Alternative to Bitty Bot Rover:

\*\*\* Disclaimer all prices subject to change without warning, prices listed as of Aug 8, 2015 \*\*\*

2 Wheel Drive DIY Kit - Double deck

<http://www.ebay.com/itm/1Set-2WD-DIY-Kit-Mini-Round-Double-Deck-Smart-Robot-Car-Chassis-for-Arduino-/281765218354?hash=item419a840832>

$10.30 + 1.59 = $11.89 (price current as of Aug 8, 2015)

\*\*\* NOTE: Does not come with a Battery Box see below \*\*\*

4 Wheel Drive DIY Kit - Half-Double Deck

<http://www.ebay.com/itm/Four-Wheel-Drive-Smart-Robot-Car-Chassis-For-4Wd-DIY-Maker-BOOOLE-/181817133489?hash=item2a552549b1>

$16.99 + $2.98 = $19.97 (On Sale now for $13.59 + $2.98 = $16.57 Aug 8, 2015)

\*\*\* NOTE: Has a small battery pack, but probably too small to be useful \*\*\*

\*\*\* NOTE II: 4 wheel independent drive will require additional driver board \*\*\*

\*\*\* NOTE III: Bitty Bot Rover and Bitty Bot Rover Jr are both 2 wheel drive robots

additional programming may be required for a 4 Wheel drive.

Additional wiring will be needed. \*\*\*

\*\*\*\*\* SEE NOTES Section for a “low cost” complete kit \*\*\*\*\*

**MINIMUM MUST HAVES**:

1 Micro Controller - Recommended Arduino UNO or UNO Clone

\*\*\* To Stay with Bitty Bot Rover the Arduino MEGA 2560 is used \*\*\*

At Least one L298 Motor Driver $2.41

<http://www.ebay.com/itm/1PCS-New-L298N-Dual-H-Bridge-Stepper-Motor-Driver-Controller-Board-Module-RED-/121678288288?hash=item1c549755a0>

\*\*\* NOTE I: There is a new version of this board out, so the one pictured may or may not be the one you get, they are pretty much the same board, with a small design change \*\*\*

\*\*\* NOTE II: IF you want to do 4 wheel independent drive you will need 2 of these drivers \*\*\*

Best Price found for UNO (Current Aug 8, 2015) $3.69

<http://www.ebay.com/itm/DIY-ATmega328P-CH340G-UNO-R3-Board-and-USB-Cable-for-Arduino-S3-/221601043614?hash=item339873949e>

Best Price found for MEGA 2560 (Current Aug 8, 2015) $8.42

<http://www.ebay.com/itm/221797498872?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\* See Notes Below for a small Mega 2560 option \*\*

Other Micro controllers may be used, however you’ll be responsible for wiring and any reprogramming that may need to be made.

**Options and Upgrades:**

\*\*\* NOTES: anything optional/upgrade will require additional programming, and may or may not be well supported or documented \* see additional comments in Notes section \*\*\*

9g Servo: $1.68

<http://www.ebay.com/itm/NEW-rc-GS09A-Servo-mini-micro-9g-for-Rc-helicopter-Airplane-Foamy-Plane-I-/391107141712?hash=item5b0fcd6050>

HC-SR04 Ultra Sonic: $.99

<http://www.ebay.com/itm/5V-Ultrasonic-Module-HC-SR04-Distance-Measuring-Transducer-for-Arduino-/161130848128?hash=item2584259f80>

Pan and Tilt (FPV) Platform (NO SERVOS) $1.88

<http://www.ebay.com/itm/PT-Kit-Pan-Tilt-Camera-Platform-Anti-Vibration-Mount-For-Servo-Aircraft-FPV-RC-/281695821950?hash=item419661207e>

High Torque Standard Servo $3.88

<http://www.ebay.com/itm/High-Torque-S3003-Futaba-Micro-Tower-Pro-Standard-Servo-for-RC-Car-Plane-Boat-/261745140552?hash=item3cf139e348>

