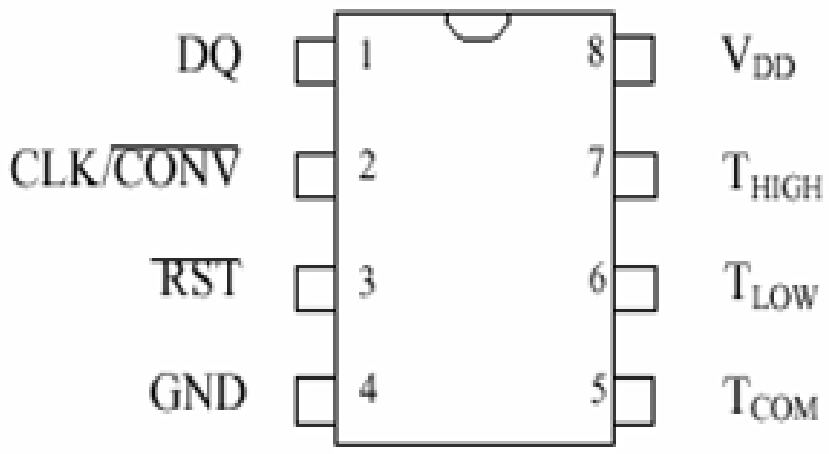
Lecture 10

Thermal Sensors

DS1620

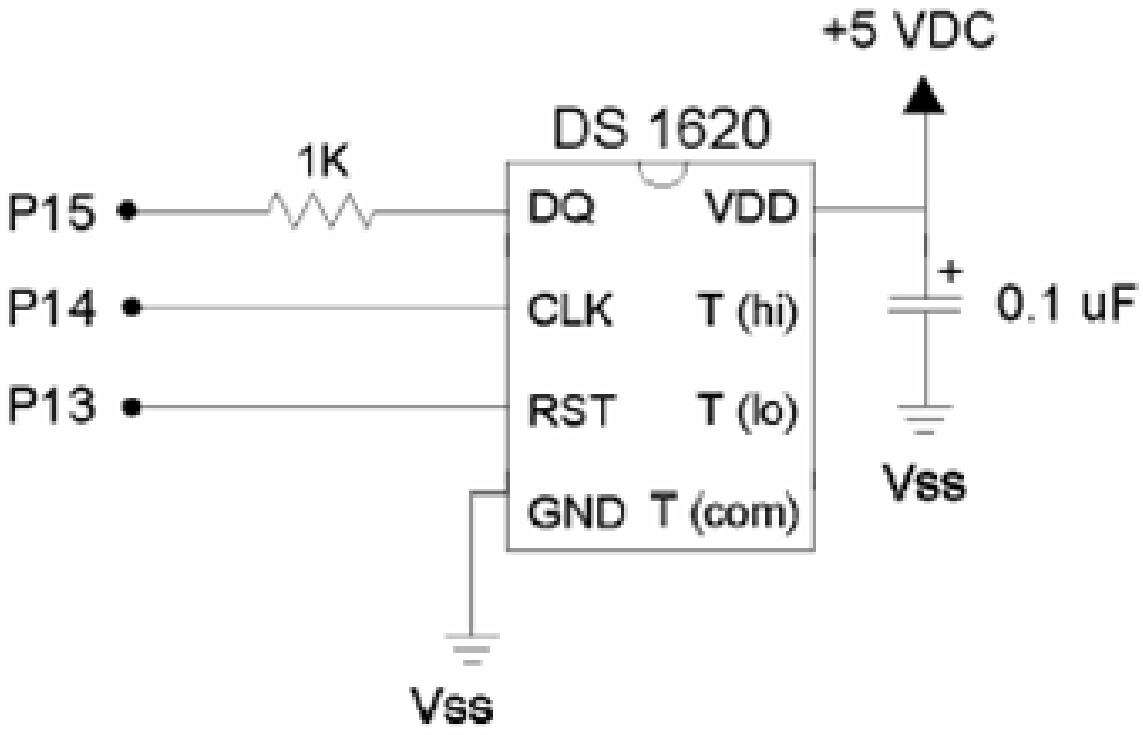


- Digital thermometer
  - Provides 9-bit temperature readings
  - Temperature range from -55°C to 125°C
  - Acts as a thermostat

