

## Materials

Sub-Assembly	Part Name	Device	Image	Package	Quantity	Description	Datasheet	Supplier	Cost* (USD)	Assembly Total
PCB	R0, R1, R2, R3, R4, R5, R6, R7	Resistor 472		SMD R0805	8	SMD Resistor 4K7 Ohm	link	link		
	R8	Resistor 472		SMD R0805	1	SMD Resistor 4K7 Ohm	link	link		
	R9	Resistor 000		SMD R0805	1	SMD Resistor 0 Ohm	link	link		
	R10	Resistor 180		SMD R0805	1	SMD Resistor 18 Ohm	link	link		
	R11	Resistor NM		SMD R0805	0	Not Mounted	link	link		
	R15	Resistor 000		SMD R0805	1	SMD Resistor 0 Ohm	link	link		
	C1, C2	Capacitor 100 pF		SMD C0603	2	SMD Ceramic Capacitor 100 pF	link	link		
	LEDO, LED1	LED WS2812B		SMD 5050	2	SMD Intelligent Control LED	link	link		
	IRLML2502	Mosfet IRLML2502		SOT23	1	SMD N-Channel Mosfet	link	link		
	MUX	Mux CD4051		SOIC-16	1	CD4051BM CMOS Single 8-Channel Analog Multiplexer/Demultiplexer	link	link		
PCB	P0, P1, P2, P3, P4, P5, P6, P7	IR TCRT5000L		TCRT5000L	8	Reflective Optical Sensor with Transistor Output (long lead version)	link	link		
	SWITCH	Switch SS12F23		SS12F23	1	SS12F23 Horizontal Slide Switch Handle Height 2 mm	link	link		
	BATT0, BATT1	Connector JST-PH-2		JST-PH-2	2	2 pin JST PH 2.0mm Through Hole Header Vertical Straight Top Entry	link	link		
	I2C UART	Female Socket Header 1X4		PH	1	1x4 Pin Single Row Female 2.54mm Vertical Socket Header	link	link		
	E_LEFT, E_RIGHT, M_LEFT, M_RIGHT	Male Pin Header 1X3		PH	4	1x3 Pin Single Row Male 2.54mm Breakable Pin Header	link	link		

Sub-Assembly	Part Name	Device	Image	Package	Quantity	Description	Datasheet	Supplier	Cost* (USD)	Assembly Total
Builtin Battery Charger(Optional)	C3, C4	Capacitor 10 uF		SMD C0603	1	SMD Ceramic Capacitor 10 uF	<a href="#">link</a>	<a href="#">link</a>		
	R12	Resistor 102		SMD R0805	1	SMD Resistor 1K Ohm	<a href="#">link</a>	<a href="#">link</a>		
	R13	Resistor 101		SMD R0805	1	SMD Resistor 100 Ohm	<a href="#">link</a>	<a href="#">link</a>		
	R14	Resistor 121		SMD R0805	1	SMD Resistor 120 Ohm	<a href="#">link</a>	<a href="#">link</a>		
	STDBY	LED SML 0805 Green		SMD SML0805	1	SMD LED Green (Standby)	<a href="#">link</a>	<a href="#">link</a>		
	CHRG	LED SML 0805 Red		SMD SML0805	1	SMD LED Red (Charging)	<a href="#">link</a>	<a href="#">link</a>		
Integrated Systems	TP4056	TP4056		SOP-8	1	1A Standalone Linear Li-Ion Battery Charger with Thermal Regulation	<a href="#">link</a>	<a href="#">link</a>		
	ESP-12E	ESP-12 NodeMCU CP2102		Socket	1	Slim Dev Kit based on microcontroller ESP8266 with WiFi SoC, integrates GPIO, PWM, I2C, 1-Wire and ADC all in one board. Version with CP2102 USB-TTL.	<a href="#">link</a>	<a href="#">link</a>		
	MT3608	MT3608 Step-up Module		Wire	1	MT3608 DC-DC Inverter Boost Converter Voltage Step Up Adjustable Power Step-up Supply Module 2A	<a href="#">link</a>	<a href="#">link</a>		
	IMU	MPU6050/GY-521 Module		Socket	1	Module MPU6050 with 3 Axis Analog Gyro and 3 Axis Accelerometer Sensors and I2C communications protocol.	<a href="#">link</a>	<a href="#">link</a>		
	TP4056	TP4056 Charging Module		Wire	1	TP4056 Charging Module 5V Micro USB 1A Lithium Battery Charging Board with Protection Charger Module.	<a href="#">link</a>	<a href="#">link</a>		
	Battery	3.7v 1800 mAh LIPO Battery		103450	1	LiPo Rechargeable Battery With 2-pin JST-PH Connector and Max Package for 103450	<a href="#">link</a>	<a href="#">link</a>		
Chassis	Encoder	Rotary Encoder 48 PPR		9MM	2	Kailh 9/10/12mm Rotary Mouse Scroll Wheel Encoder 1.74 mm Hole 40g Force	<a href="#">link</a>	<a href="#">link</a>		
	Wheel	Rubber O-ring		OD48CS5	2	NBR Rubber O RING OD48 CS5mm	<a href="#">link</a>	<a href="#">link</a>	0.20	
	Bearing	Bearing 623zz		3x10x4mm	2	Ball Bearing 623ZZ 3X10X4mm	<a href="#">link</a>	<a href="#">link</a>	0.40	
	Castor Wheels	Steels Balls		4mm Diameter	2	Steels Balls 4mm Diameter	<a href="#">link</a>	<a href="#">link</a>	0.05	
	Wheel Fastening	M3x20mm Bolt with Nut and Pressure Washer		M3	2	M3x20mm Bolt with Nut and Pressure Washer	<a href="#">link</a>	<a href="#">link</a>	0.20	1.20
	Chassis Fastening	M2.5x10mm Screws Self-Tapping		M2.5	16	M2.5x10mm Screws Self-Tapping	<a href="#">link</a>	<a href="#">link</a>	0.25	
	Pinion Gear Shaft	Standard Aluminium Rivets		Mandrel Diameter 1.8mm	2	Required Only the Mandrel part of Rivet Diameter 1.8mm	<a href="#">link</a>	<a href="#">link</a>	0.10	