NIGEL (4WD4WS) BOM

NAME	SPECIFICATIONS	COMMENTS	LINK	RATE	QTY	PRICE	COST
Chassis							
Acrylic cutouts	24"x24", 1/8" thick acrylic sheet	Chassis cutouts source files (laser cutting)	Houston Acrylic	$ 20.99	1	$ 20.99	$ 20.99
Brass standoffs	M3×15 (F-F) standoffs		Amazon	$ 0.36	4	$ 1.44	$ 8.99
Brass standoffs	M3×20 (M-F) standoffs		Amazon	$ 0.19	4	$ 0.76	$ 9.89
Brass standoffs	M3×40 (M-F) standoffs		Amazon	$ 0.50	4	$ 2.00	$ 10.19
Bolts	M2X10 bolts		Amazon	$ 0.07	24	$ 1.68	$ 7.49
Bolts	M2X25 bolts		Amazon	$ 0.18	4	$ 0.72	$ 8.99
Bolts	M2.5X8 bolts		Amazon	$ 0.09	4	$ 0.36	$ 9.49
Bolts	M2.5X25 bolts		Amazon	$ 0.18	8	$ 1.44	$ 8.99
Bolts	M3X6 bolts		Amazon	$ 0.08	22	$ 1.76	$ 7.99
Bolts	M3X8 bolts		Amazon	$ 0.08	20	$ 1.60	$ 8.49
Bolts	M3X14 bolts		Amazon	$ 0.08	4	$ 0.32	$ 8.49
Bolts	M4X10 bolts		Amazon	$ 0.08	33	$ 2.64	$ 8.49
Nuts	M2 nuts		Amazon	$ 0.08	38	$ 3.04	$ 8.49
Nuts	M2.5 nuts		Amazon	$ 0.06	8	$ 0.46	$ 5.69
Nuts	M3 nuts		Amazon	$ 0.06	4	$ 0.24	$ 6.07
Nuts	M4 nuts		Amazon	$ 0.08	33	$ 2.64	$ 8.02
L-Bracket	20x20 mm stainless steel L-bracket		Amazon	$ 0.08	8	$ 0.63	$ 7.90
Servo horn	25T horn for MG996R servo motor		Amazon	$ 1.00	4	$ 4.00	$ 9.99
Wheels	65 mm rubber tyre wheels		Amazon	$ 0.99	4	$ 3.96	$ 3.99
Strap belt	9" LiPo battery strap belt	Optional to strap-on LiPo battery	Amazon	$ 0.89	1	$ 0.89	$ 8.99
Power Electronics							
LiPo battery	11.1V 5200mAh 3S 40C/80C LiPo		Amazon	$ 36.50	1	$ 36.50	$ 72.99
LiPo charger	2S-3S balance LiPo battery charger		Amazon	$ 9.68	1	$ 9.68	$ 9.68
Voltage checker	1S-8S LiPo battery voltage checker		Amazon	$ 5.49	1	$ 5.49	$ 5.49
Master switch	12V 10A M22 ring light push button (blue)		Amazon	$ 15.99	1	$ 15.99	$ 15.99
Buck converter	12A DC-DC CC CV buck converter		Amazon	$ 10.58	1	$ 10.58	$ 10.58
Motor driver	12V 1.2A Dual TB6612FNG motor driver	Small PCB footprint	SparkFun	$ 13.95	2	$ 27.90	$ 27.90
Auxilliary Board PCB	Custom PCB	PCB source files	DKRed	$ 22.22	1	$ 22.22	$ 88.88
PVC wires	30' 24 AWG PVC wire	Red and black color	Amazon	$ 7.98	1	$ 7.98	$ 7.98
Battery connector	XT60 connector (male)		Amazon	$ 2.99	1	$ 2.99	$ 8.99
DC jack	2.5×5.5 mm DC power jack (male)	Required to power Jetson Nano	DigiKey	$ 4.97	1	$ 4.97	$ 4.97
Screw terminal	2 pin 5.08 mm pitch screw terminal block		Amazon	$ 0.14	6	$ 0.84	$ 8.39
Header pins	2.54 mm male and female header pins		Amazon	$ 11.99	1	$ 11.99	$ 11.99
Header wires	M-M, F-F, M-F header wires		Amazon	$ 6.98	4	$ 27.92	$ 27.92
