

The parts in the list below are available for checkout.

LIST UPDATED 02/06/18

1. To check out these parts, please download a sensor check-out sheet from the web (class 11).
2. Designate one of your group members as the person responsible for the sensor.
3. Completely fill out a check-sheet for each separate part, using your Tech email ONLY. Bring the sheet to the Project-Based Learning office (Bogard Hall 222) during checkout hours (posted on office door).
4. If you want multiples of an item, you may include them on one sheet. If they are separate items, fill out a sheet for each item.
5. You will need to show your ID when you pick up sensors.
6. We make no claim of the accuracy of prices, documentation or code presented here.
7. Use these resources at your own risk; if you do not agree, then do not view the resources. By using the checkout service, you assume responsibility for replacing or paying for the parts if they are damaged, lost, or otherwise not returned.

Description	Item#	Approx. Price	Quantity	Supplier	photo	documentation	Purchase ONLY
Things to Induce Motion							
Parallax (GWS) Mini Servo	900-00010	\$11.00	10	www.parallax.com			
Parallax (Futaba) Standard Servo	900-00005	\$10.00	28	www.parallax.com			
Parallax Continuous Rotation Servo	900-00008	\$12.99	10	www.parallax.com			
TowerPro 9g Micro Servo, model SG90, Standard Servo	800F7ROCEK	\$5.00	10	www.amazon.com			
FEETECH FS90R Micro CR servo	2820	\$7.00	varies	www.pololu.com			X
12V 110RPM gearmotor (50mA stall, 6mm dia shaft 27mm long)	15530 MD	\$14.95	12	www.mpja.com			
Buehler Right Angle Gear Motor (10/21/42RPM @ 6/12/24 VDC)	16779 MD	\$24.95	5	www.mpja.com			
3VDC (27RPM) to 6VDC (58 RPM) small gearmotor (3mm dia shaft)	30454 MD	\$9.95	10	www.mpja.com			
12VDC/6.8RPM Gear Motor: 3/16" dia x 3/8" long shaft	15870 MD	\$12.95	5	www.mpja.com			
Dayton 2L010 Gear Motor (1/125hp,25 RPM,12VDC,1.3A)	60067	\$46.49	2	www.drillspot.com			
12VDC Right Angle Gear Motor w 5.5" Lead Screw (88/178 RPM)	19007 MD	\$14.95	7	www.mpja.com			
gearmotor: 12VDC, 5RPM, 6mm shaft; 1.2N-m or 0.87 ft-lb torque; 3"x1.25"x1" size	TS-32GZ370-1650	\$16.88	21	www.amazon.com			
12VDC Micro Gearhead Motor	17269 MD	\$10.00	12	www.mpja.com			
12V, 500mA Mini Air Pump (3.9mm port; 3.1 L/min)	18515 MI	\$19.95	3	www.mpja.com			
small linear solenoid, 12V, 0.71 lb force, 5 mm stroke, ret spring	ASM-SOL-SM	\$9.95	20	www.trossenrobotics.com			
large linear solenoid, 12V, 2.87 lb force, 12 mm stroke, ret spring	ASM-SOL-LG	\$19.95	10	www.trossenrobotics.com			
Linear solenoid continuous, push, 12VDC, 1" stroke, 20 oz force	70155K78	\$15.27	3	www.mcmaster.com			
Linear solenoid used for automotive locks (0.75" travel; 12VDC, 9.5" extension rod)	DLA-1	\$5.50	15	www.allelectronics.com			
12" stroke linear actuator, 15 lbs, 1.5A, 0.75 in/s (with hardware)	FA-MS-15-12-12	\$99.50	2	www.e-monioninc.com			
12" stroke linear actuator, 15 lbs, 1.5A, 1 in/s (with hardware)	FA-RMS-15-12-12	\$119.00	4	www.e-monioninc.com			
Amico 12V soledoid electric door lock		\$23.22	6	www.amazon.com			
6mm vibrating motor (like a cell phone vibrator)	16053 MD	\$1.50	20	www.mpja.com			X
10mm x 2.5mm vibrating disk motor (3V, 80mA, 30,000 rpm)	700724294791	\$3.66	2	www.amazon.com/			X
Relays and Motor Drivers							
SPST-NO Relay, 1A contact, coil=5V, coil=36mA	Z1228-ND	\$2.91	21	www.digikey.com			X