5pc IR Photoelectric switches (Line Tracing robot) $8.08

<http://www.ebay.com/itm/171419230296?_trksid=p2057872.m2749.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\*\* NOTES: These are pointed down, and have a nice hole for mounting, they also have both Analog and Digital outputs \*\*\*\*

ESP8266 Carrying Brd + 800ma 3.3v Board $1.98

<http://www.ebay.com/itm/ESP8266-Carrying-Brd-800ma3-3VBrd-Arr1-10BDay-/281491677402?hash=item418a3620da>

\*\*\* NOTES: Not completely needed, but the ESP8266 is a 3v device - This doesn’t take care of the 3v logic shift however \*\*\*

ESP8266 WIFI Board $2.64

<http://www.ebay.com/itm/ESP8266-Serial-WIFI-Wireless-TransceiveR-Module-Send-Receive-LWIP-AP-STA-Y7-/271930572568?hash=item3f50533f18>

\*\*\* NOTES: The ESP8266 is a 3 volt device, and uses 3 volt logic, a level shifter and external regulator is highly recommended \*\*\*

5pcs 2 - Channel Bi-Directional Logic Level Shifter $3.03

<http://www.ebay.com/itm/5pcs-2-Channel-Bi-Directional-Logic-Level-Shifter-Converters-3V-5V-For-Arduino-/291505613766?hash=item43df16abc6>

Bi-Directional Level Shifter, 8-Channel $2.65

<http://www.ebay.com/itm/Bi-Directional-Level-Shifter-Logic-Level-Converter-8-Channel-for-Arduino-DIY-/391148728882?hash=item5b1247f232>

84x48 LCD Module (Nokia 5110) $2.26

<http://www.ebay.com/itm/84x48-Pixel-LCD-Module-Blue-Backlight-Adapter-LED-PCB-For-Nokia-5110-Arduino-/171321594587?hash=item27e39012db>

1602 16x2 HD44780 I2C LCD $3.99

<http://www.ebay.com/itm/1602-16x2-HD44780-Character-LCD-w-IIC-I2C-Serial-Interface-Adapter-Module-/281317663849?hash=item417fd6e469>

\*\*\* NOTES: Requires soldering \*\*\*

Blue .96” SPI/I2C 128x64 OLED Display module $3.73

<http://www.ebay.com/itm/Blue-0-96-SPI-I2C-Serial-128x64-OLED-LCD-LED-Display-Module-Fr-Arduino-STM32-AP-/121712777487?hash=item1c56a5990f>

433mhz RF Transmitter and Receiver Kit $.99

<http://www.ebay.com/itm/1-Set-of-433Mhz-RF-Transmitter-and-Receiver-Kit-for-Arduino-remote-control-/221524421949?pt=LH_DefaultDomain_0&hash=item3393e26d3d>

NRF24L01 Wireless (2.4ghz but not WIFI) $.99

<http://www.ebay.com/itm/2014-high-quality-1pc-New-NRF24L01-2-4GHz-Antenna-Wireless-Transceiver-Module-/400727919112?pt=LH_DefaultDomain_0&hash=item5d4d3eca08>

\*\*\* NOTES: Like the ESP8266 a carrier board is highly recommended, these are also 3 volt logic, and could be damaged if using 5v. \*\*\*

\*\*\* NOTES II: There are different models of this board, and all seem to work slightly differently \*\*\*

\*\*\* NOTES III: Documentation is not written well, perhaps because of how many different models \*\*\*

\*\*\* PERSONAL NOTE: I like these boards, when they work right, they work really well, but they are picky and finicky boards, and probably not a good choice for the beginner \*\*\*

NRF24L01 Socket adapter module $1.05 (Highly recommend using one of these)

<http://www.ebay.com/itm/Socket-adapter-module-Bureau-8PIN-NRF24L01-wireless-module-/361089059228?pt=LH_DefaultDomain_0&hash=item541295c99c>

Sensor Shield V5 $2.66

<http://www.ebay.com/itm/For-Arduino-APC220-Bluetooth-Analog-Module-Servo-MotorNew-Sensor-Shield-V5-V5-0-/130946759173?hash=item1e7d08fa05>

Spare Wheel Set - $2.41

2x spare wheels, just in case.