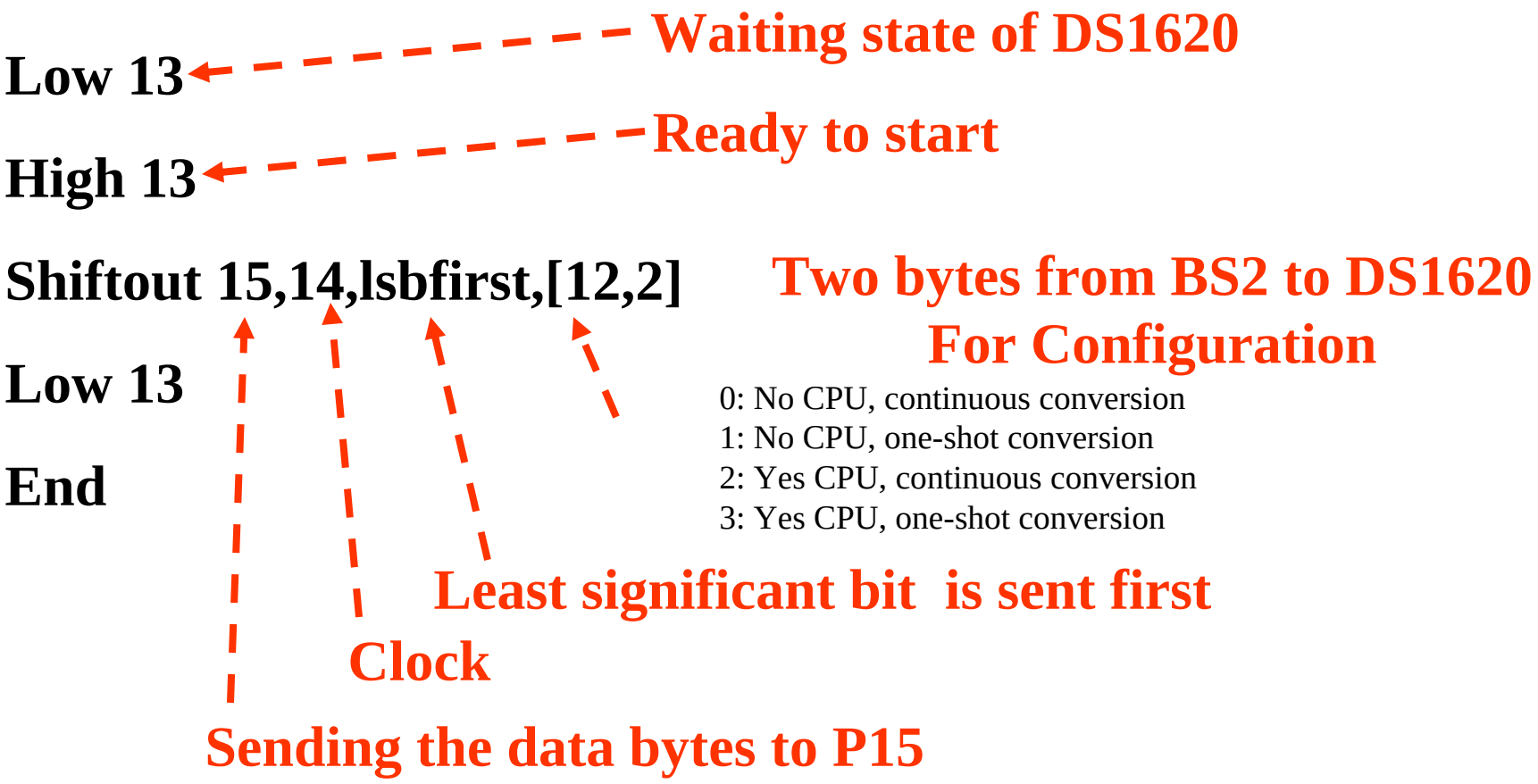
Detail Description

PIN	SYMBOL	DESCRIPTION
1	DQ	**Data Input/Output pin** for 3-wire communication port.
2	CLK/$\overline{\text{CONV}}$	**Clock input pin** for 3-wire communication port. When the DS1620 is used in a stand-alone application with no 3–wire port, this pin can be used as a convert pin. Temperature conversion will begin on the falling edge of $\overline{\text{CONV}}$.
3	$\overline{\text{RST}}$	**Reset input pin** for 3-wire communication port.
4	GND	**Ground pin.**
5	T_{COM}	**High/Low Combination Trigger**. Goes high when temperature exceeds TH; will reset to low when temperature falls below TL.
6	T_{LOW}	**Low Temperature Trigger.** Goes high when temperature falls below TL.
7	T_{HIGH}	**High Temperature Trigger.** Goes high when temperature exceeds TH.
8	V_{DD}	**Supply Voltage.** 2.7V – 5.5V input power pin.

DS1620 with BS2



Programming for DS1620 1

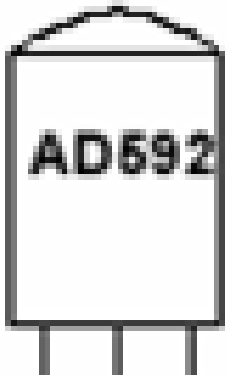


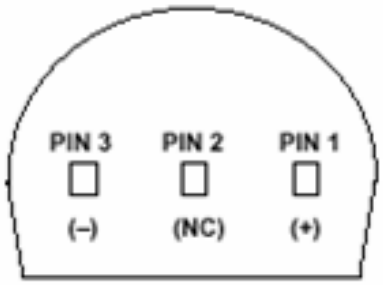
Programming for DS1620 2

```
high 13 <- - - - - - - - - - Ready to start
Shiftout 15,14,lsbfirst,[238] <- - - Start conversion
low 13

Temploop:
high 13
shiftout 15,14,lsbfirst,[170] <- - Send "get data" command
shiftin 15,14,lsbpre,[x]  <- - - - Get the data
low 13
degC=x/2
Goto Temploop
```

AD592



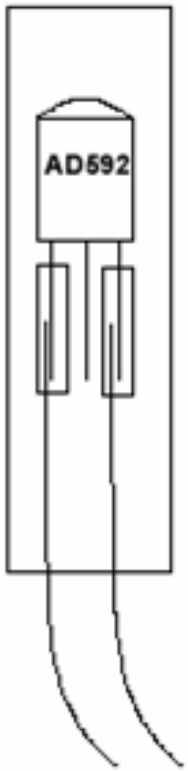


★ PIN 2 CAN BE EITHER ATTACHED OR UNCONNECTED

BOTTOM VIEW

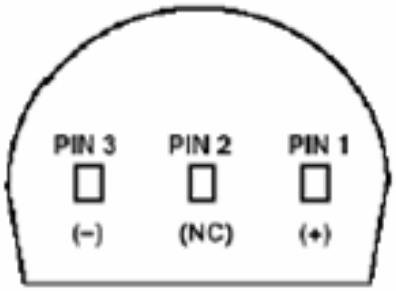
- Analog temperature sensor
  - Provides an output current proportional to absolute temperature
  - Temperature range from -25°C to 105°C
  - Acts as a thermostat
  - Extended out away from the recording instruments