SPST-NO Relay, 3A contact, coil=5V, coil=40mA	PB370-ND	\$1.57	200	www.digikey.com			X
SPDT Relay, 5A contact, coil=5V, coil=80mA	PB890-ND	\$1.17	200	www.digikey.com			X
SPDT Relay, 14A contact, coil=5V, coil=42.4mA	PB442-ND	\$6.50	3	www.digikey.com			
SPDT relay board; 8-channel; switchable by 5V microcontroller	31302 MP	\$12.96	15	www.mpja.com	photo	PDF	
DPDT Relay, 1A contact @ 24V, coil=5V, coil=125ohms (FRT2H-S)	18474 RL	\$1.95	70	www.mpja.com			X
DPDT Relay, 3A contact, coil=5V, coil current=30mA	PB383-ND	\$1.61	100	www.digikey.com			X
Motor Driver (15V max, 1.2A per motor, PWM control, CW or CCW)	ROB-09457	\$8.06	6	www.sparkfun.com			
Motor Speed Controller: KEEDOX 6V-90V 15A DC speed controller	800CW82ZPG	\$14.00	3	www.amazon.com			
HB-25 Motor Controller (1ms full reverse; 1.5ms off; 2 ms full forward)	29144	\$37.49	10	www.parallax.com			
PowerSwitch Tail II (allows you to switch 120VAC power with no exposed 120V wiring)	80136	\$29.95	5	www.amazon.com			
Grippers, Wheels, Kits							
Little Grip Kit (LG_KT) & attachment Kit (LGA-KT)	LG-KT	\$47.00	2	www.lynmotion.com			
24VDC/45RPM Gearhead Motor attached to 4-7/8" Dia Wheel	17971 MD	\$9.95	10	www.mpja.com			
Displays & Touch Screens							
LCD: 2x16, Backlit	27977	\$27.99	10	www.parallax.com			
LCD: 4x20, Backlit	27979	\$39.95	12	www.parallax.com			
LCD: 4x20, Backlit	LCD-09568	\$29.99	9	www.sparkfun.com			
Touch Shield - Seeed Studio (2.8" touch shield, multicolor display)	SLD62445P	\$49.99	5	www.radioshack.com			
Red 1" Common Anode 7 Segment LED Display	EI-1100AHR1	\$0.95	5	www.circuitspecialists.com			
Audio & Sound Devices							
Emic Text-to-Speech SIP Module (Female)	30006	\$59.95	6	www.parallax.com			
Emic 2 Text-To-Speech Module	30016	\$59.99	6	www.parallax.com			
Say It Module (add voice recognition)	30080	\$79.99	5	www.parallax.com			
Easy VR Shield - Voice Recognition Shield	COM-10963	\$49.95	3	www.sparkfun.com			
Microphone Breakout (returns amplified audio signal varying with time)(retired)	BOB-09964	retired	28	www.sparkfun.com			
Microphone Breakout (returns amplified audio signal varying with time)	BOB-12758	\$5.95	2	www.sparkfun.com			
Analog Sound Sensor Module	31072 MP	\$3.95	2	www.mpja.com			
Sound Impact Sensor - detects sound from up to 3 meters away	29132	\$7.19	10	www.parallax.com			
Music Shield - Adafruit Music maker MP3 Shield for Arduino (MP3, WAV, MIDI, ...)	P1790	\$29.95	2	www.adafruit.com			
Music Shield - SparkFun MP3 shield for arduino, earlier version of DEV-122660			1	www.sparkfun.com			
Input Devices							
4x4 matrix membrane keypad	27899	\$6.99	24	www.parallax.com			
4X4 Matrix Keypad	27944	\$19.00	4	www.parallax.com			
MEMKey (to use with the Keypad)	27963	\$37.00	4	www.parallax.com			
4x4 Keypad Cable	27943	\$7.99	4	www.parallax.com			
Temperature Sensors							
Thermistor - 10kohm (resistance changes with temp)	317-1258-ND	\$0.13	1000	www.digikey.com			X - VENDING MACHINE
Sensirion Temperature/Humidity Sensor	28018	\$26.96	6	www.parallax.com			
AD592 Temperature Probe	28130	\$11.50	34	www.parallax.com			
MLX90614 Infrared Thermometer 10 deg FOV	28042	\$49.99	2	www.parallax.com			
DS1620 Digital Thermometer (8 pin chip, for air only)	604-00002	\$5.99	22	www.parallax.com			
Infrared Temperature Sensor - non-contact thermometer	SEN 01041P	\$9.90	3	www.studica.com			
Motion, Angle, Direction, Distance, Location Sensing							