Wire sleeve	Spiral wire sleeve		Amazon	$ 5.99	1	$ 5.99	$ 5.99
Sensors							
Throttle sensor	Virtual sensory feedback (firmware)	Virtual (firmware)	NA	NA	1	NA	NA
Steering sensor	Virtual sensory feedback (firmware)	Virtual (firmware)	NA	NA	1	NA	NA
Incremental encoders	16 PPR 2-channel hall-effect magnetic encoder	Pre-installed on the motors	NA	NA	4	NA	NA
Microphone	KY-037 microphone module		Amazon	$ 1.49	1	$ 1.49	$ 8.99
IPS	AprilTag marker	Sticker print	NA	NA	1	NA	NA
IPS	Retroreflective marker	Optional (if motion capture system is available)	NA	NA	4	NA	NA
IMU	MPU9250 9-axis IMU		Amazon	$ 15.99	1	$ 15.99	$ 15.99
LIDAR	RPLIDAR A1M8 (with mini-USB adapter)		Amazon	$ 99.00	1	$ 99.00	$ 99.00
RGB cameras	8 MP Raspberry Pi Camera v2.1 (with CSI adapter)		SparkFun	$ 25.00	2	$ 50.00	$ 50.00
RGB-D camera	Intel RealSense D435i Depth Camera		Amazon	$ 324.99	1	$ 324.99	$ 324.99
Tracking camera	Intel RealSense T265 Tracking Camera		Amazon	$ 520.00	1	$ 520.00	$ 520.00
Computational Resources							
Jetson Orin Nano	NVIDIA Jetson Orin Nano Developer Kit		Amazon	$ 499.00	1	$ 499.00	$ 499.00
Arduino Mega	Arduino Mega 2560 Rev.3 development board	Unsoldered version	Alexnld	$ 43.19	1	$ 43.19	$ 43.19
Arduino Mega	Arduino Mega 2560 Rev.3 development board	Soldered version	Amazon	$ 20.99	1	$ 20.99	$ 20.99
Communication Systems							
LIDAR cable	USB Type-A to Micro-USB Type-B cable	Comes with LIDAR	NA	NA	1	NA	NA
CSI cables	22-15 pin camera serial interface (CSI) cable	Required for Jetson Orin Nano	Amazon	$ 3.50	2	$ 6.99	$ 6.99
MCU cable	USB Type-A to USB Type-B cable	Comes with Arduino	NA	NA	2	NA	NA
Wi-Fi adapter	TP-Link TL-WN725N USB Wi-Fi adapter	Optional (if Jetson Nano does not come with a WiFi card)	Amazon	$ 9.99	1	$ 9.99	$ 9.99
DP emulator	DisplayPort emulator plug	Optional (if required by Jetson Nano)	Amazon	$ 6.99	1	$ 6.99	$ 6.99
HDMI emulator	HDMI emulator plug	Optional (if required by Jetson Nano)	Amazon	$ 2.66	1	$ 2.66	$ 15.99
Actuators							
Drive actuators	6V 120 RPM 120:1 TT L motor (with encoders)	L-configuration	RobotShop	$ 7.99	4	$ 31.96	$ 31.96
Steering actuator	MG996R servo motor	Metal gear	Amazon	$ 7.49	4	$ 29.96	$ 29.98
Lights and Indicators							
LEDs	5 mm red, white and amber LEDs	Pre-wired LEDs (pack of 120)	Amazon	$ 0.11	12	$ 1.32	$ 12.99
Buzzer	12 mm passive buzzer		Amazon	$ 0.60	1	$ 0.60	$ 5.99
						TOTAL $ 1,907.72	$ 2,188.39

NIGEL (AS) BOM								
NAME	**SPECIFICATIONS**	**COMMENTS**	**LINK**	**RATE**	**QTY**	**PRICE**		**COST**
