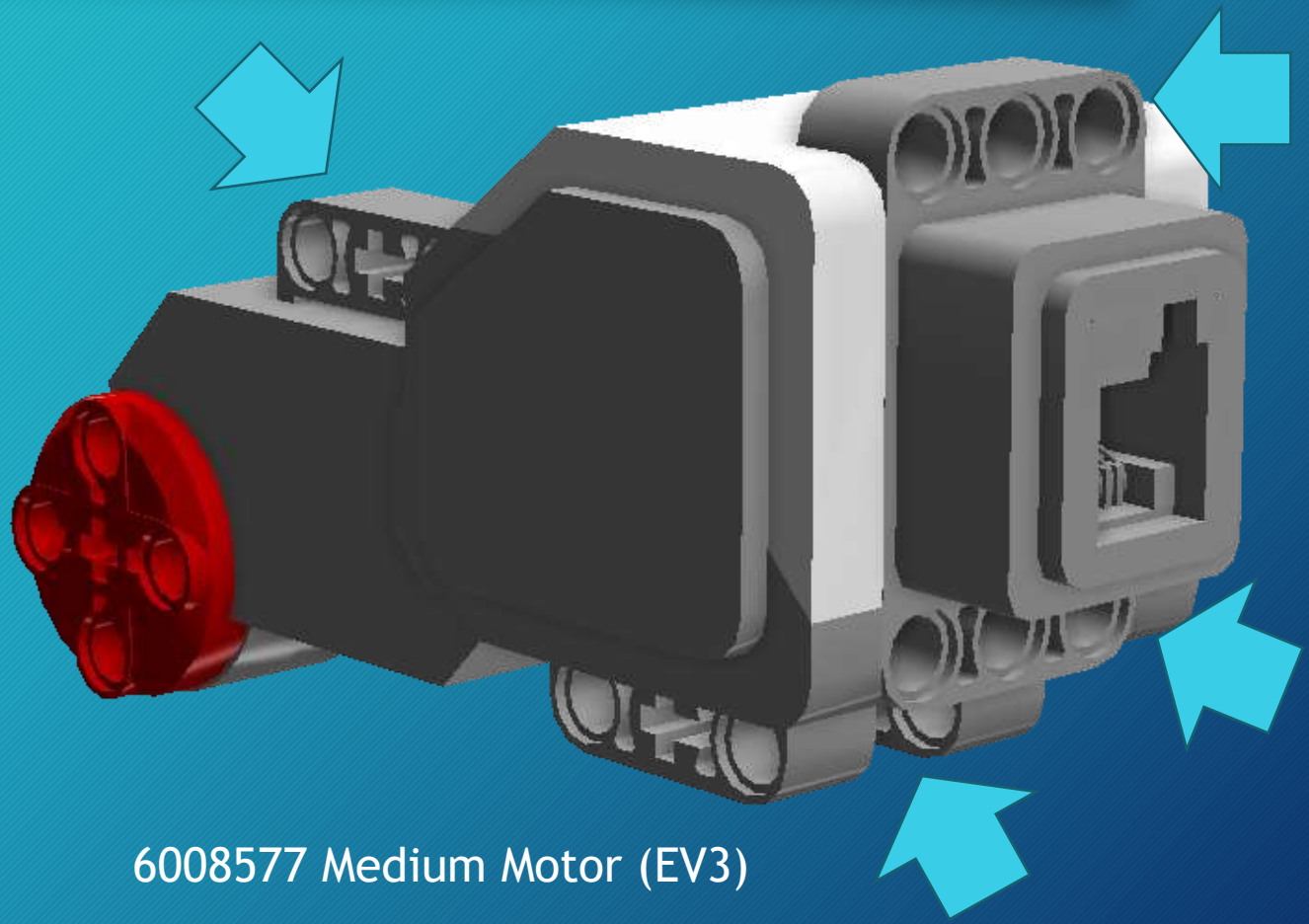
- Yes, motors are sensors!
- They can provide feedback to the program.
  - How many rotations/degrees have they turned.
  - In what direction did they turn.
  - How fast they are going.
- Motors have additional mounting points.