GPS Module	28146	\$62.96	7	www.parallax.com
GPS module receiver PMB-688, will need GPS antenna part 28502	28501		5	www.parallax.com
GPS antenna, external, with MMCX connector	28502	\$9.99	9	www.parallax.com
Compass: Hitachi HM55B	29123	\$23.96	12	www.parallax.com
Accelerometer: Memscic 2125 Dual-axis	28017	\$26.96	9	www.parallax.com
Accelerometer: Hitachi H48C Tri-Axis	28026	\$31.96	2	www.parallax.com
Accelerometer: 3 axis, +-3g, uses ADXL335 chip from Analog Devices	876-1002-ND	\$20.00	24	www.digikey.com
Accelerometer: 3 axis, +-3g, uses ADXL335 chip from Analog Devices	SEN-09269	\$11.96	22	www.sparkfun.com
4-Directional Tilt Sensor	ST-00008	\$4.99	1	www.shopsimplytronics.com
Gyroscope: LISY300	27922	\$35.99	5	www.parallax.com
Piezo Film Vibra Tab Mass	605-00004	\$1.70	7	www.parallax.com
PIR Sensor	555-28027	\$12.99	17	www.parallax.com
PING))) Ultrasonic Sensor - Distance	28015	\$25.00	26	www.parallax.com
XL-MaxSonar - EX/AE Ultrasonic Range Finder	MB1210	\$44.95	2	www.maxbotix.com
XL-MaxSonar - EZL1 ultrasonic distance finder (up to 10 m)	MB1261	\$54.95	3	www.maxbotix.com
IR Distance Sensor: Sharp IR Analog Distance Sensor; 10-80cm with cable	GP2Y0A21YKOF	\$10.25	20	www.amazon.com
Liftmaster 41A5034 Garage Door Opener Safety Beam Kit	41A5034	\$15.50	1	www.amazon.com
24 position rotary encoder, high torque (Panasonic EVE-KC2F2024B)	P12334-ND	\$0.76	8	www.digikey.com
potentiometer - 1Kohm, 1/8W, single turn, 0.236" diameter shaft	CT2262-ND	\$1.03	100	www.digikey.com
knob for rotary encoders & potentiometer (1/4" shaft diameter)	6332K36	\$6.76	5	www.mcmaster.com
potentiometer - 5Kohm slide potentiometer audio taper	304T-5KA	\$0.50	100	www.mpja.com
water flow sensor - 1-30L/min, pressure =< 1.75MPa	YF-S201	\$5.28	5	www.dx.com

Color, Light, Camera Devices

TCS230-DB Color Sensor	28302	\$50.96	6	www.parallax.com
DB Expander (for color sensor and other sensors)	28325	\$9.99	8	www.parallax.com
DB Extension Cable (connect expander to color sensor)	28301	\$14.99	8	www.parallax.com
QTI Sensor	555-27401	\$5.00	10	www.parallax.com
TSL230 Light to Frequency Converter	27924	\$4.00	6	www.parallax.com
TSL1401-DB Linescan Sensor Module	28317	\$49.99	1	www.parallax.com
Pixy (CMUcam5) - camera to locate and track colored objects	CMUcam5	\$69.00	3	www.amazon.com
Pixy pan/tilt mechanism - 2-axis robotic camera mount		\$39.00	1	www.amazon.com
CMOS Camera Module - 728x488	SEN-11745	\$31.95	1	www.sparkfun.com
ArduCam Rev B w 2 MP OV2540 CMOS camera module	31065 MP	\$39.95	1	www.mpja.com

