

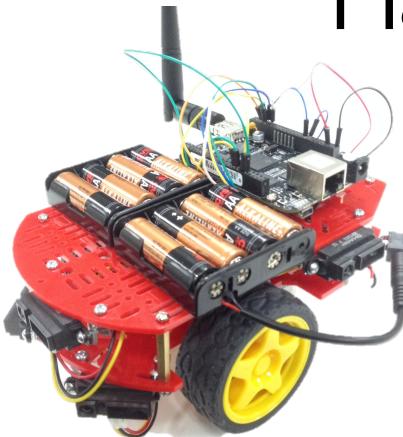
Introduction to the QuickBot

Control of Mobile Robots: Hardware Lecture #1

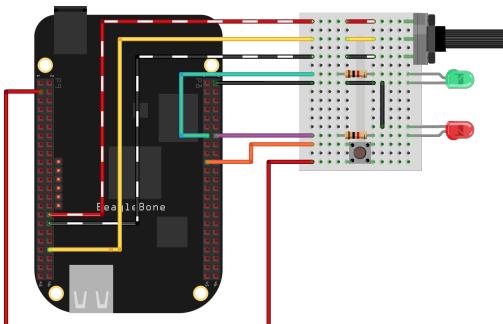


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Robotics Ph.D. Candidate
Georgia Tech

Hardware Lecture Schedule



- Weeks 1 – 4: QuickBot... buy, build, wire, run!



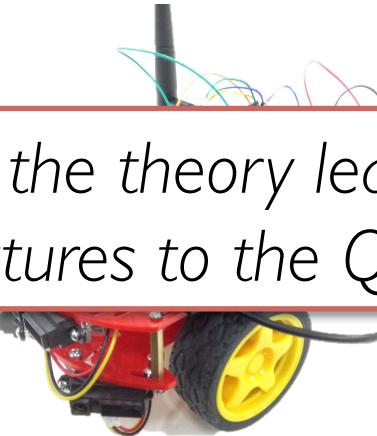
Made with Fritzing.org

- Weeks 5 – 7: Intro to Physical Computing w/
BeagleBone Black

QuickBot

- Relatively inexpensive **differential drive** mobile robot
- Powerful **microcomputer**, Wi-Fi, wheel encoders, IR sensors, etc.
- You buy the individual parts online & **build at home**
- Interface with the Matlab **Sim.I.Am** simulator

*Apply the theory learned in
the lectures to the QuickBot!*



QuickBot Parts



QuickBot Parts

Chassis \$17.50



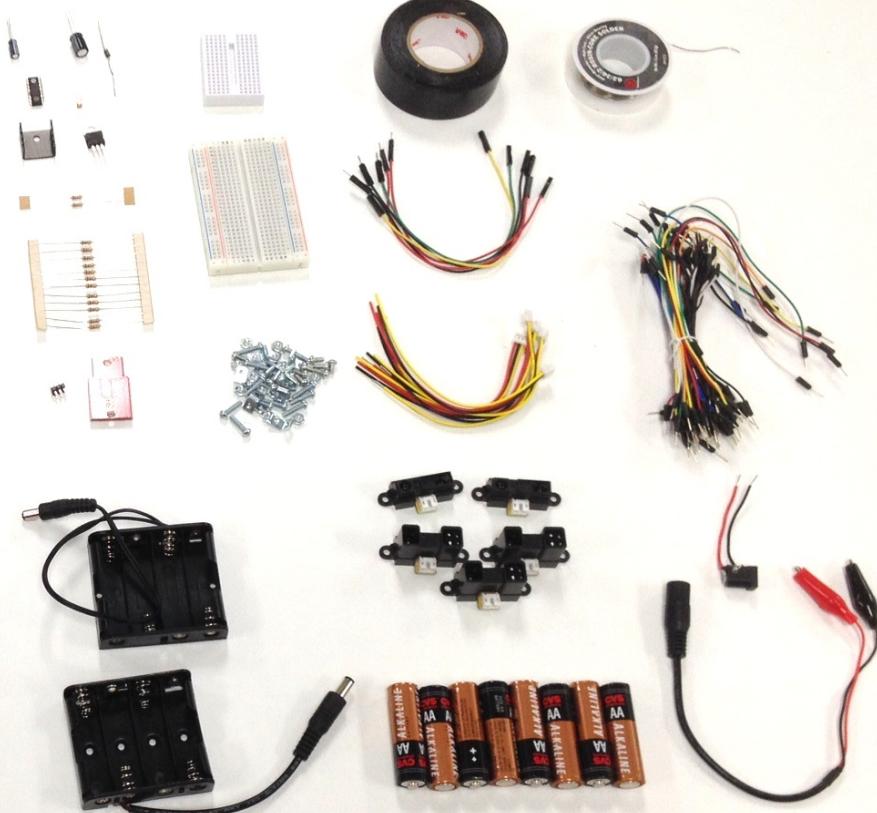
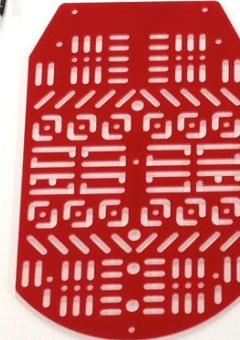
QuickBot Parts