Chassis								
Acrylic cutouts	3 mm thick acrylic cutouts (laser cut)		GitHub	NA	21	NA		NA
Brass standoffs	M3×60 (M-F) standoffs		Amazon	$ 1.29	4	$ 5.16	$	12.99
Brass standoffs	M3×40 (F-F) standoffs		Amazon	$ 0.99	10	$ 9.90	$	9.99
Bolts	M2X10 bolts		Amazon	$ 0.09	36	$ 3.24	$	7.99
Bolts	M2.5X8 bolts		Amazon	$ 0.09	4	$ 0.36	$	10.19
Bolts	M2.5X25 bolts		Amazon	$ 0.20	8	$ 1.60	$	8.99
Bolts	M3X6 bolts		Amazon	$ 0.07	5	$ 0.35	$	7.49
Bolts	M3X8 bolts		Amazon	$ 0.09	20	$ 1.80	$	8.99
Bolts	M3X10 bolts		Amazon	$ 0.08	6	$ 0.48	$	8.99
Bolts	M3X14 bolts		Amazon	$ 0.09	6	$ 0.54	$	8.49
Bolts	M3X25 bolts		Amazon	$ 0.11	5	$ 0.55	$	9.99
Bolts	M4X10 bolts		Amazon	$ 0.10	4	$ 0.40	$	9.49
Nuts	M2 nuts		Amazon	$ 0.09	56	$ 5.04	$	8.49
Nuts	M2.5 nuts		Amazon	$ 0.04	8	$ 0.32	$	4.51
Nuts	M3 nuts		Amazon	$ 0.06	18	$ 1.08	$	6.06
Nuts	M4 nuts		Amazon	$ 0.08	4	$ 0.32	$	8.06
Plastic spacer	M4X5 spacers	Optional for motor driver	NA	NA	4	NA		NA
Servo horn	25T horn for MG996R servo motor		Amazon	$ 1.00	1	$ 1.00	$	9.99
TT motor gearboxes	100 RPM TT motor gearbox	Optional for 2WD configuration	NA	NA	2	NA		NA
Wheels	65 mm rubber tyre wheels		Amazon	$ 0.99	4	$ 3.96	$	3.99
Strap belt	9" LiPo battery strap belt	Optional to strap-on LiPo battery	Amazon	$ 1.59	1	$ 1.59	$	7.99
Power Electronics								
LiPo battery	11.1V 5200mAh 3S 40C/80C LiPo		Amazon	$ 36.50	1	$ 36.50	$	72.99
LiPo charger	2S-3S balance LiPo battery charger		Amazon	$ 9.68	1	$ 9.68	$	9.68
Voltage checker	1S-8S LiPo battery voltage checker		Amazon	$ 5.49	1	$ 5.49	$	5.49
Master switch	12V M12 ring light push button (blue)		Amazon	$ 2.33	1	$ 2.33	$	13.98
Buck converter	12A DC-DC CC CV buck converter		Amazon	$ 10.58	1	$ 10.58	$	10.58
Motor driver	20A motor driver with braking		Robokits	$ 7.80	1	$ 7.80	$	7.80
Motor driver	12V 2A L298N motor driver	Alternative motor driver	Amazon	$ 6.99	1	$ 6.99	$	6.99
Prototype board	6x8x cm universal prototype board	PCB source files	Amazon	$ 1.49	1	$ 1.49	$	14.90
PVC wires	30' 24 AWG PVC wire	Red and black color	Amazon	$ 2.99	1	$ 2.99	$	8.99
Battery connector	XT60 connector (male)		Amazon	$ 2.99	1	$ 2.99	$	8.99
DC jack	2.5×5.5 mm DC power jack (male)	Required to power Jetson Nano	DigiKey	$ 4.97	1	$ 4.97	$	4.97
Screw terminal	6 pin 5.08 mm pitch screw terminal block		Amazon	$ 0.15	2	$ 0.30	$	8.98
Header pins	2.54 mm male and female header pins		Amazon	$ 11.99	1	$ 11.99	$	11.99
Header wires	M-M, F-F, M-F header wires		Amazon	$ 6.98	4	$ 27.92	$	27.92
