BOM Remotes

	# required	Type	Example Link	Contained in Kit	Comment
PCB Left Top	1	n/a		yes	
PCB Left Bottom	1	n/a		yes	
PCB Right Top	1	n/a		yes	
PCB Right Bottom	1	n/a		yes	
Enclosure Left Top	1			yes	
Enclosure Left Bottom	1			yes	
Enclosure Right Top	1			yes	
Enclosure Right Bottom	1			yes	
Lanyard	2			yes	
Display	1		https://de.rs-online.com/web/p/lcd-displays-farbig/1647079?srsltid=AfmBOopPenmIOVHuUOmIRWCe4Hyb5smmsbZHTicUNc	yes	
Ball Knob	2		PCBWAY	yes	1 extra should one get lost
Ball Know Screw	2			yes	
Joystick Lever	2			yes	
Joystick	2		https://a.aliexpress.com/_EGkkT9R	yes	Self solder
Potentiometer	2	3352T-102LF-ND	https://www.digikey.de/de/products/detail/bourns-inc/3352T-1-102LF/1088340	yes	Self solder
Endless Pot	1	CJMCU-103	https://www.digikey.de/de/products/detail/bourns-inc/3382G-1-103G/1944267	yes	Populated
Side Buttons	10		https://de.aliexpress.com/item/1005004331522633.html?srcSns=sns_Copy&sourceType=1&spreadType=socialShare&bizTy	yes	Self solder
ESP32 Board	2		https://www.digikey.de/de/products/detail/seeed-technology-co-ltd/113991114/19285530?s=N4IgTCBcDaIlwFYCcB2AtHOBmJTNwBY0A5AERAF0BflA	yes	Populated
XBee Board	2		https://mou.sr/3OltYHy	yes	Populated
Antenna	2		https://www.amazon.de/gp/r.html?C=3KS82OZ9EHPVW&K=2C2JUMDU7CAVA&M=urn:rtn:msg:202	yes	Using ESP32 2.4Ghz antennas works well
On/Off Switch	2		https://a.aliexpress.com/_EJZx0Ff	yes	Self solder
Battery	2		https://www.amazon.de/dp/B0CSSFQL94?ref=ppx_yo2ov_dt_b_fed_asin_title	no	Definitely not bigger than 45mm x 22mm x 6.9mm. Leads need to be reversed!!!
Inner screws M2x3	10		https://a.aliexpress.com/_EJgM4EH	yes	
Outer screws M2x12	10		https://a.aliexpress.com/_EwoJjmZ	yes	
Hex key 1,3mm	1		https://a.aliexpress.com/_EJxqiKl	yes	
Hex key 1,5mm	1		https://a.aliexpress.com/_EJxqiKl	yes	
Connection Pins 12 long	1		https://de.aliexpress.com/item/1005005112381207.html?srcSns=sns_Copy&spreadType=socialShare&bizType=ProductDet	yes	
Connector Female 4 Pin	1		https://de.aliexpress.com/item/1005002534767823.html?src=google&aff_fcid=88c2a0fb418a461f8ba91fb1a684fba1-17272	yes	

	# required	Type	Example Link	Contained in Kit	Comment
Connector Female 6 Pin	1		https://de.aliexpress.com/item/1005002534767823.html?src=google&aff_fcid=88c2a0fb418a461f8ba91fb1a684fba1-17272	yes	