QuickBot Parts



BBB \$63.50



QuickBot Parts



QuickBot Parts



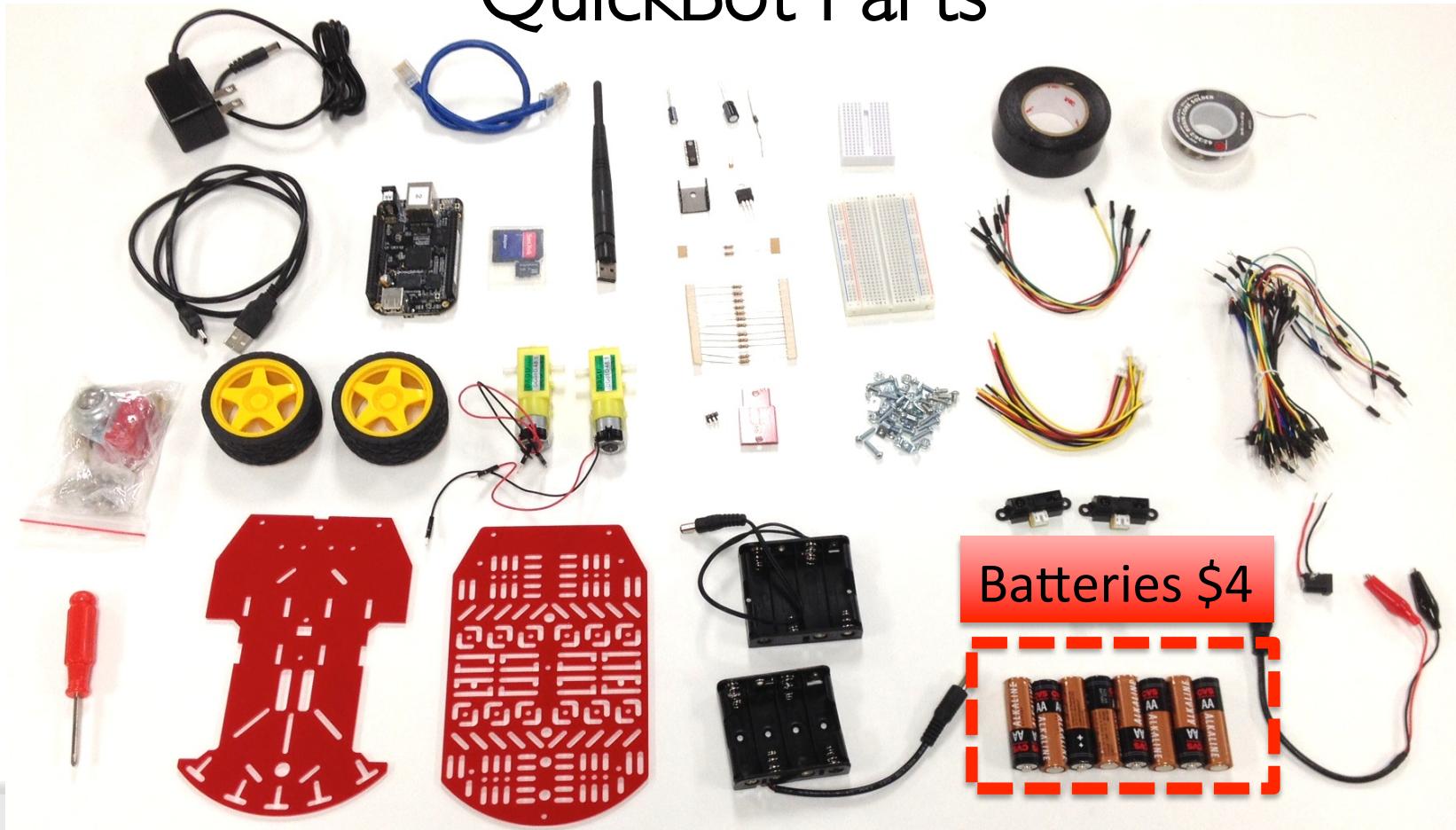
QuickBot Parts



QuickBot Parts



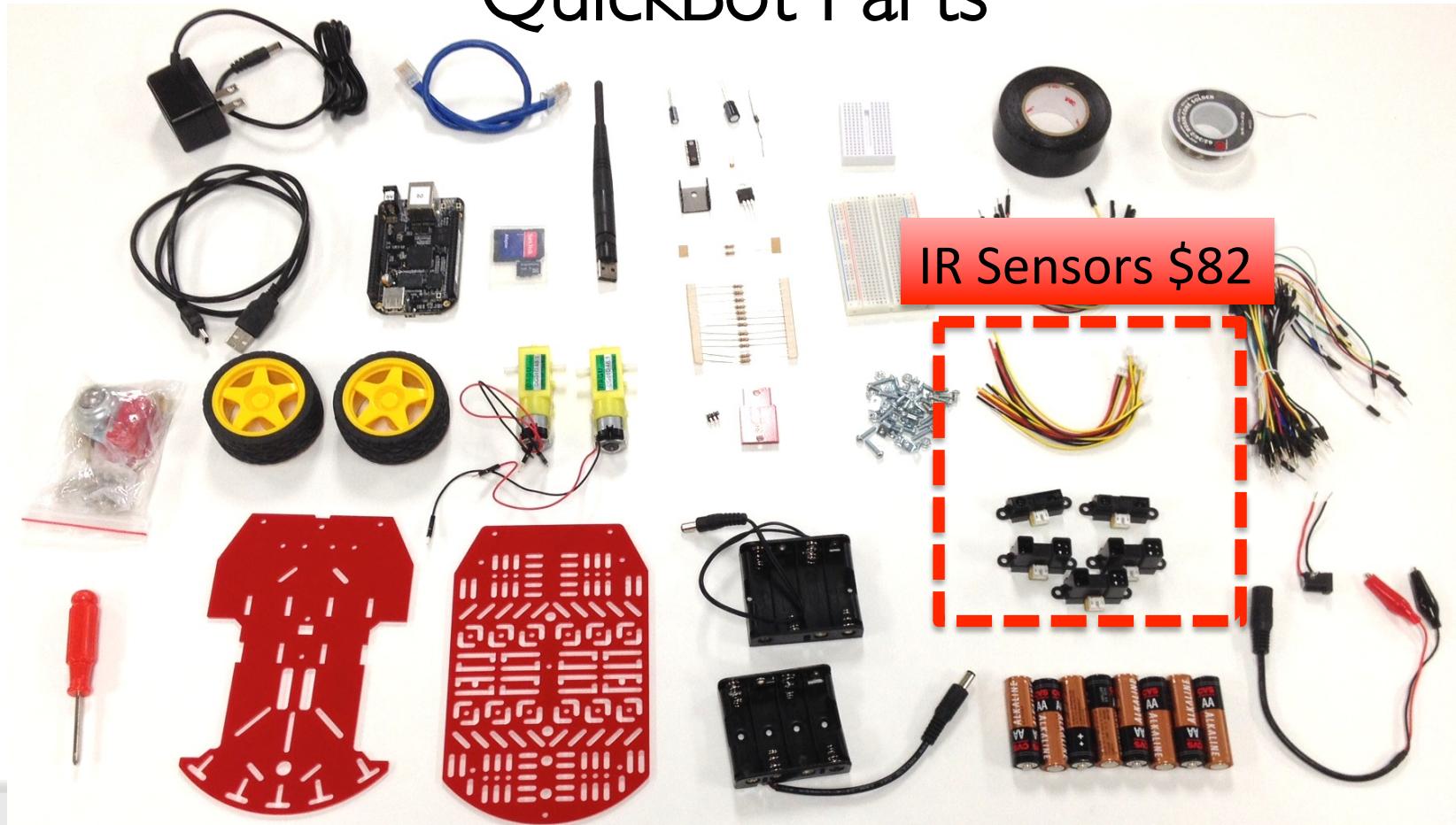
QuickBot Parts



QuickBot Parts



