

Database of One-Way Attack Drones



By Dan Gettinger

May 2023

This database accompanies the report “One-Way Attack Drones: Loitering Munitions of Past and Present,” which the Vertical Flight Society published in May 2023. The full report is available at the VFS Library & Store (<https://vtol.org/store/>). All measurements are in metric. For more information, please write to editor@vtol.org.

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Ukraine	Pilum	A.Drones	Mini	Fixed-Wing	2019	Tandem			10	2	50	0.5	2000	100	1, 2
South Korea	Black Knight	AccessWe	Mini	Fixed-Wing	2019	Conventional	1.9	1.08	5.5		120	1.5			3,4
Canada	DroneBullet	AerialX	Micro	VTOL	2019	Quadrotor	0.16	0.269	0.91						5
Israel	Orbiter-1K	Aeronautics	Mini	Fixed-Wing	2015	Flying Wing	2.9	1.41	13	3	100	2.5			6
USA	Switchblade	AeroVironment	Micro	Fixed-Wing	2006	Tandem	0.58	0.37	0.7		8	0.8		144	7
USA	Switchblade 300	AeroVironment	Mini	Fixed-Wing	2012	Tandem			2.5	0.5	10	0.25		160	8
USA	Switchblade 600	AeroVironment	Mini	Fixed-Wing	2020	Tandem		1.3	14.97	2.5	80	0.66		185	9
USA	Ghost Phoenix	AEVEX Aerospace	Small	VTOL	2022										10
Armenia	AW-1	Airworker	Mini	Fixed-Wing	2018	Conventional			3.5	1.1		0.25	3000		11

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Armenia	AW-17	Airworker	Mini	Fixed-Wing	2021	Conventional				2		0.9	3500		12
China	CH-901 / FH-901	ALIT/CASC	Mini	Fixed-Wing	2013	Tandem	1.5	1.2	8		15	1	1500	150	13
Lithuania	Jadogan	Altus Technicus	Mini	Fixed-Wing	2022	Conventional			1.5		15				14
USA	Anvil	Anduril	Mini	VTOL	2019	Quadrotor	0.4	0.38	5						15
USA	Altius-600	Area-I	Mini	Fixed-Wing	2017	Conventional	2.54	1	15	2.7	440	4		166	16
USA	Altius-700	Area-I	Small	Fixed-Wing	2021	Conventional	3.66		30	18.1					17
Spain	Q-SLAM-40	Arquimea	Mini	Fixed-Wing	2021	Tandem	1.4	0.83	4.2	1	15	0.25	2800	126	18
USA	NX30	Ascent Aero Systems	Mini	VTOL	2022	Coaxial			13	2.2	56	1.16		104	19
China	LQ-302	ASN UAV Technology	Small	Fixed-Wing	2022	Conventional			70	25	400	3			20
Ukraine	ST-35	Athlon Avia	Mini	VTOL	2020	Cruciform			9.5	3.5	30	1	1200		21
Turkey	Kagem	Baykar	Mini	Fixed-Wing	2023	Conventional			10		60				22
India	Multi Rotor UAV	Bharat Forge	Small	VTOL	2020	Coaxial Octo-copter			150	65	50	0.5	500	50	23
USA	Dominator	Boeing	Small	Fixed-Wing	2006	Conventional			47	17		14			24
USA	CQM-121 Pave Tiger (Brave 200)	Boeing	Small	Fixed-Wing	1983	Canard	2.57	2.118	130	18	480	8	3000	320	25

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
South Africa	Quad-CAS:M250x	Bothwell-Royal		VTOL	2023	Quadrotor				0.25					26
South Africa	Quad-CAS:M500	Bothwell-Royal		VTOL	2023	Quadrotor				0.5					26
China	ASN-301	CATIC	Small	Fixed-Wing	2011	Delta	2.41	2.5	135	18	288	4	4570	220	27
Ukraine	RAM	CDET	Mini	Fixed-Wing	2018	Conventional	2.3	1.78	8	3	30	1		150	28
Ukraine	RAM II (Leleka 100)	CDET	Mini	Fixed-Wing	2021	Conventional	2.6	1.45	9.8	3	30	0.6	1000	120	29
China	CH-817	CASIC	Micro	VTOL	2021	Coaxial			0.85	0.05		0.25		64	30
China	YS-101 Peregrine Loitering Munitions System	CASIC		Fixed-Wing	2021	Cruciform									31
China	Unnamed swarm LM	CETC		Fixed-Wing	2022	Tandem									32
China	YS-20	CETC	Small	Fixed-Wing	2022	Conventional			18		200	5.5	2000	180	33
China	Throwing Flight Grenade	China Enterprises Association of the National Defense Industry	Micro	VTOL	2022	Quadrotor		0.15	0.7						34
India	Shaurya-1 "Sierra Tango"	Cingularity Aerospace	Small	Fixed-Wing	2023	Tandem	2.5	1.5		7		2.5			35
Ukraine	Anti-Drone 1st Gen	Cobra	Mini	VTOL	2023	Quadrotor		0.4	2.2	1					36
Indonesia	Rajata	Dahana		Fixed-Wing	2022	Conventional					30			180	37