BOM D-O Mainboard + Supply board

	# required	Type	Link	Contained in Kit	Comment
Main board	1			yes	
Power board	1			yes	
Female pin header Main board / Arduino	2	2.54mm 14pin		yes	Self solder
Female pin header Main board / DFPlayer	2	2.54mm 14pin		yes	Self solder
Female pin header Power board / Gyro	1	2.54mm 9pin		yes	Self solder
Female pin header Main board / Xbee	2	2mm 10pin	https://a.aliexpress.com/_Evyz9aN	yes	Self solder
Male pin header Main board / Amplifier	2	2.54mm 2pin	https://a.aliexpress.com/_ExxAZ2d	yes	Self solder
Gyro standoffs	2	M2.5x12	https://a.aliexpress.com/_EG86KNx	yes	
Gyro standoff screws	2	M2.5x5	https://de.aliexpress.com/item/32810852732.html?spm=a2g0o.productlist.main.7.35f2ea97efFr5N&algo_pvid=5189f	yes	
Power board mounting screws	2	M2x8	https://a.aliexpress.com/_EG068mN	yes	
Encoder cable with connector	2	KF2510 4 Pin 200mm	https://a.aliexpress.com/_EJB2txj	yes	Self solder
Motor driver cable with connector	2	KF2510 3 Pin 200mm	https://a.aliexpress.com/_EJB2txj	yes	Self solder
Amplifier Cable	1	JST PH 2mm	https://a.aliexpress.com/_Exf7Yh7	yes	Self solder
Fan connector	2		JST XH 2pol	yes	Self solder
XT30 Male + Female Power Connector	10	XT30	https://www.amazon.de/HUAZIZ-Anschlüsse-Rundstecker-Schrumpfschlauch-Multicenter/dp/B094XVGHZV/	yes	Self solder
XT30 Boards for Battery Packs	2		https://de.aliexpress.com/item/1005006755414157.html?spm=a2g0o.detail.pcDetailTopMoreOtherSeller.1.30ccZniGZniGiH	yes	Self solder
Fuse holder 17x7mm incl. 10A fuse	1		https://de.aliexpress.com/i/4000583874791.html	yes	Self solder
Battery holder	2	Keystone 1049	https://www.reichelt.de/batteriehalter-fuer-2x-18650-keystone-1049-p218273.html?&trstct=pol_1&nbc=1	yes	Self solder
Screw terminal socket + plug 3.81mm	1	2EDG 2 Pin 3.81mm	https://de.aliexpress.com/item/1005006431241111.html?spm=a2g0o.productlist.main.35.18e354565eNspE&algo_pvid=521	yes	Self solder
Power switch	1		https://www.reichelt.de/kippschalter-10a-125vac-1x-ein-ein-ms-166-p13140.html?	yes	Self solder
Fan 12V XH2.54 Version	0		https://a.aliexpress.com/_EwbIuWN	no	Optional
Arduino Mkr Wifi 1010	1		https://store.arduino.cc/en-de/products/arduino-mkr-wifi-1010?srsltid=AfmBOor1uf474VBQ4F3swBHxR5Ink16Y9eqV17ocvqeqTx	no	Not contained in kit
Arduino Mkr Dynamixel Shield	1		https://www.mybotshop.de/ROBOTIS-DYNAMIXEL-Arduino-MKR-Shield	no	Not contained in kit
Xbee board	1	XB24CAUIT	https://de.rs-online.com/web/p/entwicklungstools-kommunikation-und-drahtlos/1252739...	no	Not contained in kit
Gyro board	1	ISM330DHCX	https://www.digikey.de/de/products/detail/adafruit-industries-llc/4502/11569134?utm_adgroup=Development Boards, Kits,	no	Not contained in kit
UBEC 12V3A	1		https://de.aliexpress.com/item/1005007037699334.html?spm=a2g0o.productlist.main.1.7932d20ctt8PtJ&algo_pvid=9c1a4	no	Not contained in kit
UBEC 5V3A	1		https://de.aliexpress.com/item/1005007037699334.html?spm=a2g0o.productlist.main.1.7932d20ctt8PtJ&algo_pvid=9c1a4	no	Not contained in kit

	# required	Type	Link	Contained in Kit	Comment
DfPlayer Mini	1		https://de.farnell.com/dfrobot/dfr0299/dfplayer-mini-mp3-player-arduino/dp/3517866?CMP=KNC-GDE-GEN-KWL-PMAX-Search-	no	Not contained in kit
Amplifier	1	TPA3110	https://a.aliexpress.com/_Eli5efP	no	Not contained in kit
Speakers	2	5W8Ω	https://www.cqrobot.com/index.php?route=product/product&product_id=1106	no	Not contained in kit