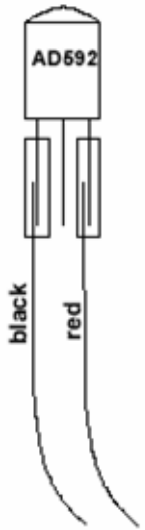
Temperature Probe with AD592



- The part needs to be protected before being inserted into liquid

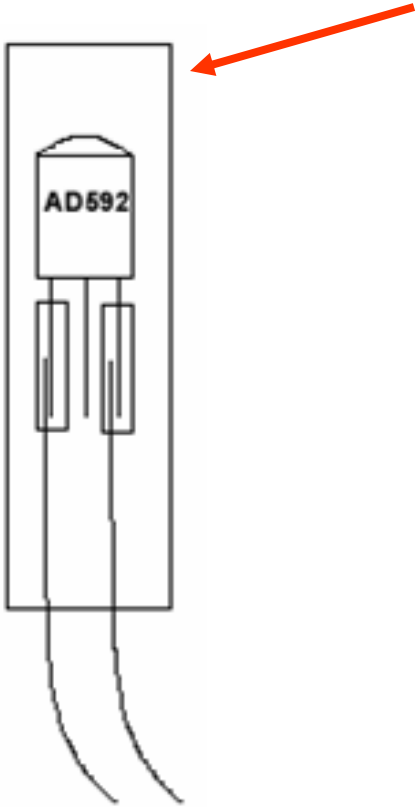
How to Make Temperature Probe 1





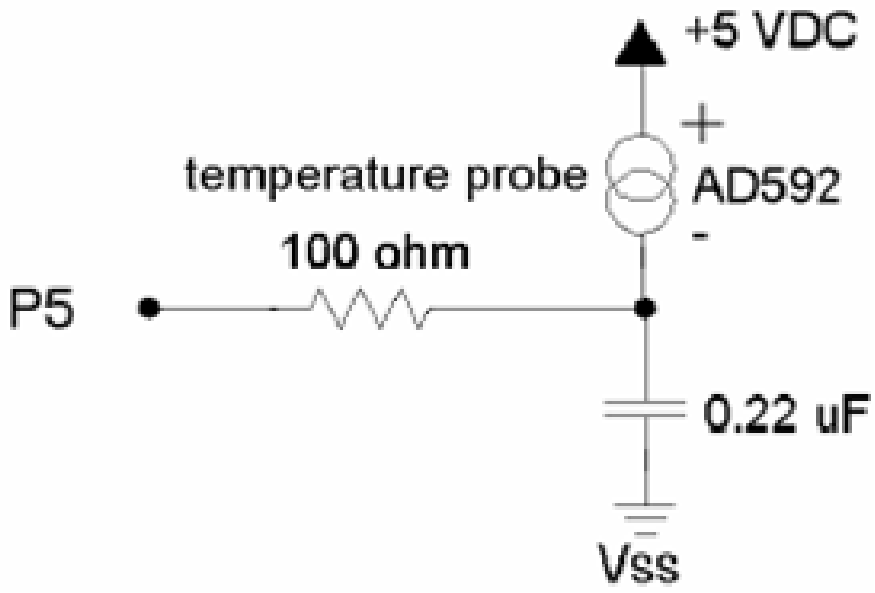
1. Identify the AD 592's (-), NC, and (+) pins from this picture as viewed from the bottom
2. Slip the solder sleeve over the black wire and pin 3 (-)
3. Slip another solder sleeve over the red wire and pin 1 (+)
4. Heat up the connections until the wires are joined

How to Make Temperature Probe 2

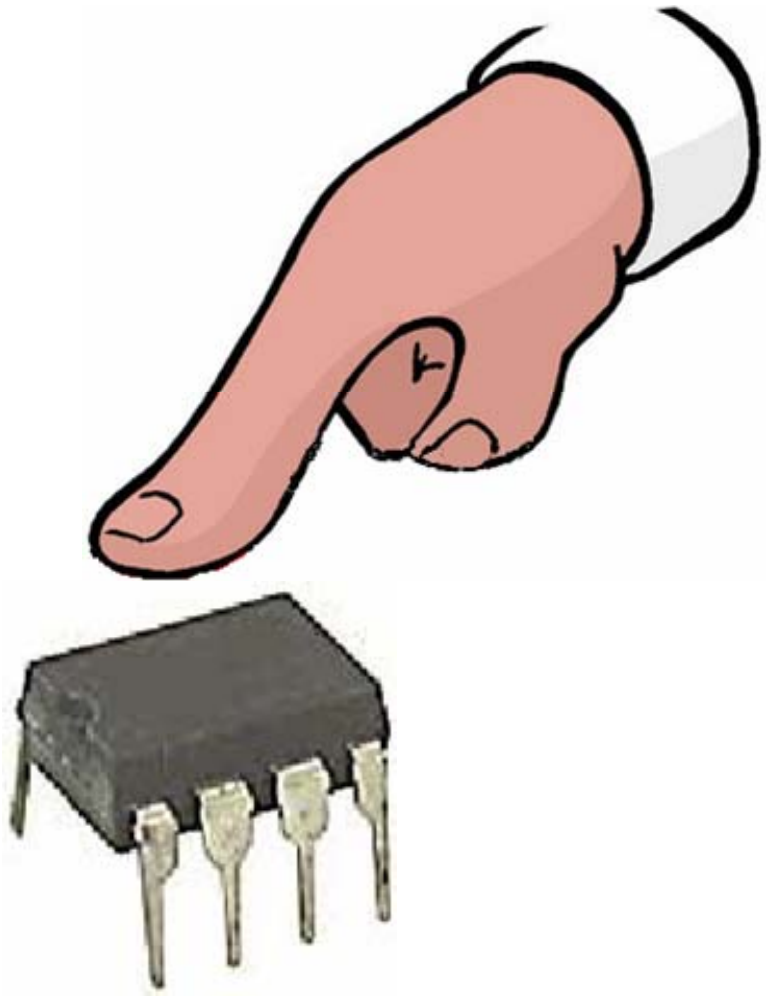


5. Slip the heat shrink tubing over the entire package
6. Fasten the package with a heat gun, and while it's still hot clamp the top portion to ensure that it stays shut

AD592 with BS2



Caution!!