<http://www.ebay.com/itm/252041716771?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

10x Ultrasonic Sensor Mounting Bracket For HC-SR04 Module - $8.99

<http://www.ebay.com/itm/360982109922?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\* More than you probably need, but cheaper to buy them in bulk (Single Mount is almost $3)

Ultrasonic Sensor Mounting Bracket for HC-SR04 Smart Car - $.99 + $1.96

<http://www.ebay.com/itm/Ultrasonic-Sensor-Mounting-Bracket-for-HC-SR04-Smart-Car/221591839317?_trksid=p2047675.c100005.m1851&_trkparms=aid%3D222007%26algo%3DSIC.MBE%26ao%3D1%26asc%3D33098%26meid%3D486a3fe478874f77a22a4e38abe42fbc%26pid%3D100005%26rk%3D3%26rkt%3D6%26sd%3D360982109922>

\*\*\* This is not the mount as above, and is almost $3 bucks for just one

10pcs SG90 Servo motor bracket for smart car chassis - $5.82 + $1.95

<http://www.ebay.com/itm/231444414434?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\* As is typical, it’s cheaper to buy these in bulk, These are for the 9G (mini-servos)

SG90 Servo Motor bracket for smart car chassis - $1.39 + $2.50

<http://www.ebay.com/itm/SG90-Servo-Motor-Bracket-SG90-Bracket-for-Robot-NO-Motor/381084575972?rt=nc&_soffid=5006040008&_soffType=OrderSubTotalOffer&_trksid=p5731.m3795>

\*\*\* For 9G Mini-servos

**REPLACEMENT MOTORS and UPGRADED MOUNTS:**

4pcs smart car plastic tire wheel & DC Gear Motors - $9.98 + $2.00

<http://www.ebay.com/itm/371343663687?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\* 48:1 gear ratio - 4 spares with wheels

1 smart car plastic wheel with dc gear motor - $2.49

<http://www.ebay.com/itm/400932694704?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\*\* 48:1 gear ratio

TT Motor DC 3v-6v Intelligent Car Gear Motor - 1pc - $2.55, 2pc - $4.55, 4pc - $7.99

<http://www.ebay.com/itm/181500093560?_trksid=p2060353.m1438.l2649&var=480456212555&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\*\* 48:1 gear ration

L Type Alloy TT Motor Bracket Fixed Bracket for Robot Smart Car $4.00 + $1.00

<http://www.ebay.com/itm/L-Type-Alloy-TT-Motor-Bracket-Fixed-Bracket-for-Robot-Smart-Car-Arduino-/131180125600?hash=item1e8af1dda0>

\*\*\* Metal Alloy “L” Bracket Mounts, with the right holes drilled (?) additional mounting screws

\*\*\*\* Currently on sale for $2.40 + $1.00

# 1x 6v Bend of uniaxial TT Gear Motor/deceleration motor/DC Geared Motor to toys $3.76

<http://www.ebay.com/itm/281767542220?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\*\* “L” bend motor, doesn’t say what gear ratio is

# 4pcs Single shaft Robot Motor gear motor DC 3v-6v motor gear box for Robot Car - $7.92

<http://www.ebay.com/itm/131202438873?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

\*\*\* “L” bend motor, doesn’t say what gear ratio is

# TT Motor Mount Holder Bracket Fasteners for RC Model Car - $3.65

<http://www.ebay.com/itm/TT-Motor-Mount-Holder-Bracket-Fasteners-for-RC-Model-Car-/321454974331?hash=item4ad835a57b>

\*\*\*\* Priced for 1, Metal Mount, much stronger and better than the plastic mounts that come with the chassis, it is optional item \*\*\*

# 2pcs TT DC Geared Motor Bracket Holder Mount for Smart Car Robot Parts - $2.48 + $2.00

<http://www.ebay.com/itm/2pcs-TT-DC-Geared-Motor-Bracket-Holder-Mount-for-Smart-Car-Robot-Parts-/201415086923?hash=item2ee546534b>

\*\*\*\* 2 pcs, Metal Mount, much stronger and better than plastic mounts that come with the chassis, it is optional item \*\*\*

**WHEEL ENCODERS (Optional):**

Wheel encoders are optional, the chassis listed here do not include the discs, or encoders

You’ll need discs and some type of optical sensor to count the holes in the discs.