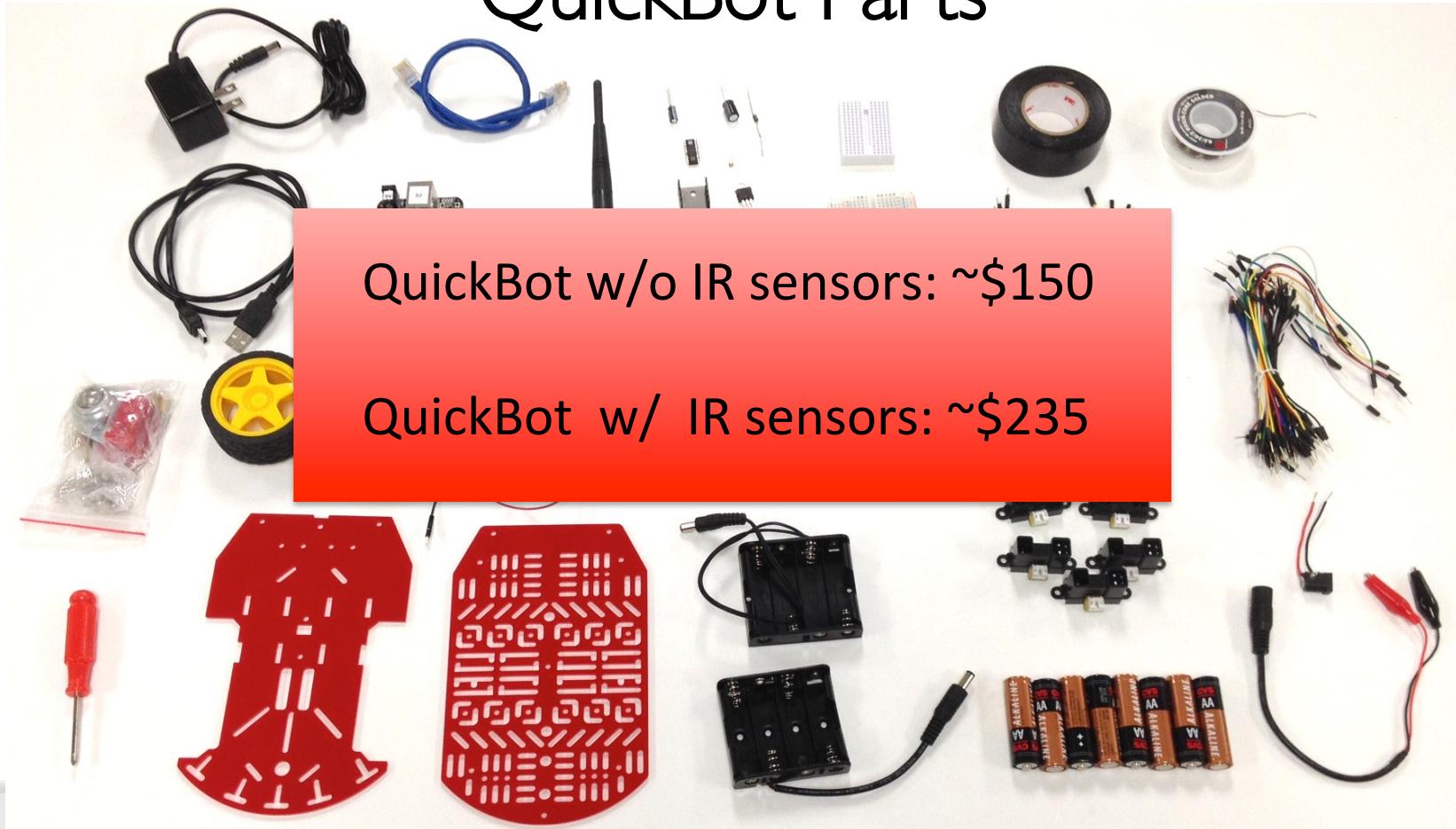
QuickBot Parts



QuickBot Parts

QuickBot w/o IR sensors: ~\$150

QuickBot w/ IR sensors: ~\$235



QuickBot Necessary Tools



- Screwdriver*
- Wire cutters
- Needle nose pliers
- Soldering iron

*Comes with Magician Bot chassis

Vendors

- Adafruit (www.adafruit.com)
- Amazon (www.amazon.com)
- Logic Supply (www.logicsupply.com)
- Mouser Electronics (www.mouser.com)
- SparkFun (www.sparkfun.com)