- Be careful when you put your finger on it
- Specially for a big finger

Temperaure Sensors Experiments

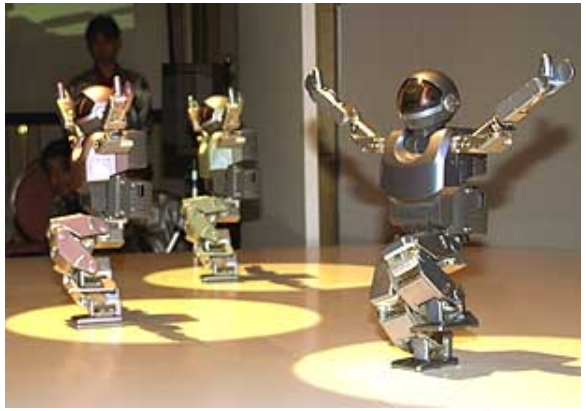
Experiments	Chapters
What's micro controller	
Basic A and D	
Earth measurements	1, 2, 3*, and 4
Robotics	
StampWorks	29
Others	

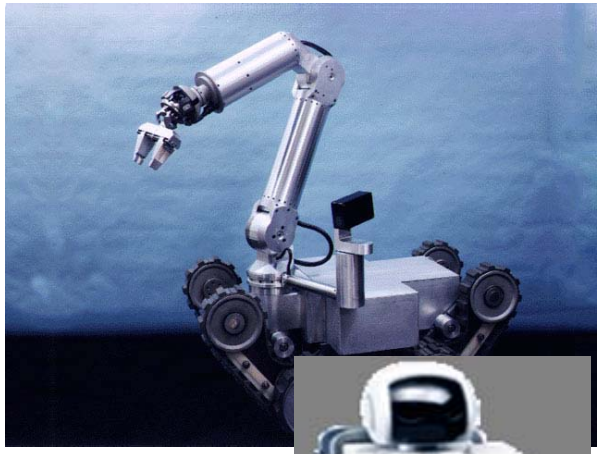
***Use 2 wires for Simple Resistance Detector with proper resistor and capacitor**

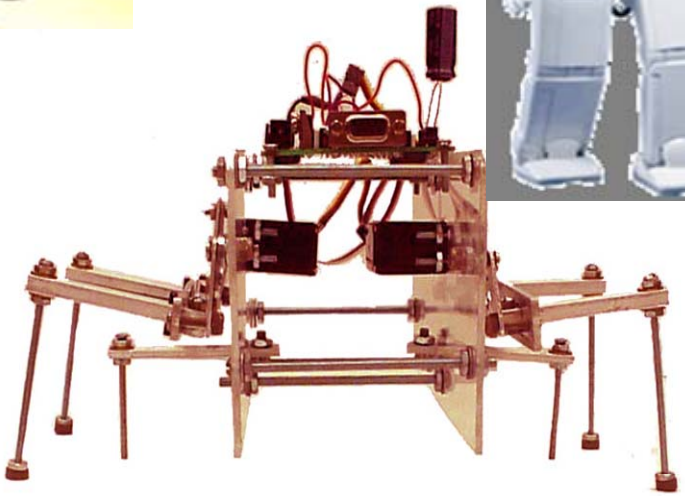
Lecture 11

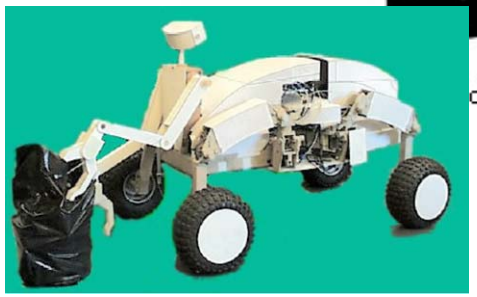
Robotics

Robots







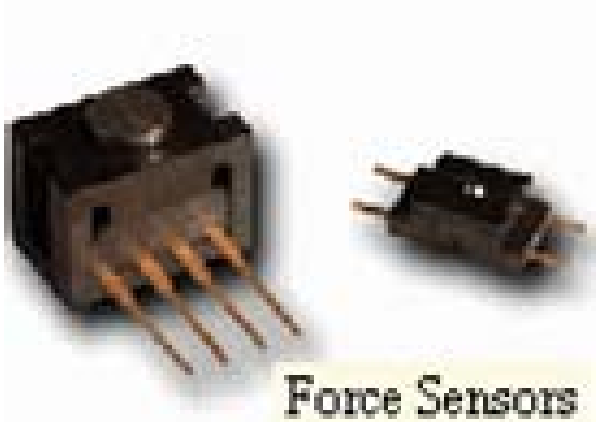


Definition of Robot

- First introduced
  by Karel Capek in a 1920

- Definition of robot
  - Reprogrammable
  - Multifunctional manipulator
  - Designed to move material, parts, tools or specialized devices
  - Through variable programmed motions for the performance of a variety of tasks
  - Robot Institute of America, 1979

Sensors

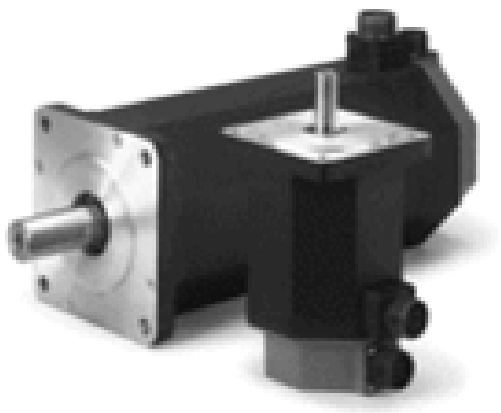


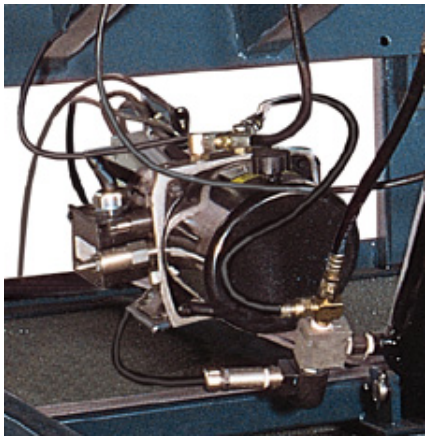
In-Sight vision sensors

Tilt Sensor

Actuators

- Actuators used in robotics is almost always combinations of different electro-mechanical devices
  - Stepper motor
  - AC servo motor
  - Brushless DC servo motor
  - Brushed DC servo motor