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
South Korea	Wraith	Darts	Micro	VTOL	2021	Quadro-tor	0.25	0.46	0.5		1.3	0.1		100	38
Armenia	DEV-3	Davaro	Small	Fixed-Wing	2021	Canard	2.88		40	10	450	3.25			39
Australia	Drone155	DefendTex	Small	VTOL	2020	Quadro-tor	1.3	0.5	30	20	80	2		144	40
Australia	Drone40	DefendTex	Micro	VTOL	2016	Quadro-tor	0.12	0.12	0.3	0.11	20	0.2			40
Australia	Drone81	DefendTex		VTOL	2021	Quadro-tor									40
Azerbaijan	Fatum	DefTech	Mini	Fixed-Wing	2022	Tandem			5.5	2	15				41
Germany	Libelle	Diehl Defense	Micro	VTOL	2021	Coaxial									42
Germany	DAR	Dornier	Small	Fixed-Wing	1986	Delta	2	2.25	110			3			43
Germany	Mini-RPV/ KDAR	Dornier	Small	Fixed-Wing	1977	Delta	2	2.1	70	15		3	3000	360	44
USA	E-45	E-Systems	Small	Fixed-Wing	1972	Twin-boom	2.41	2.36	20.5	6.8		5			45
USA	E-55	E-Systems	Small	Fixed-Wing	1977	Twin-boom	2.41	2.36	25		241	4			45
France	K100	EADS-CAC Systems	Small	Fixed-Wing	2001	Conventional	2.4	1.5	27		60	0.5	3048		46
India	Nagastra-1	Economic Explosives Limited	Mini	Fixed-Wing	2021	Conventional				1.5	15				47
India	Nagastra-2	Economic Explosives Limited	Mini	Fixed-Wing	2021	Conventional				4	25	1.5			47
India	Nagastra-3	Economic Explosives Limited	Small	Fixed-Wing	2021	Conventional				10	100				47
UAE	QX-1	EDGE ADASI	Mini	VTOL	2021	Quadro-tor			3	0.5	10	0.4	2000		48

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
UAE	RW-24	EDGE ADASI	Small	Fixed-Wing	2019	Tandem			45	8	100	2	2000		49
UAE	RW-24 Extended Range	EDGE ADASI	Small	Fixed-Wing	2021	Tandem				13					49
UAE	Shadow-25	EDGE ADASI	Small	Fixed-Wing	2021	Flying Wing	2.36	2.84	80	25	250	0.66	7620		50
UAE	Shadow-50	EDGE ADASI	Small	Fixed-Wing	2021	Flying Wing	4.9	2.9	135	50	295	9	3048		51
USA	Unknown LM	Edge Autonomy		Fixed-Wing		Tandem									52
UAE	Hunter	EDGE Halcon		VTOL	2021	Coaxial	0.5	0.2	2	0.4	5	0.5			53
UAE	Hunter-10	EDGE Halcon	Small	Fixed-Wing	2021	Conventional	4.2	3.4	47	10		0.66	2500		53
UAE	Hunter-2S	EDGE Halcon	Mini	Fixed-Wing	2022	Tandem	1.44	1.25	8	2	10	0.5	1000		54
UAE	Hunter-5	EDGE Halcon	Small	Fixed-Wing	2021	Conventional	2.4	1.9	16	5		0.5	1500		53
Israel	Lanius	Elbit Systems	Micro	VTOL	2022	Quadrotor	0.294	0.294	1.25	0.15		0.1		72	55
Israel	SkyStriker	Elbit Systems	Small	Fixed-Wing	2016	Conventional			45	10	20	1		185	56
Israel	Sparrow	EMIT	Small	Fixed-Wing	2005	Conventional	2.44	2.14	45	8	120		5000	170	57
USA	ATM-100 Advanced Tactical Mini Drone	Fairchild	Small	Fixed-Wing	1981	Conventional	2.21	2.29	78	22.7	603		3350	362	58
France	R2-120 RAIJIN	FLY-R	Mini	Fixed-Wing	2023	Tandem	1.215	1.07	5	1.5	50	0.75	3000	270	59