6008577 Medium Motor (EV3)

Motors

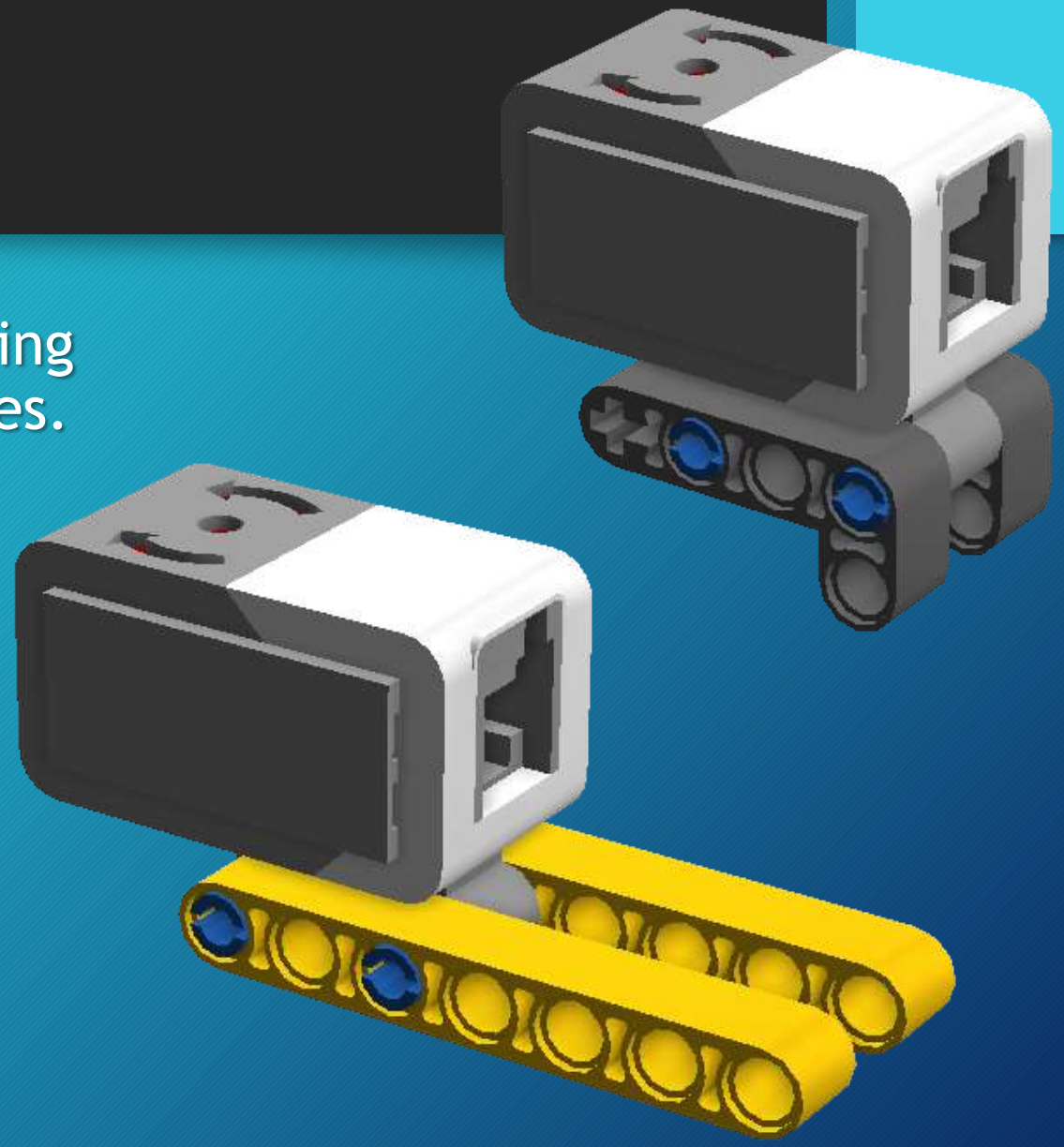
- Additional motor mount points permit mounting in many orientations.
- Multiple mounting points on motor drive enables numerous movement methods