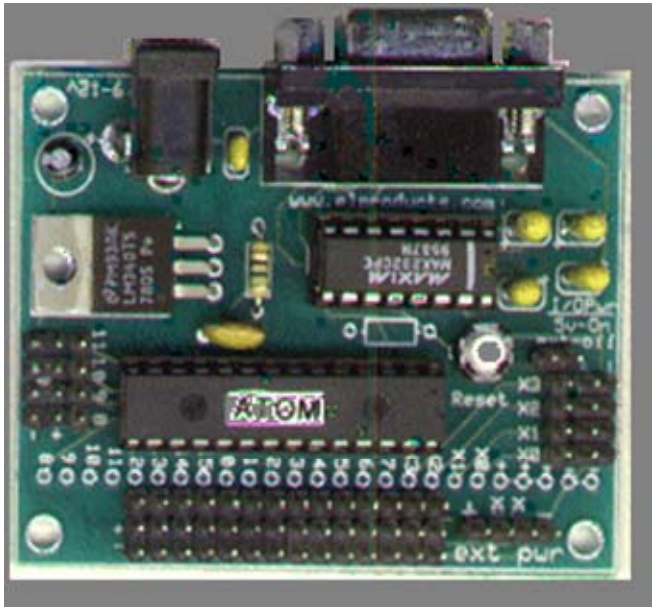
Hydraulic Motor

Stepper Motor

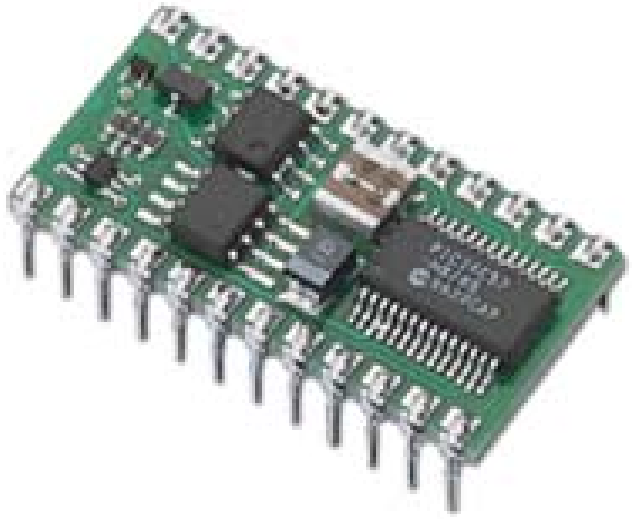
Pneumatic Motor

Servo Motor

Controller



RoboBoard Robotics Controller

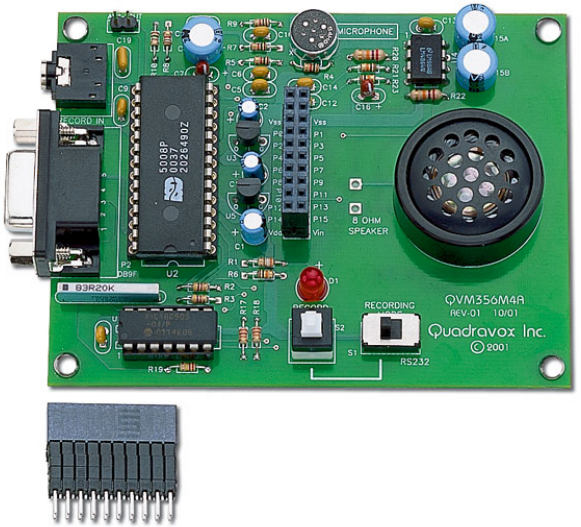


BASIC Stamp 2 Module

The Interface Units

Interfacing with the external world (sensors and actuators)

Analog to Digital Converter



Operational Amplifier

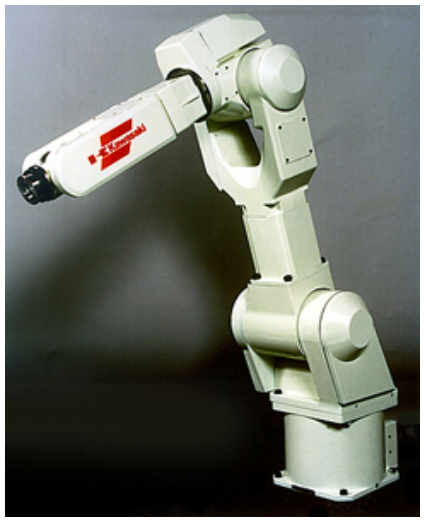
What Can a Robot Do?

- Industrial Robots

1. Material Handling
2. Material Transfer
3. Machine Loading and/or Unloading
4. Spot Welding
5. Continuous Arc Welding
6. Spray Coating
7. Assembly
8. Inspection