BOM D-O Rest

Part		# required	Type	Link	Comment
Body	**Lead weight**	2kg	Lead shot ~1mm		
Body	**Countersunk screws top frame - bottom frame**	6	M3x8		
Body	**Motors**	2	Pololu 4863		
Body	**Screws motor - body**	4	M3x8 countersunk		
Body	**Motor drivers**	2	Adafruit DRV8871		
Body	**Neck - main axis connector male (in body)**	1	2.54mm 10 pin 2 row	https://www.digikey.de/short/pd8w3z7d	
Body	**Main axis i2c cable**	1	150mm+	https://www.amazon.de/elechawk-Kabel-Kit-Entwicklungsboards-Sensorboard-Breadboard/dp/B08HQ1VSVL/	
Body	**Main axis Dynamixel cable**	1	100mm+		Comes with the servos
Body	**Main axis bearings**	2	6805-2RS OD 37mm ID 25mm Width 7mm		
Body	**Square nuts body**	16	M3		
Body	**Square nuts body**	4	M4		
Body	**Countersunk screws main axis holder left**	2	M4x10		Shorter, from inside the body
Body	**Countersunk screws main axis holder right**	2	M4x18		Longer, from outside the body
Body	**Main neck servo**	1	XL430-W250-T		
Body	**Screws servo holder - body**	3	M3x12 countersunk		
Body	**Screws servo holder - servo**	3	M2.5x12 socket		
Body	**Screws servo gear - servo**	4	M2x10mm socket		Included with servo
Wheels	**Delrin Balls**	120	10mm		
Wheels	**Countersunk screws wheels - body**	10	M3x8		
Wheels	**Countersunk screws wheels - outer bearings**	12	M3x8		
Wheels	**Countersunk screws drive edge - lazy susans**	12	M3x8		
Wheels	**Square nuts lazy susans**	12	M3		

Part		# required	Type	Link	Comment
Wheels	Outer bearings wheels	12	683-ZZ OD 7mm ID 3mm Width 3mm		May need to experiment with 8mm OD bearings such as 619/3-ZZ if you're using the Prusa Cut outer tire
Neck	Countersunk screws neck - body	3	M3x40		
Neck	Neck - body connector female (in neck)	2	Dupont 2.54mm 5 pin	https://www.amazon.de/Crimpzange-Dupont-Stecker-Steckverbinder-Crimpkontakten/dp/B07QX51F3B	
Neck	Neck carbon tube	0	OD15mm, ID13mm, length >170mm	https://www.amazon.de/dp/B07RLF822F/ref=pe_27091401_487027711_TE_SCE_3p_dp_i1?th=1	Optional, can use printed part
Neck	Neck i2c cable	1	STEMMA/Qt, length 250mm+	https://www.amazon.de/elechawk-Kabel-Kit-Entwicklungsboards-Sensorboard-Breadboard/dp/B08HQ1VSVL/	
Neck	Neck Dynamixel cable	1	length 250mm+		Comes with the servos, maybe has to be extended with a regular generic 3-strand cable, like a servo extension cable or
Neck	Neck square nut	1	M3		
Neck	Neck safety screw	1	M3x5		
Head Box	Head pitch servo	1	Dynamixel XL330-M288		
Head Box	Square nut servo connector	1	M3		
Head Box	Screws servo connector - servo	3	2mm self-tapping socket		Included with servo
Head Box	Screw servo connector - neck	1	M3x12 countersunk		
Head Box	Screws head frame - pitch servo	4	M2.5x12 socket		
Head Box	Square nut head frame	1	M3		
Yaw Assy	Screw neck bottom - head frame	1	M3x8 countersunk		
Yaw Assy	Screws neck bottom - servo	4	M2.5x12 socket		
Yaw Assy	Head yaw servo	1	Dynamixel XL330-M288		
Yaw Assy	Screws neck bottom - neck top	2	M3x40 countersunk		
Yaw Assy	Screws tilt mount - yaw servo	4	2mm self-tapping socket		Included with servo
Yaw Assy	Screws tilt mount - roll servo	4	M2.5x12 socket		
Head	Head roll servo	1	Dynamixel XL330-M288		
Head	Head roll servo rear mount grommet	1	FPX330-H101		
Head	Screws head plate - roll servo	8	2mm self-tapping socket		Included with servo
Antenna Assy	Antenna Microcontroller	1	Adafruit Qt Py ESP32S2		

Part		# required	Type	Link	Comment
Antenna Assy	**Antenna Servos**	3	1.5g Nano Linear Servos	https://www.amazon.com/Actuators-Digital-Actuator-Ultra-Micro-Aircraft/dp/B07STC2K1W/	
Antenna Assy	**Dynamixel cable**	1			Included with servo
Antenna Assy	**Stripboard**	1			Alternatively use Bav Builders Adapter board
Antenna Assy	**Pinheaders**	3	3-pin each		Alternatively use Bav Builders Adapter board
Antenna Assy	**Dupont connectors**	3	3-pin each		Alternatively use Bav Builders Adapter board

Tabelle 1

Ausgaben			
Name	Was	Summe	
Felix	Aliexpress	75,31 €	
Felix	Aliexpress	13,00 €	
Felix	Aliexpress	9,08 €	
Felix	Aliexpress	14,91 €	
Björn	JLC Komponeneten	900,00 €	
Felix	Aliexpress	50,95 €	
Felix	Aliexpress	6,98 €	