6008577 Medium Motor (EV3)

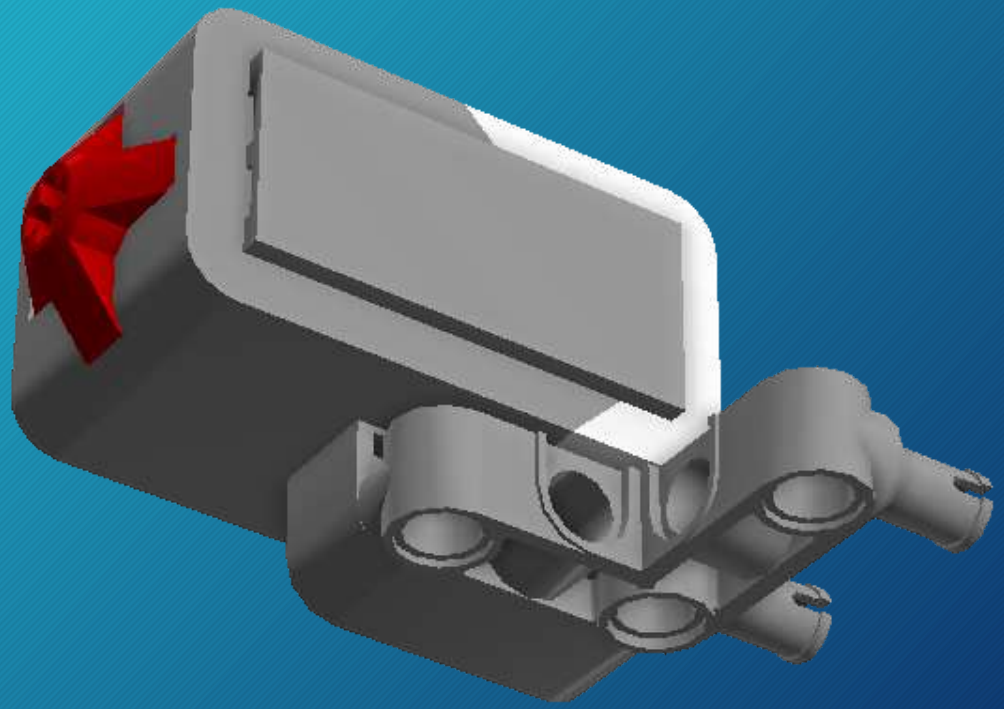
General senor mounting

- An almost unlimited number of mounting options are available using Lego® pieces.
- Remember to keep the cable port accessible.



General senor mounting

- Often a simple mount works best.



Connecting sensors – Default ports

- Port 1: Touch Sensor
- Port 2: Gyro Sensor/Temperature Sensor
- Port 3: Color Sensor
- Port 4: Ultrasonic Sensor/Infrared Sensor

Mindstorms® software defaults to these ports for sensors.

Connecting Motor – Default Ports

- Port A: Medium Motor
- Port B & C: Large Motor to each
- Port D: Large Motor

Mindstorms® software defaults to these ports for motors.

Color sensor overview

- The color sensor is a digital sensor that can detect the color or intensity of light that enters the small window on the face of the sensor.
- The color sensor has three modes:
  - Color mode
  - Reflected Light Intensity mode
  - Ambient Light Intensity Mode

Color sensor overview

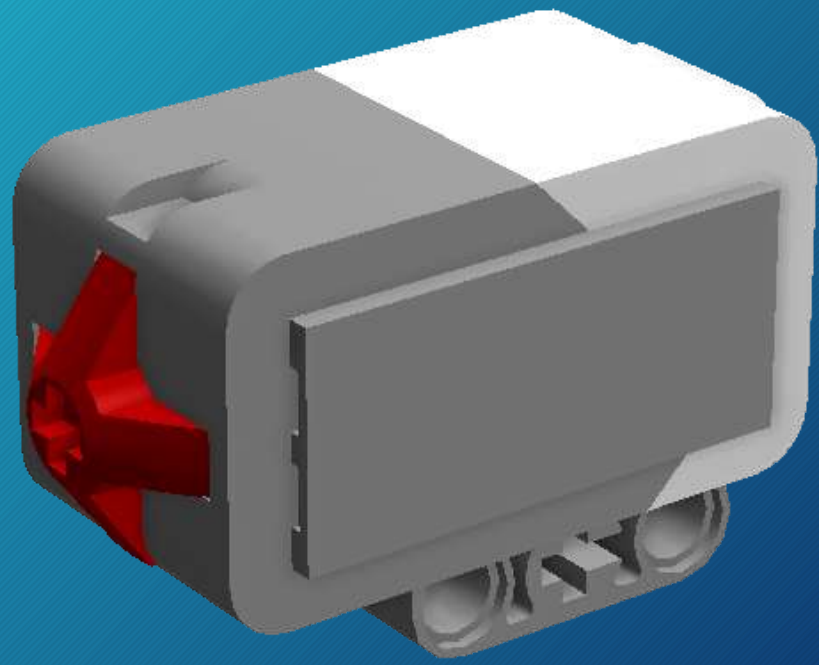
- Color mode: the Color sensor recognizes seven colors – black, blue, green, yellow, red, white, and brown. Plus no color.
- Reflected Light Intensity mode: measures the intensity of light reflected back from a red light-emitting lamp using a scale of 0 (very dark) to 100 (very light).
- Ambient Light Intensity mode: measures the strength of light that enters the window from its environment using a scale of 0 (very dark) to 100 (very light).
- The sample rate is 1 kHz/sec