One for each wheel, as with most things if you buy in bulk you can get slightly better prices

(With this exception, if you only need or want 2 discs, it is cheaper to buy them separated)

1 disc: $1.30

<http://www.ebay.com/itm/DZ186-Coded-Disc-Encoder-20-Holds-Motor-Speed-Sensor-for-Robot-Speed-Test-/131319659225?hash=item1e9342fad9>

2 Discs: $1.56 + $1.95 shipping = $3.51 or $1.76 each (Not the best deal)

<http://www.ebay.com/itm/2pcs-Coded-Disc-Encoder-20-Holds-Motor-Speed-Sensor-for-Robot-Speed-Test-/400763148831?hash=item5d4f585a1f>

4 Discs: $2.23 + $1.98 shipping = $4.21 or $1.05 each

<http://www.ebay.com/itm/4PCS-Coded-Disc-Encoder-20-Holds-Motor-Speed-Sensor-for-Robot-Speed-Test-new-/221462105725?hash=item33902b8e7d>

5 Discs: $2.43 + $1.98 shipping = $4.41 or $.88 cents each

<http://www.ebay.com/itm/5pcs-Coded-Disc-Encoder-20-Holds-Motor-Speed-Sensor-for-Robot-Speed-Test-/371130817226?hash=item56691edaca>

10 Discs: $4.53 + $1.00 shipping = $5.53 or $.55 cents each (best deal?)

<http://www.ebay.com/itm/10PCS-Coded-Disc-Encoder-20-Holds-Motor-Speed-Sensor-Speed-Test-for-Robot-/390923251046?hash=item5b04d76d66>

You also need a sensor for each wheel, generally this are a diode/photodiode pair, but they could be IR, or any type of sensor that can give both a high and low (for counting), unfortunately I have not tried any of these with the discs above, so they may be too close together on the board, or some other problem.

You need one for each wheel.

H206 Speed Measuring Sensor & Encoder Kit - $8.39

<http://www.ebay.com/itm/New-H206-Speed-Measuring-Sensor-Module-Photoelectric-Encoders-Kit-for-Arduino-/381211238971?hash=item58c1f5e23b>

\*\*\* Expensive, but come with the encoder disc

\*\*\* Mounting it might be a issue

H206 Opto-Coupler Smar Car Speed Sensor With Kit - $7.65 +$2.05 shipping (From U.S.A.)

<http://www.ebay.com/itm/H206-Opto-Coupler-Smart-Car-Speed-Sensor-With-Kit-Arduino-NEW-SHIP-FROM-USA-/262015745037?hash=item3d015afc0d>

\*\*\* Also expensive, comes with encoder disc, mounts to DC motor.

**Additional Items that will make life easier, but not included:**

Switch for your Chassis \*\* See Notes Section

additional wires

Stand offs for the Micro-Controller (\* See Notes \*)

barrel connectors (male and female) From .99 cents to $14.15

<http://www.ebay.com/itm/5-5x2-1mm-DC-Power-Female-Male-Connector-Cable-Pigtail-Plug-Wire-CCTV-LED-Light-/221498037947?pt=LH_DefaultDomain_0&var=&hash=item33924fd6bb>

\*\*\* See Notes Section \*\*\*

**\*\*\* BATTERIES \*\*\***

The Motors are 6v but will handle 9v without problem, the current Bitty Bot has the ability to change out battery packs, so there are a couple of ways to go.

These are just two options for batteries, there are others, that may or may not work better or worse.