Material Handling Manipulator

Spot Welding Manipulator

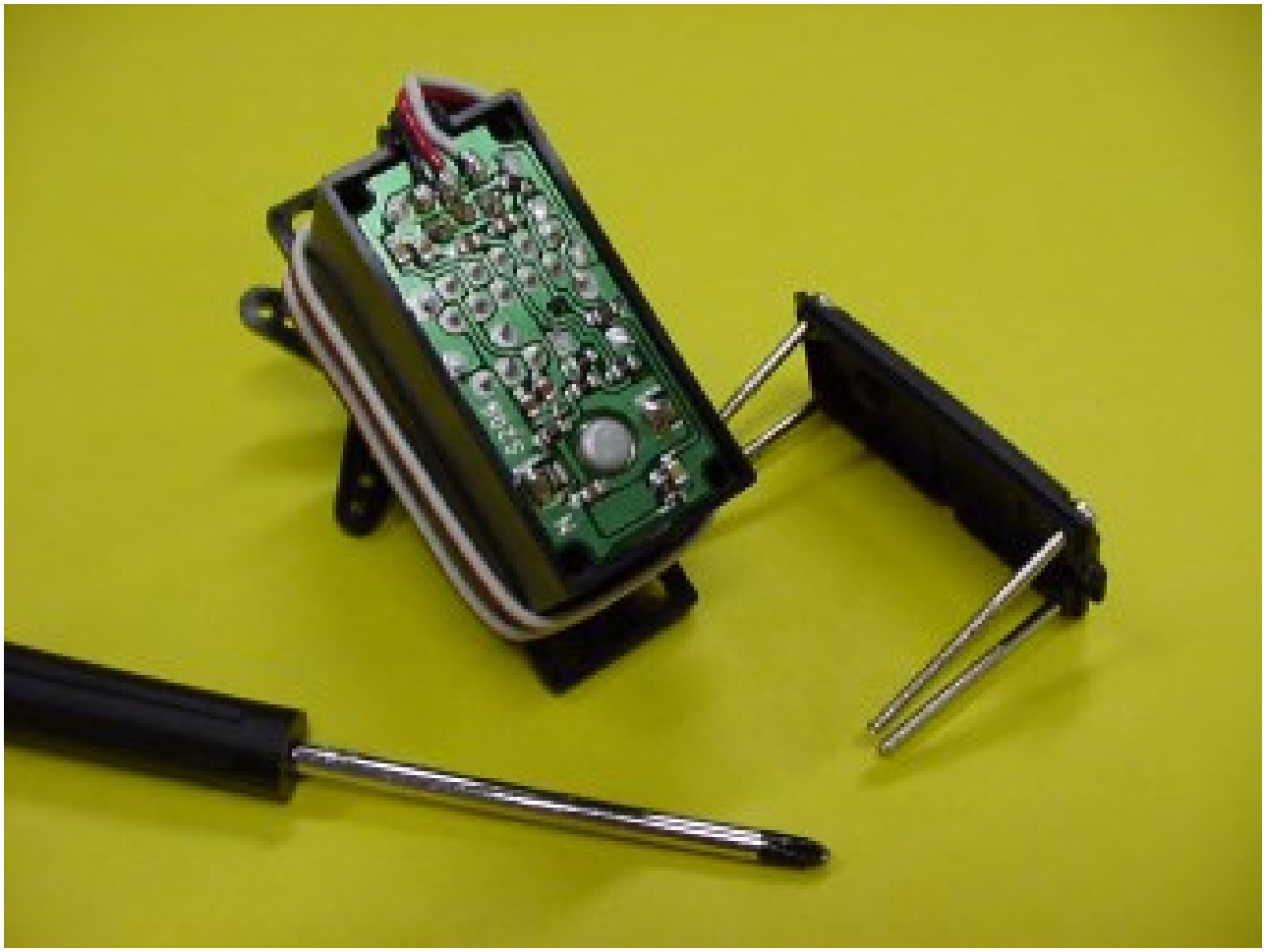


Assembly Manipulator

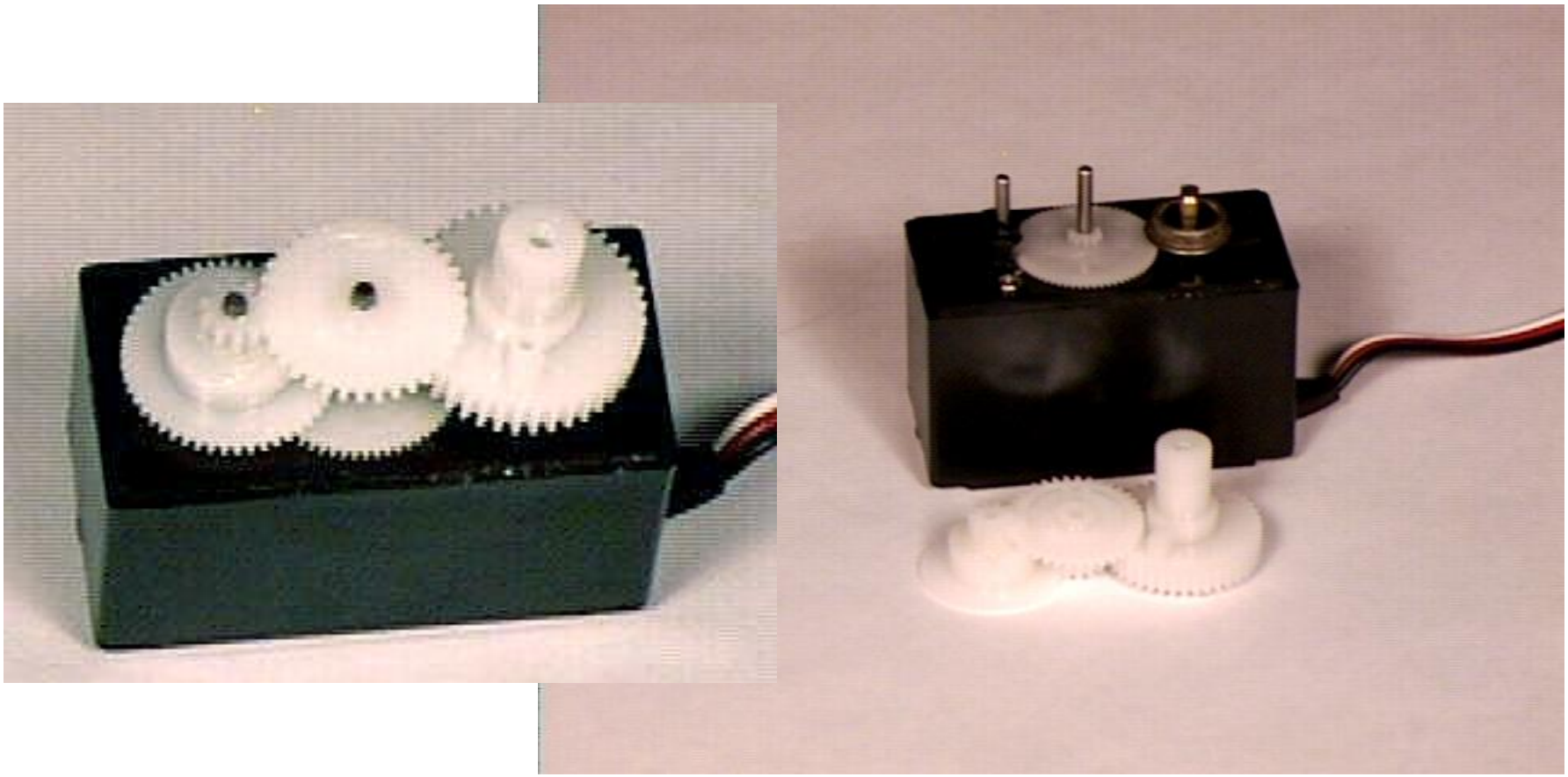
How to Modify Servo Motor

Prepare All the Tools

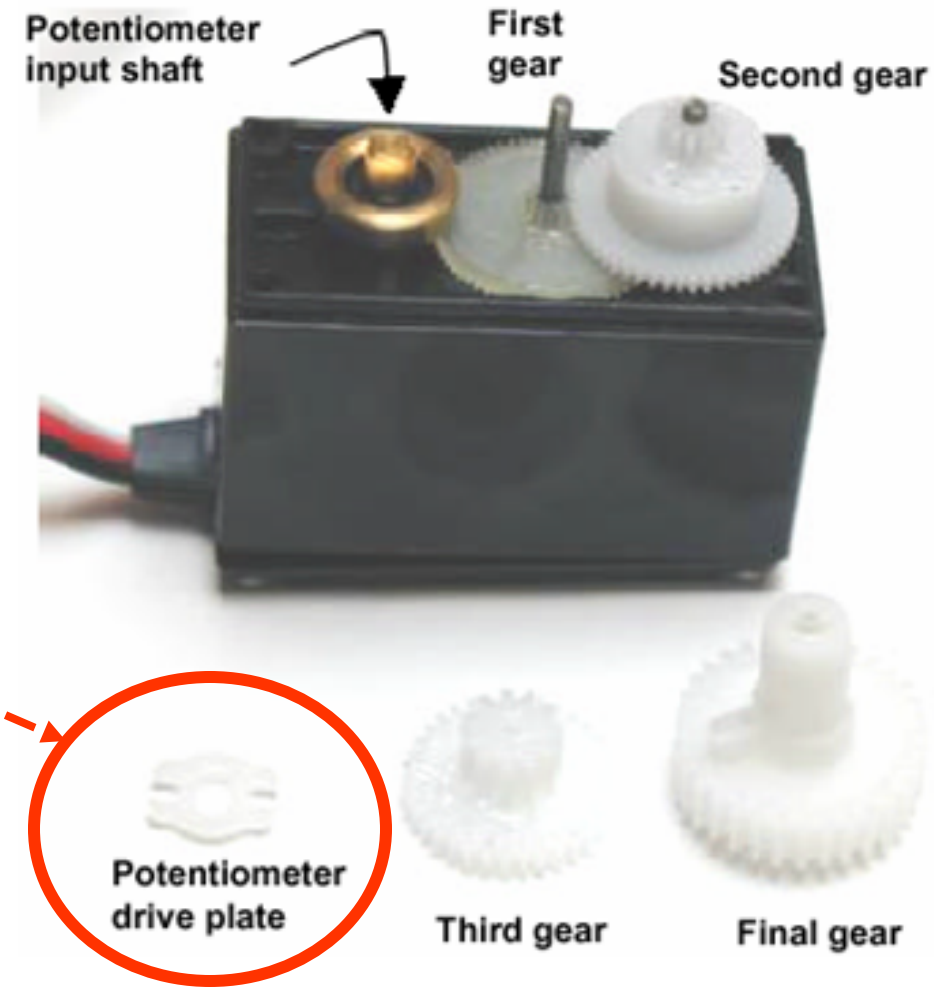
Open Cover