Color sensor mounting

- Mounted at right angle to surface be measured for color and reflected modes
- Mount no more than 1 cm from surface being measured, but not touching
- Shrouds can help ambient light from interfering in color and reflected modes.
- For line followers, mount in front of wheels

Touch senor overview

- The Touch Sensor is an analog sensor that can detect when the sensor button has been pressed or released.
- Can be programmed to respond to three conditions:
  - Pressed
  - Released
  - Bumped (pressed and released)



Touch sensor

- Touch sensor can be mounted in an orientation that permits the sensor button to be activated.
- Touch sensor can be used to start and stop programs.

Ultrasonic senor overview

- The Ultrasonic Sensor is a digital sensor that measures distance to an object using high-frequency sound waves.
- Distance can be measured in centimeters or inches.
  - 3-250 cm (±1 cm)
  - 1-99 in. (0.394 in.)
- EV3 – a steady light around the sensors “eyes” indicates the sensor is in measure mode. A blinking light indicates it is “Presence mode” which means it detects another Ultrasonic Sensor operating nearby.

Ultrasonic sensor mounting

- In the same direction as the object being sensed.
- At about the same height of the object being sensed.
- Can be mounted in any orientation to face object to sense.

4297174 (NXT)

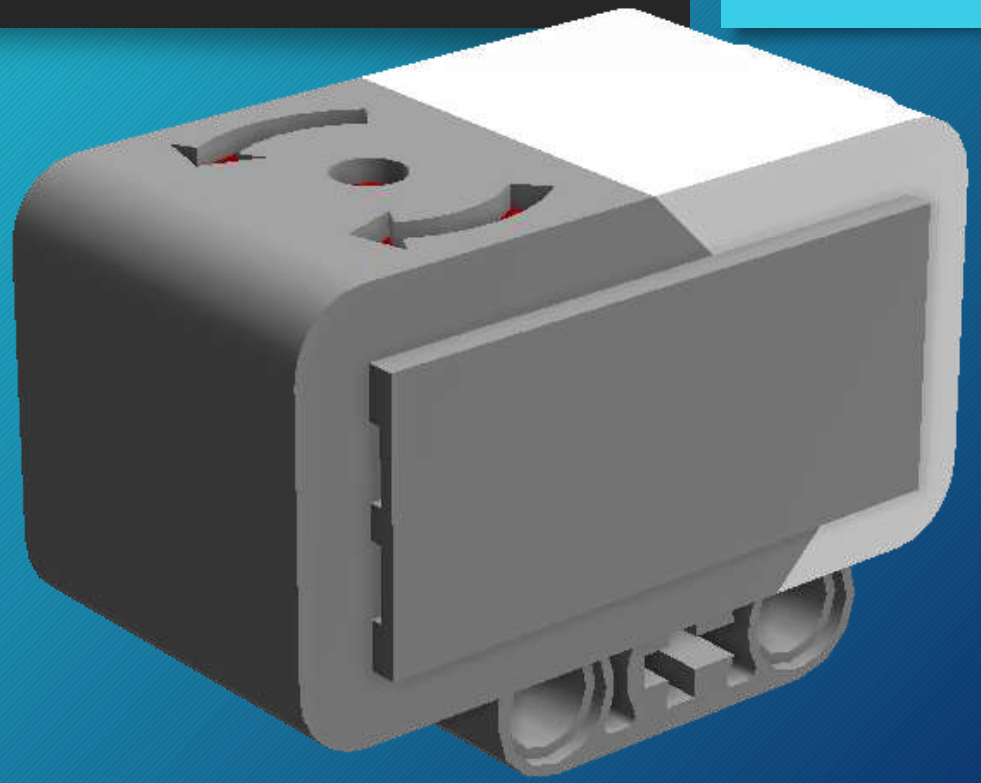
6063629 (EV3)

Gyro sensor overview

- The Gyro Sensor is a digital sensor that detects rotational motion on a single axis in the direction of the arrows on the sensor case.
- The Gyro Sensor can detect rotation up to a spin rate of 440 degrees per second.
- The Gyro keeps track of the total rotation angle in degrees with an accuracy of ±3 degrees.