Complete Parts List Is Online

QuickBot Parts List						
Part	Name	Quantity	Price each (non bulk)	Vender	URL	
4	Microprocessor	Beaglebone Black	1	\$ 44.95	Adafruit	http://www.adafruit.com/products/1278
5	DC Power Supply	SV 2A (200mA) switching power supply	1	\$ 9.95	Adafruit	http://www.adafruit.com/products/276
6	Power Jack	Female DC Power adapter - 2.1mm jack to screw terminal block	2	\$ 2.00	Adafruit	http://www.adafruit.com/products/368
7	Jumper Wires M/M	Breadboarding wire bundle	1	\$ 6.00	Adafruit	http://www.adafruit.com/products/153
8	SD card	Sandisk 4GB microSD Memory Card with SD Adapter	1	\$ 6.50	Amazon	http://www.amazon.com/Sandisk-MicroSD-Memory-Adapter-Packaging/dp/B000SMVQ8R/ref=sr_1_1_tie=UTF8&qid=1384779586&sr=8-1&keywords=sd+card
9	Mini Breadboard & Wires M/M	miniBreadboard - Mini Breadboard for Arduino w/ Jumper Wires	1	\$ 6.00	Adafruit	http://www.adafruit.com/product/170
10	Breadboard & Wires M/M	microBread - 400-point Experiment Breadboard w/ Jumper Wires	1	\$ 6.00	Adafruit	http://www.adafruit.com/product/149
11	Wifi	Compact USR WiFi Antenna with 4" Antenna	1	\$ 12.95	Logic Supply	http://www.logic-supply.com/products/wav20
12	SV Regulator	LDO Voltage Regulators 5.0V 3.0A Positive - LD1085V50	1	\$ 1.55	Mouser Electronics	http://www.mouser.com/Search/ProductDetail.aspx?R=D1085V50
13	Cap 100uF	Electrolytic Capacitors - 100uF 25V	1	\$ 0.09	Mouser Electronics	http://www.mouser.com/ProductDetail/Nichicon/U/L1E10M1ED1DU700s%AE#pJZ2mhfh252b1w0xYkX7Dm6N0Ugh001bzNafv38%3d
14	Cap 10uF	Electrolytic Capacitors - Leaded 10uf 16V	1	\$ 0.08	Mouser Electronics	http://www.mouser.com/ProductDetail/Nichicon/U/L10M16V10-TB70ss%AE#pJZ2mhf1n9v9220rcr4dOUxxy8r0405H5h2f%3d
15	Cap 1uF	Ceramic Capacitors - Leaded 1uf 50V	1	\$ 0.10	Mouser Electronics	http://www.mouser.com/ProductDetail/VX/SR205105MAR#pJZ2mhfM27MwM3W7TlRQKXIM3yAnwvIBS0QwvWzA1s%3d
16	Diode	Rectifier diode 1N4007	1	\$ 0.14	Mouser Electronics	http://www.mouser.com/ProductDetail/VX/SR205105MAR#pJZ2mhfM27MwM3W7TlRQKXIM3yAnwvIBS0QwvWzA1s%3d
17	Resistor 20k	Resistor Through hole 3.9kW 10k ohm	2	\$ 0.04	Mouser Electronics	http://www.mouser.com/ProductDetail/VX/SR205105MAR#pJZ2mhfM27MwM3W7TlRQKXIM3yAnwvIBS0QwvWzA1s%3d
18	Resistor 10k	Resistor Through hole 1.1W 10k ohm	12	\$ 0.05	Mouser Electronics	http://www.mouser.com/ProductDetail/VX/SR205105MAR#pJZ2mhfM27MwM3W7TlRQKXIM3yAnwvIBS0QwvWzA1s%3d
19	Battery Holder	Battery Holder - 4xAA Square	1	\$ 0.06	Mouser Electronics	http://www.mouser.com/ProductDetail/VX/SR205105MAR#pJZ2mhfM27MwM3W7TlRQKXIM3yAnwvIBS0QwvWzA1s%3d
20	Chassis Kit	Magician Chassis	1	\$ 2.50	Sparkfun	https://www.sparkfun.com/products/9835
21	Encoder	RedBot Wheel Encoder	1	\$ 14.95	Sparkfun	https://www.sparkfun.com/products/10825
22	Jumper Wires M/F	Jumper Wires Premium 6" M/F Pack of 10	1	\$ 10.00	Sparkfun	https://www.sparkfun.com/products/11768
23	Mounting Screws (long)	Screw - Phillips Head (1/2", 4-40, 10 pack)	2	\$ 1.50	Sparkfun	https://www.sparkfun.com/products/10452