Take All Gears Out

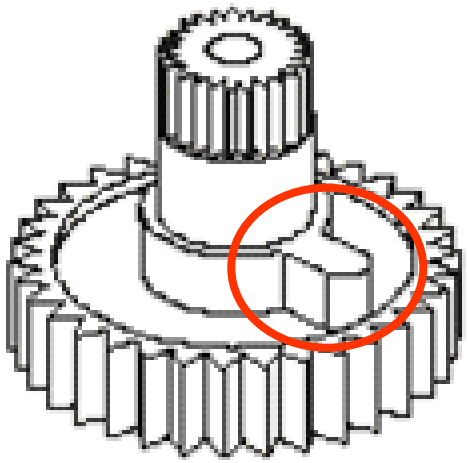


Take Pot Drive Plate Out

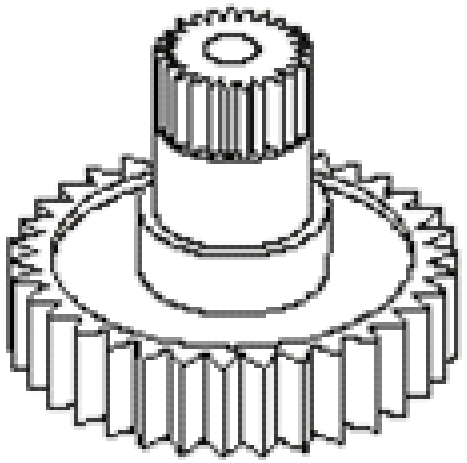


Don't forget to remove it

Cut Tab off the Surface of the Gear

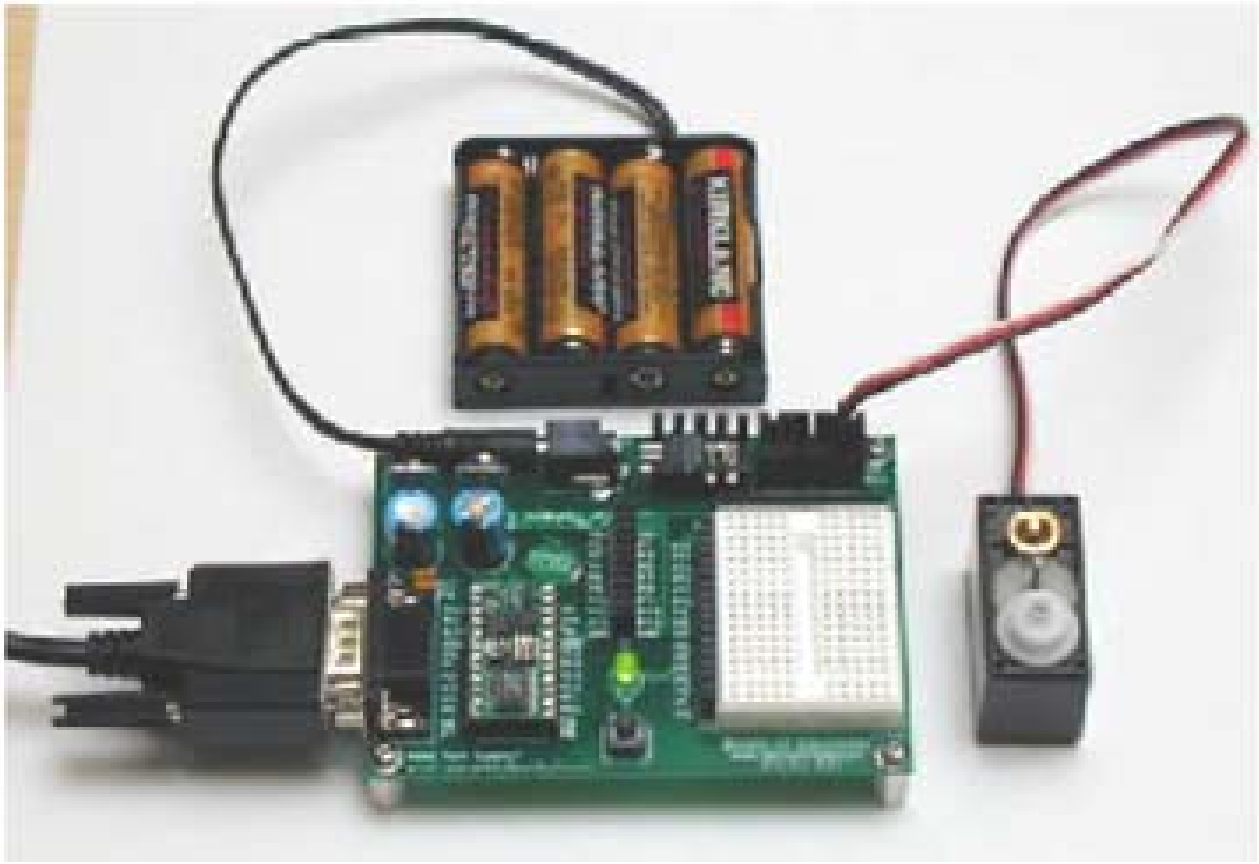


Before



After