Force and Pressure Sensing

Flexiforce Sensor Demo Kit	30056	\$24.99	13	www.parallax.com
Flexiforce Sensor - 1 lb	SEN-08713	\$15.96	5	www.sparkfun.com
Square Resistive Force Sensor (1.75"x1.5", .1kg-10kg)	SEN-09376	\$7.16	23	www.sparkfun.com
Pressure Sensor: VTI SCP1000 30-120kPa (gases only)	27928	\$29.99	5	www.parallax.com
Pressure Sensor: measures air pressure (0psi - 15psi)	ASDX015	\$47.83	1	www.digikey.com
Load Cell - 100 lb button-type (gives voltage output with load)	MSP6951-ND	\$63.53	6	www.digikey.com
Load Cell - 10kg, Straight Bar (TAL22)	SEN-13329	\$5.56	3	www.sparkfun.com
Load Cell - 200 kg disk (TAS606)	SEN-13332	\$56.95	1	www.sparkfun.com
Load Cell Amplifier - HX711	SEN-13879	\$9.95	4	www.sparkfun.com

Electricity Sensors

ACS712 Low Current Sensor (measures up to 5A of current)	SEN-08883	\$13.46	10	www.sparkfun.com
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Gas Sensors

CO	27931	\$29.99	5	www.parallax.com
CO with TTL digital output or analog output	31041 MP	\$9.95	5	www.mpja.com
CO2	27929	\$49.99	1	www.parallax.com
C2H5OH (MQ-3)	27904	\$29.99	1	www.parallax.com
Natural or LPG gas with TTL digital output or analog output	31042 MP	\$12.95	5	www.mpja.com
H ₂ or LPG gas with TTL digital output or analog output	31043 MP	\$9.95	5	www.mpja.com
O2 sensor (oxygen sensor module)	LINKER_O2SEN_LY1	\$49.99	2	store.linksprite.com
MQ4 gas sensor (combustible gas sensor: methane, coal gas, CO, etc.)	B00AFQB69I	\$5.99	5	www.amazon.com
MQ2 gas sensor (LPG, LPG, CH4, CO, alcohol, smoke, propane)	10160105	\$7.99	1	sainsmart.com
MQ-2 gas sensor (LPG, i-butane, propane, methane, alcohol, hydrogen & smoke)	CJRSLRB MQ-2	\$3.50	2	www.amazon.com
MQ-3 gas sensor (ethanol)	CJRSLRB MQ-3	\$3.50	2	www.amazon.com
MQ-4 gas sensor (methane - CH4)	CJRSLRB MQ-4	\$3.50	2	www.amazon.com
MQ-5 gas sensor (H2, LPG, CH4, CO, alcohol)	CJRSLRB MQ-5	\$3.50	2	www.amazon.com
MQ-6 gas sensor (LPG, iso-butane, propane, LNG; avoid the noise of alcohol & cooking fumes)	CJRSLRB MQ-6	\$3.50	2	www.amazon.com
MQ-7 gas sensor (carbon monoxide - CO)	CJRSLRB MQ-7	\$3.50	2	www.amazon.com
MQ-8 gas sensor (H2)	CJRSLRB MQ-8	\$3.50	2	www.amazon.com
MQ-9 gas sensor (LPG, CO, CH4)	CJRSLRB MQ-9	\$3.50	2	www.amazon.com
MQ135 gas sensor (NH3, NOx, alcohol, benzene, smoke, and CO2)	CJRSLRB MQ135	\$3.50	2	www.amazon.com

