Mobile Robot Platform - Bill of Materials

Based on SmaringWing Tracked Chassis & Raspberry Pi 4

1. Core Components

Qty	Component	Specifications & Notes
1	**SmaringWing Tracked Chassis** (Amazon B09V7NMCPK)	2mm aluminum plate (7.6"x7.6"). Includes 2x high-torque 12V gear motors and rubber caterpillar tracks. Rated for 6-12V DC.
1	**Raspberry Pi 4 (8GB)**	Main compute board. Run Pi OS Lite for robotics. Requires active cooling.
1	**3S LiPo Battery**	11.1V 2200mAh with XT60 connector. Provides ~60-90 mins runtime. Standard RC battery size.
1	**TB6612FNG Motor Driver**	Efficient dual-channel driver. Handles up to 1.3A per motor continuously. Much cooler and more efficient than older L298N boards.
1	**LM2596 Buck Converter**	Steps 11.1V battery down to a stable 5.0V/3A specifically for the Pi 4. Prevents brownouts.

2. Sensors & Actuation

Qty	Component	Specifications & Notes

1	**Raspberry Pi Camera v2**	8MP Wide Angle. Plugs directly into Pi CSI port. Primary vision sensor.
2	**MG90S Metal Gear Servos**	High-torque metal gear servos. Used for pan/tilt camera mount or future robotic arms.
1	**Jumper Wire Kit**	Assorted Male-to-Female and Male-to-Male wires for all GPIO and power connections.

3. Mechanical & Mounting

Qty	Component	Specifications & Notes
1	**M3 Hardware Kit**	Stand-offs (19mm/25mm), M3 screws, nuts, and washers for secure PCB mounting to aluminum chassis.
2	**Right-Angle Servo Horns**	Keeps servo shafts clean and allows for compact camera/sensor mounting.
Assorted	**Velcro Straps & Heat Shrink**	Cable management, battery retention, and wire insulation. Gives a clean "bare metal" harness look.

> ⚡ **Critical Wiring Note:** Always connect the `GND` (ground) pin of the Raspberry Pi, the Motor Driver, and the Servos together. Without a common ground reference, PWM control signals will be erratic or fail completely.

4. Power & Wiring Layout

- **Battery (+)** → Motor Driver `VMOT` → Buck Converter `VIN+`
- **Battery (-)** → Motor Driver `GND` → Buck Converter `GND` → Pi GPIO `GND`

- **Buck Converter Output** → Adjust screw until multimeter reads exactly `5.0V` → Pi 4 USB-C Port
- **Pi GPIO 12, 13, 16, 18** → Motor Driver `IN1 - IN4` (Direction & Enable signals)
- **Pi GPIO 19, 21** → Servo Signal Wires (for camera pan/tilt)