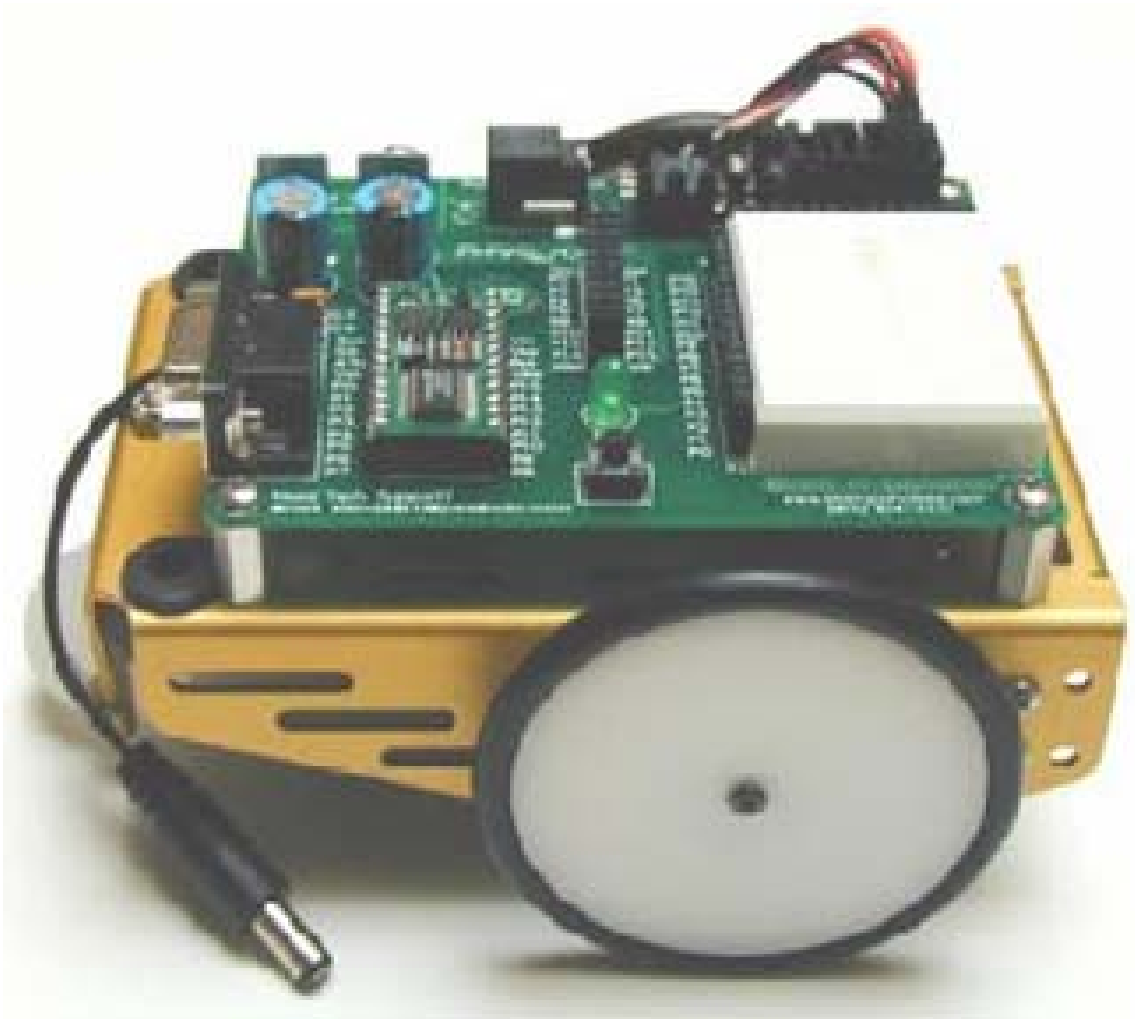
Servo Calibration



```
low 12

loop:
   pulsout 12, 750
   pause 20
goto loop
```

Fully Assembled Boe-Bot



Robot Experiments

Experiments	Chapters
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Robotics	1, 2, 3, and 4
StampWorks	
Others	