24	Mounting Screws (short)	Screw - Phillips Head (1/4", 4-40, 10 pack)	2	\$ 1.50	Sparkfun	https://www.sparkfun.com/products/10453
25	Mounting Nuts	Nut - Metal (4-40, 10 pack)	1	\$ 1.00	Sparkfun	https://www.sparkfun.com/products/10454
26	Motor Controller	Hi-Bridge Motor Driver 1A	1	\$ 2.35	Sparkfun	https://www.sparkfun.com/products/215
27	Heatsink	Heatsink TO-220	1	\$ 0.90	Sparkfun	https://www.sparkfun.com/products/121
28	Batteries	1500 mAh Alkaline Battery - AA	8	\$ 0.50	Sparkfun	https://www.sparkfun.com/products/8100
29	Switch	Rocker Switch - SPST (right-angle)	1	\$ 0.95	Sparkfun	https://www.sparkfun.com/products/8837
30	QuickBot Total (w/o IR Sensors)		49	\$ 151.11		
32						
33	IR Sensor	Infrared Proximity Sensor Short Range	5	\$ 14.00	Sparkfun	https://www.sparkfun.com/products/8959
34	IR Connector	JST Jumper 3 Wire Assembly	5	\$ 1.50	Sparkfun	https://www.sparkfun.com/products/9915
35	IR Brackets	Angle Bracket - 4-40	10	\$ 0.45	Sparkfun	https://www.sparkfun.com/products/10228
36	QuickBot Total (w/ IR Sensors)		20	\$ 233.11		
38						
39	Tools & Misc					
40	Needle-nose pliers	Stanley 84-096 5-Inch Needle Nose Plier	1	\$ 4.00	Amazon	http://www.amazon.com/Stanley-84-096-5-Inch-Needle-Plier/dp/B0001W5OY/ref=sr_1_1_tie=UTF8&qid=1384779586&sr=8-1&keywords=needle+pliers
41	Soldering Iron	Dr. Meter® 60 Watts High-performance Soldering Iron with Stand	1	\$ 9.00	Amazon	http://www.amazon.com/Dr-Meter%C2%AE-Watts-High-performance-Soldering-Stand/dp/B007XCAOE/ref=sr_1_1_tie=UTF8&qid=1384779586&sr=8-1&keywords=soldering+iron
42	Solder	Lead-Free Solder 5 Roll - LF-99	1	\$ 4.00	Amazon	http://www.amazon.com/Lead-Free-Solder-5-Roll-LF-99/dp/B002ILVMW/ref=sr_1_1_tie=UTF8&qid=1384779586&sr=8-1&keywords=solder
43	Wire cutters	Hedao Professional Tools Wire Cutter Plier Yellow 4.5 Inch 125 Mm	1	\$ 6.50	Amazon	http://www.amazon.com/Hedao-Professional-tools-Wire-Cutter-yellow-4.5-Inch-125-mm/dp/B00US04AKC/ref=sr_1_1_tie=UTF8&qid=1384779586&sr=8-1&keywords=wire+cutters
44	Electrical tape	Electrical tape	1	\$ 0.95	Sparkfun	https://www.sparkfun.com/products/10689
45	Tools Total		5	\$ 24.45		
47						
48	Substitutions					
49	DC Barrel Jack	2.1mm DC Barrel Jack to Alligator Clips	2	\$ 1.95	Adafruit	http://www.adafruit.com/products/1328
50	Breadboard	Tiny breadboard	2	\$ 4.00	Adafruit	http://www.adafruit.com/products/65
51	Diode	Diode rectifier 1N4001	1	\$ 0.15	Sparkfun	https://www.sparkfun.com/products/9589
52	Capacitor	Capacitor Ceramic 0.1uF	1	\$ 0.25	Sparkfun	https://www.sparkfun.com/products/8375
53	Capacitor	Capacitor Electrolytic 10uF	1	\$ 0.45	Sparkfun	https://www.sparkfun.com/products/523
54	Capacitor	Capacitor Electrolytic 100uF	1	\$ 0.35	Sparkfun	https://www.sparkfun.com/products/956
55	Jumper wires M/M	Jumper Wires Premium 6" M/M Pack of 10	2	\$ 3.95	Sparkfun	https://www.sparkfun.com/products/8431
56						
57	Other Items					
58	Micro HDMI Cable	Micro-HDMI to HDMI Socket Adapter Cable	1	\$ 6.95	Adafruit	http://www.adafruit.com/products/1358

QuickBot Demo