Switches, Proximity Sensing

Hall effect, digital, unipolar (magnetic field switches output)	TLE4905LE6433INTB-ND	\$0.40	100	www.digikey.com	X
Hall effect, linear (voltage output change with magnetic field)	480-2005-ND	\$1.99	20	www.digikey.com	X
Melexis 90217 Hall-Effect Sensor	605-00005	\$4.00	120	www.parallax.com	
photogate (detect object that breaks optical beam - 10 mm gap)	425-1935-5-ND	\$1.50	20	www.digikey.com	
QT113-D Touch Sensor	604-00038	\$7.00	10	www.parallax.com	
5-Position Switch (sort of like a joystick)	27801	\$4.74	5	www.parallax.com	
8 position joystick, 3"x3.5" mounting plate, 3.75" stick	JS-5	\$13.75	10	allelectronics.com	
switch: SPNO 15A snapaction pushbutton	11-1901	\$0.80	10	www.surpluscenter.com	X
switch: SPDT 5A snapaction pushbutton	480-5273-ND	\$4.44	7	www.digikey.com	
switch: SPDT 4A snapaction long lever - 0.183 quick connect	2117333	\$1.15	18	www.jameco.com	
switch: SPNC 10A snapaction lever arm			8		
switch: SPDT 20A short lever with roller			3		
switch: SPDT 10A short lever with roller	159572	\$2.95	8	www.jameco.com	
switch: SPDT 25A snapaction long lever arm	CH316-ND	\$3.55	9	www.digikey.com	
Reed Switch and Magnet	910-27225	\$9.00	7	www.parallax.com	
Liquid Float Switch Water level Sensor (side mounted)	DerBlue	\$2.33	7	www.amazon.com	

Communication

Arduino Ethernet Rev3 without PoE	782-A000068	\$57.95	1	www.mouser.com
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Arduino WiFi Shield	782-A000058	\$89.95	1	www.mouser.com
Seed Bluetooth Shield V1.1	SLD63030P	\$23.00	8	www.seeedstudio.com
SainSmart USB Host Android ADK Shield 2.0	B00614G000	\$19.99	1	www.amazon.com
Bluetooth 4.0 Low Energy-BLE Shield v2.3	103990055	\$19.90	1	www.seeedstudio.com
Parallax EmbeddedBlue EB500 Bluetooth Serial Adapter	eb500-SER	\$5.00	1	www.parallax.com
GPRS / GSM: SainSmart GPRS+GSM SIM300 Module	by SainSmart	\$44.50	2	www.amazon.com
GPRS / GSM: SIM900/SIM900A Minimum System Module	IM140318007	\$39.00	3	www.itead.cc
GPRS / GSM: Arduino GPRS Shield V1.2 (with antenna)	103030013	\$59.90	1	www.seeedstudio.com
GPRS / GSM: Arduino GPRS Shield V2.0	113030000	\$74.95	4	www.seeedstudio.com

Radio Frequency, Wireless

Keychain Transmitter with Decoded Receiver	XETR01	\$19.23	15	www.xenon-tech.com		
Keychain Transmitter with Decoded Receiver - extendable antenna	32197-MI	\$10.00	80	www.mpja.com	photo	PDF
RF Link 2400bps Receiver - 315 MHz (robot to robot)	WRL-08948	\$4.95	5	www.sparkfun.com		
RF Link Transmitter - 315 MHz (robot to robot)	WRL-08945	\$3.95	5	www.sparkfun.com		
RF Link 2400bps Receiver - 434 MHz (robot to robot)	WRL-08949	\$4.95	3	www.sparkfun.com		
RF Link Transmitter - 434 MHz (robot to robot)	WRL-08946	\$3.95	3	www.sparkfun.com		
RF module: Xbee Pro 60mW wire antenna & and Xbee Explorer	WRL-08742	\$47.90	3	www.sparkfun.com		
EmbeddedBlue Transceiver AppMod	30068	\$65.00	2	www.parallax.com		
Bluetooth: KEDSUM Arduino Wireless Bluetooth Transceiver Slave	B0093XAV4U	\$9.99	15	www.amazon.com		
2.4 GHz Wireless Transceiver (uses nRF24L01+ transceiver chip)	B007ZZANPA	\$8.74	17	www.amazon.com		
Parallax 433 MHz RF Transmitter (robot to robot)	27980	\$29.99	6	www.parallax.com		
Parallax 433 MHz RF Receiver (robot to robot)	27981	\$39.99	4	www.parallax.com		
RFID Reader Module	28140	\$44.99	12	www.parallax.com		
RFID 25 mm Round Tag	32397	\$1.29	31	www.parallax.com		
RFID 50 mm Round Tag	28142	\$2.20	4	www.parallax.com		
RFID 54mm x 85 m Rectangle Tag	28141	\$2.20	27	www.parallax.com		
RFID Blue Eye Key Fob Tag	28147	\$5.00	15	www.parallax.com		
HID Global World Tag RFID transponder			15	www.hidglobal.com		
Xenon 433 MHz Transmitter (XETX01A) / Receiver (XERE01A)	XERE01A	\$9.62	30	www.xenon-tech.com		
RTL-SDR - computer based radio scanner	100701	\$20.95	2	www.nooelec.com		
4-channel on/off 12VDC remote control	RC-13	\$38.00	5	allelectronics.com		
FRD22102 RFDuio DIP - wireless enabled microcontroller	1562-1000-ND	\$28.69	4	www.digikey.com		