Gyro sensor

- Typically mounted with axis parallel to surface that robot is on (Arrows and dot up).
- In this case top must be level with surface.
- As with most gyros there can be drift. A short program can be used to minimize the draft.

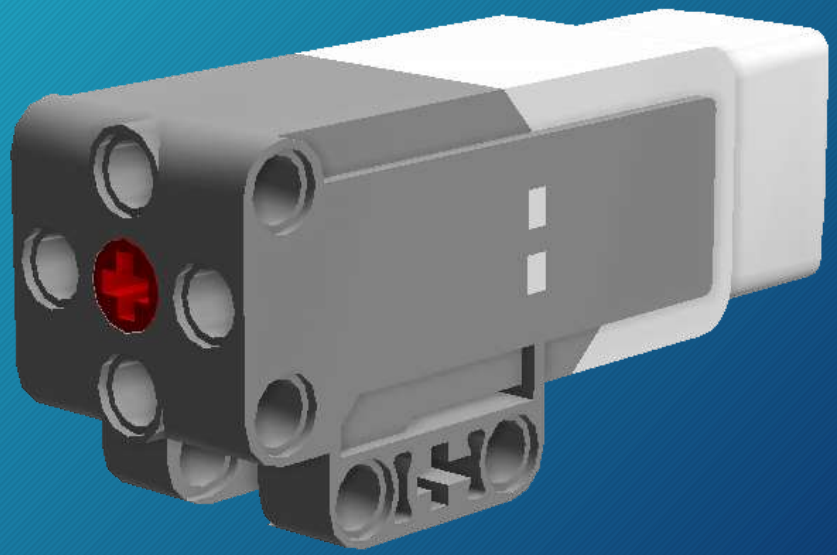


6008916 (EV3)

6008577 Medium Motor (EV3)

- Built-in Rotation Sensor with 1 degree resolution.
- Smaller and lighter, more responsive.

- Runs at 240-250 rpm, with a running torque of 8 Ncm and a stall torque of 12 Ncm.
- Supports Auto ID.