AA Battery Holder 6 cell - comes with connector already installed <http://www.ebay.com/itm/BLK-AA-Batteries-Holder-Box-Case-Making-Battery-Pack-for-Arduino-monolithic-/181797581070?hash=item2a53faf10e>

$2.71

AA Battery Holder 6 cell - connector NOT included (Doesn’t mount to deck of robot)

<http://www.ebay.com/itm/1Pcs-6-AA-Battery-9V-Diy-Clip-Holder-Box-Case-With-Wire-Leads-Black-TW-/131556417283?pt=LH_DefaultDomain_0&hash=item1ea15f9f03>

$1.09

**FINAL COSTS:**

Base Kits include: Chassis, with motors (2 or 4 depending on chassis kit), Microcontroller (UNO, MEGA 2560), L298N Motor Driver, battery holder

2 Wheel Drive with UNO - $20.99

2 Wheel Drive with MEGA2560 - $25.72

4 Wheel Drive with UNO - $29.07

4 Wheel Drive with UNO Independant drive - $31.48

4 Wheel Drive with Mega - $33.80

4 Wheel Drive with Mega Independant drive - $36.21

2 Wheel Drive with UNO compared to $34.99 eBay Kit found in Notes:

(Comes with v5 sensor shield, 9g servo, ultra sonic, fpv mount)

* $28.20 (\*\*\* See Notes \*\*\*)
* You will still need to add stand-offs, and, barrel connectors. Which are better priced when buying in bulk. The kits come with stand-offs for the chassis, but not the microcontroller or l298 driver boards.

Stickly speaking these are not required, they will make life nicer in the long run. Same is true for the additional barrel connectors.

**\*\*\*\*\* NOTES: \*\*\*\*\***

1. Small Arduino Mega 2560 Alternative (Mega2560 Pro Mini v1.0)

Want a MEGA 2560 but don’t have room on your bot? I found these:

Prices hover around $15 to $18 plus shipping, so not a cheap alternative:

<http://www.ebay.com/itm/161757319864?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

$16.50 + $2.00 = $18.50

\*\*\* These appear to be the same as the MEGA 2560, only in a small package, wiring details may or may not change, and you’ll probably need to be able to solder the headers on yourself.

2) Probably the best way to buy Standoffs is in bulk, you’ll get a better price, but end up with stands you don’t or can’t use -

This Kit probably has the most useful collection: It is about $5.00 for 120 pieces, the price is in Canada (so it can change a bit)

<http://www.ebay.com/itm/M3-Nylon-Hex-Spacers-Screw-Nut-Assortment-Kit-Stand-off-Plastic-Accessories-Set-/181815737269?hash=item2a550ffbb5>

\*\*\* IF a few people go in together, for this kit the price will be cheap, and people can share the stands/spacers, nuts and screws - I think there is plenty for 3 or 4 people \*\*\*

3) Avoidance Smart Robot Car Chassis Kit 2 wheel drive (Think this is a single deck kit)

<http://www.ebay.com/itm/252046513461?_trksid=p2060353.m1438.l2649&ssPageName=STRK%3AMEBIDX%3AIT>

Comes with a 4 cell battery holder (AA - 6v), rocker switch, a version 5 sensor shield (This is really additional breakouts for power and connectors, you still need sensors), 9g Servo, Ultra Sonic, L298 motor driver, and FPV holder for ultra sonic (?)

The cost is $34.99

\*\*\*\* NOTES: I believe using the prices above, you could save about yourself about $6.79 however it might be worth the extra money because it is all coming from one place \*\*\*\*

4) Optional Parts/Upgrades - most of these parts I have listed I have personally used, and have code and documentation for most, community support is generally pretty good, and help in the club can be found.

5) Barrel Connectors - 2pc (2 each male/female) $2.06 - In bulk (50 pcs each) you can get the connectors for as little as $0.25 each, I’d recommend buying these in bulk and splitting the costs, and sharing.

6) Rocker Switch - generally these switches can be found from local sources for less than a dollar, get at least a 12v switch. I’m leaving the switch up to the end user until we get a few of these kits and can figure out which switch will work.

\*\*\* It is possible that these kits come with switches, and just are not pictured. One of my kits had a switch, the other did not \*\*\*