Chips for Projects

LM358 dual op-amp	602-00015	\$0.50	227	www.parallax.com
ADC0831 8-bit A/D Converter	ADC0831CCN-ND	\$3.28	8	www.digikey.com
XTAL-32.768 kHz	251-03230	\$2.25	10	www.parallax.com
Mosfet, 60v N-channel	153-00002	\$0.50	20	www.parallax.com

Other Helpful Devices

ServoPal	28824	\$19.95	5	www.parallax.com
SoundPal	28825	\$24.95	2	www.parallax.com
SD card reader/writer (Virtuabotix)		\$14.95	3	www.amazon.com
CR2032 Coin Battery Shield for RFDuino	RFD22128		1	www.sparkfun.com
RFDuino USB shield	RFD22121	\$26.00	1	www.sparkfun.com
microSD shield, adds memory to arduino, used for data-logging, etc.	DEV-12761	\$14.95	3	www.sparkfun.com
Brushless DC Pump (submersible water pump, DC 12V, 4.8W)	DC30A1230	\$14.50	2	www.amazon.com
Real Time Clock (to keep track of time and date)	BOB-12708	\$14.95	10	www.sparkfun.com

Extension Wires for Sensors

14-inch Extension Cable and 3-pin Header, 3 conductor	805-00012	\$0.80	102	https://www.parallax.com		
13-inch extension cable, 3 pin, 0.1"				https://www.parallax.com		
24-inch extension cable, 3 pin, 0.1"				https://www.parallax.com		
6-inch extension cable, 3 pin, 0.1"				https://www.parallax.com		
12-inch extension cable, 3 pin, 0.1"				https://www.parallax.com		
7.75-inch jumper wire, 1 pin, 0.1"				https://www.parallax.com		
6-inch extension cable, 4 pin, 0.1"				https://www.parallax.com		
6-inch extension cable, 6 pin, 0.1"				https://www.parallax.com		
12-inch extension cable, 6 pin, 0.1"				https://www.parallax.com		
Pack of 40 jumper wires, 1 pin, male-to-female, 7.87"/20cm length		\$4.00		https://www.parallax.com		X
Pack of jumper wires (varying lengths), 140 pieces	27027 TE	\$7.00		www.mpja.com		X
6-inch extension cable, 6 conductor			42	www.ebay.com		

Environmental Sensing

wind speed sensor - anemometer, analog voltage output, 0 to 32.4 meters/s	1733	\$59.99	1	www.adafruit.com
moisture sensor - measures resistance between probes	SEN0114	\$4.80	10	www.dfrobot.com
moisture sensor - HONG111 TE215 soil moisture sensor	HONG111	\$2.00	2	www.amazon.com
barametric pressure, temperature, altitude; JBtek BMP180	B00UUS12PO	\$6.99	10	www.amazon.com

Biological Sensing

heart rate sensor module, Asiawill PulseSensor; 609 nm (www.pulsesensor.com)	B00PED9W98	\$13.99	5	www.amazon.com
Gesture Sensor	28046		5	www.digikey.com
MyoWare muscle sensor; outputs analog signal showing how hard muscle is flexed	B018TIWR32	\$37.99	3	www.amazon.com
MyoWare electrodes for muscle sensor above 6-pack, 1" or 24mm; reusable	B01AU46ZYA	\$8.99	3	www.amazon.com

total available sensors: 3788

piezospeaker: Kobitone Audio Company: PB140-ROX 2098523 \$ 3.00 www.jameco.com