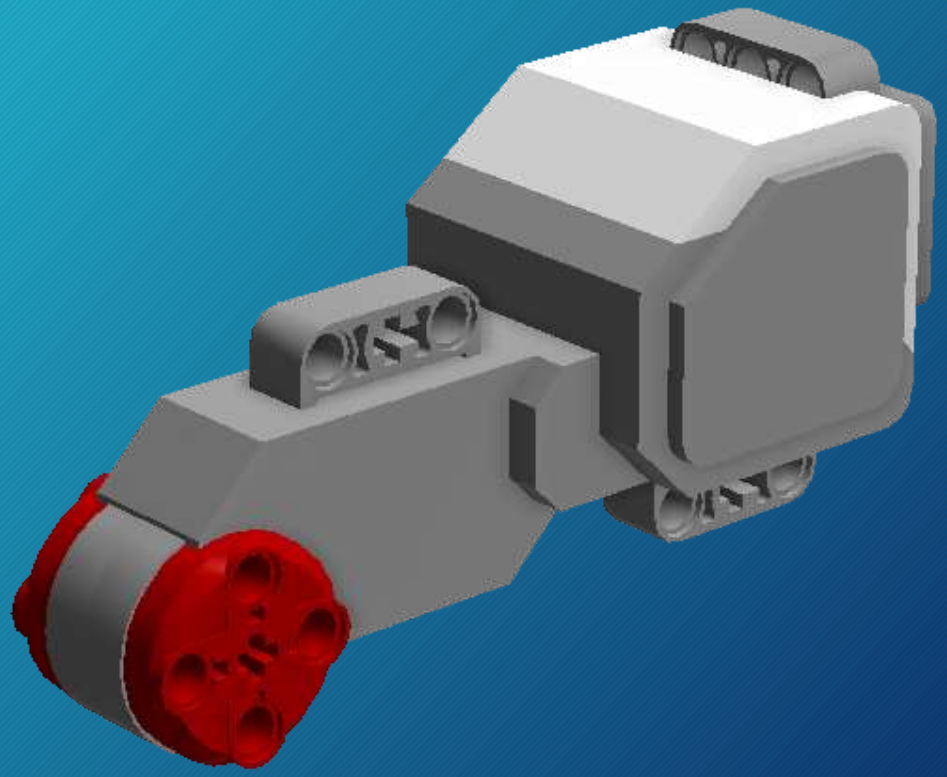


6008577 Medium Motor (EV3)

6009430 Large Motor (EV3)

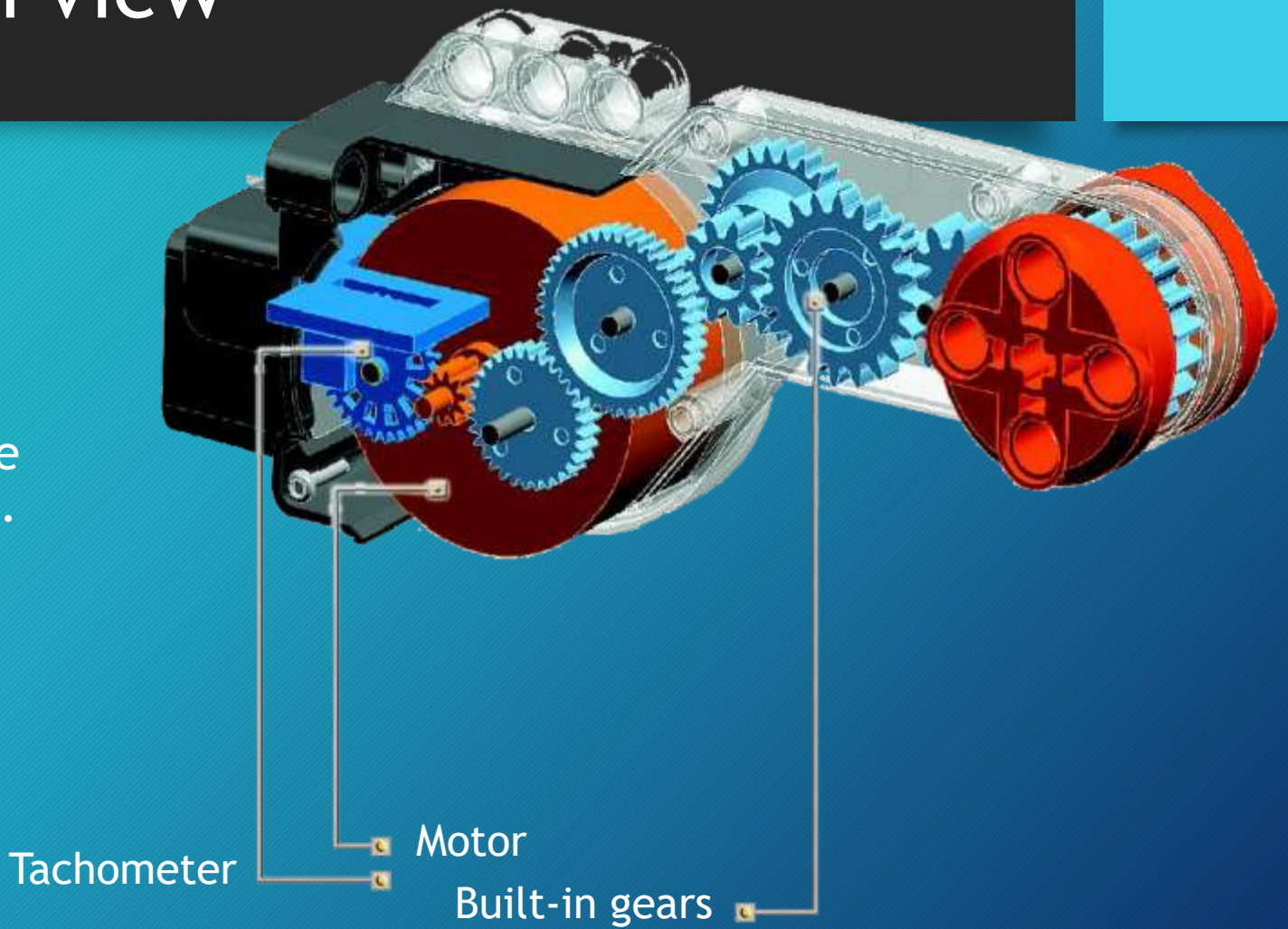
- Built-in Rotation Sensor with 1 degree resolution.
- Optimized for driving base of robot.
- Using Move Steering or Move Tank programming block will coordinate motors.

- Runs at 160-170 rpm, with a running torque of 20 Ncm and a stall torque of 40 Ncm.
- Supports Auto ID.



NXT motor phantom view

- Tachometer
  - An instrument measuring the rotation speed of a shaft or disk, as in a motor or other machine usually displayed the Revolutions Per Minute (RPM).
- Motor
- Built-in gears
- Data can be read by brick.



Questions