Wire sleeve	Spiral wire sleeve		Amazon	$ 6.49	1	$ 6.49	$	6.49
Cooling fan	5V DC 4020 cooling fan	Optional to cool Jetson Nano	DFRobot	$ 6.90	1	$ 6.90	$	6.90
Sensors								
Throttle sensor	Virtual sensory feedback (firmware)	Virtual (firmware)	NA	NA	1	NA		NA
Steering sensor	Virtual sensory feedback (firmware)	Virtual (firmware)	NA	NA	1	NA		NA
Incremental encoders	16 PPR 2-channel hall-effect magnetic encoder	Pre-installed on the motors	NA	NA	2	NA		NA
IPS	AprilTag marker	Sticker print	GitHub	NA	1	NA		NA
IMU	MPU9250 9-axis IMU		Amazon	$ 15.99	1	$ 15.99	$	15.99
LIDAR	RPLIDAR A1M8 (with mini-USB adapter)		Amazon	$ 99.00	1	$ 99.00	$	99.00
Cameras	8 MP Raspberry Pi Camera v2.1 (with CSI adapter)		SparkFun	$ 25.00	2	$ 50.00	$	50.00
Computational Resources								
Jetson Nano	NVIDIA Jetson Nano Developer Kit - B01		Amazon	$ 149.00	1	$ 149.00	$	149.00
Arduino Nano	Arduino Nano Rev.3 development board		Amazon	$ 6.66	1	$ 6.66	$	19.99
Communication Systems								
LIDAR cable	USB Type-A to Micro-USB Type-B cable	Comes with LIDAR	NA	NA	1	NA		NA
CSI cables	Camera serial interface (CSI) cable	Comes with camera	NA	NA	1	NA		NA
MCU cable	USB Type-A to Mini-USB Type-B cable	Comes with Arduino	NA	NA	2	NA		NA
Wi-Fi adapter	TP-Link TL-WN725N USB Wi-Fi adapter	Required if Jetson Nano does not have a WiFi card	Amazon	$ 9.99	1	$ 9.99	$	9.99
Actuators								
Drive actuators	6V 120 RPM 120:1 TT I motor (with encoders)	I-configuration better for RW	DFRobot	$ 7.40	2	$ 14.80	$	29.60
Drive actuators	6V 120 RPM 120:1 TT L motor (with encoders)	L-configuration better for FW	DFRobot	$ 7.99	2	$ 15.98	$	31.96
Steering actuator	MG996R servo motor	Metal gear	Amazon	$ 7.49	1	$ 7.49	$	14.99
Lights and Indicators								
LEDs	5 mm red, white and amber LEDs	Pre-wired LEDs (pack of 120)	Amazon	$ 0.11	12	$ 1.32	$	12.99
						TOTAL	$ 553.33	$ 813.83

INFRASTRUCTURE BOM										
NAME	**SPECIFICATIONS**	**COMMENTS**	**LINK**	**RATE**	**QTY**	**PRICE**		**COST**	
Obstruction Modules									
Construction box	3 ply boxes (4×4×12 inches)	Pack of 25	Amazon	$ 28.91	4	$	115.64	$	115.64
Surveillance Elements									
Camera	Smartphone camera			NA	NA	1	NA		NA
Camera stand	Desk Mount Clamp Gooseneck Stand		Amazon	$ 10.99	1	$	10.99	$	10.99
Calibration grid	A0 camera calibration grid	A0 laser print	GitHub	NA	1	NA		NA
Preconfigured Maps									
Driving School	10×5 ft Driving School map	10×5 ft flex printing	GitHub	NA	1	NA		NA
					TOTAL	**$**	**126.63**	**$**	**126.63**