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
China	SEL4-FL01-100	Guandong Defense Industry Group Corporation	Mini	VTOL	2022	Quadrotor	0.58	0.31	2		15		5800	100	60
China	SEL4-FL01-60	Guandong Defense Industry Group Corporation	Micro	VTOL	2022	Quadrotor	0.42	0.235	0.4		15		5800	100	60
China	S570	Guide Infrared	Mini	Fixed-Wing	2018	Cruciform			7		10	0.4			61
India	Balidan	Hawking Defence	Micro	VTOL	2022	Quadrotor			0.4		5	0.3		120	62
Iran	Ababil-2	HESA	Small	Fixed-Wing	1999	Canard	3	2.5	80	30	100	2			63
Iran	Qasef-1/2K	HESA	Small	Fixed-Wing	2017	Canard	3.25	2.88	85	30			3000	370	64
Iran	Shahed-131	HESA	Small	Fixed-Wing	2014	Delta	2.2	2.6	135	15					65
Iran	Shahed-136	HESA	Small	Fixed-Wing	2021	Delta	1.5	3.5	200					185	66
Israel	Green Dragon (Mini-Harop)	IAI	Mini	Fixed-Wing	2016	Conventional	1.7	1.6	15	3	50			200	67
Israel	Harop	IAI	Small	Fixed-Wing	2009	Canard	3	2.5		23	200	9	4572	416	68
Israel	Harpy	IAI	Small	Fixed-Wing	1986	Delta	2.4	2.1	144	32	150	9	4572	416	69
Israel	Harpy NG	IAI	Small	Fixed-Wing	2016	Canard		2.1	160	16	200	9	4572		70
Israel	Mini-Harpy	IAI	Small	Fixed-Wing	2019	Conventional			40	8	100	2	1524	370	71
Israel	Point Blank (ROC-X)	IAI	Mini	VTOL	2022	Quadrotor	0.8	1	6.8	2	10	0.3		288	72

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Israel	Rotem	IAI	Mini	VTOL	2016	Quadrotor			6	1.2	10	0.5		90	73
USA	Point-And-Toss	IATech	Micro	Fixed-Wing	2009	Flying Wing	0.91	0.36	0.75	0.45		0.5			74
USA	SkyStinger	IATech	Micro	Fixed-Wing	2007	Conventional	1	0.5	1.8					128	74
Slovakia	Predator AX-1	Incoff,- Compel Industries Bratislava	Mini	Fixed-Wing	2018	Conventional			10	2	4	0.4		250	75
Slovakia	Predator AX-2	Incoff,- Compel Industries Bratislava	Small	Fixed-Wing	2018	Conventional	2.16	1.96	25	4	20	0.25	3000	430	76
Australia	OWL	Innovero	Small	Fixed-Wing	2022	Conventional	1.6	1.6	30	7	200	0.5			77
Pakistan	E-RAD	Integrated Dynamics	Micro	VTOL	2022	Quadrotor	0.13	0.5	1	0.5	5	0.2	500	200	78
Pakistan	Nishank Mk-2	Integrated Dynamics	Small	Fixed-Wing	2022	Delta	2.87	3.06	65	15	100	4		400	78
Pakistan	Rover LM	Integrated Dynamics	Mini	Fixed-Wing	2022	Conventional	1.5	0.9	4.5	1.5	40	1.5		100	78
Germany	MK-106 HIT	International Aerospace Technologies	Small	Fixed-Wing	1989	Canard	3.2	2	85	40	50	2		180	79
Iran	Meraj-504	IRGC		Fixed-Wing	2022	Delta				2.5	100				80
Iran	Meraj-521	IRGC		Fixed-Wing	2022	Tandem				1	5	0.25			81
Iran	Kian	IRIADF		Fixed-Wing	2014	Conventional	3.5	4			1000		5000	480	82

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Taiwan	Flyingfish 200	JC Tech	Mini	Fixed-Wing	2022	Conventional			2.2	0.5	10				83
India	JM-1	Johnnette	Mini	Fixed-Wing	2022	Conventional	1.4	1.5	3.5		5	0.5	200	140	84
India	JM-2	Johnnette	Mini	Fixed-Wing	2022	Conventional	3		9	0.5			500		85
Belarus	UBAK-25 Chekan	JSC 558 Aviation Repair Plant		Fixed-Wing	2021	Flying Wing				2	25				86
India	Anudishya	Kadet Defence Systems	Small	Fixed-Wing	2021	Conventional				20	300			500	87
India	Jx2 NG	Kadet Defence Systems	Small	Fixed-Wing	2021	Conventional				10	400			200	88
South Korea	DK-150	KAI	Small	Fixed-Wing	2018	Conventional			150		80			150	89
South Korea	DK-20	KAI	Small	Fixed-Wing	2018	Conventional			20		70			250	89
South Korea	DK-25	KAI	Small	Fixed-Wing	2012	Conventional	1.3	1.5	25		40			400	89
Russia	KUB-UAV	Kalashnikov	Small	Fixed-Wing	2019	Delta	1.2	0.95	19	3		0.5		130	90
Turkey	XQ-06 Fi	Kartal Defense Technologies	Mini	Fixed-Wing	2016	Tandem	1.5		3.5	0.75	12	0.25		125	91
South Africa	Lark	Kentron	Small	Fixed-Wing	1991	Delta	2.1	2.3	120	20	400		5000	600	92
Russia	Molniya	Kronstadt	Small	Fixed-Wing	2020	Conventional	1.2	1.5		7				700	93

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
USA	Cutlass	L3 Technologies	Mini	Fixed-Wing	2009	Conventional		0.8	6.8	1.4	56	1			94
Turkey	Kargi	Lentatek (Vestel)	Small	Fixed-Wing	2022	Delta									95
South Korea	Multi-Purpose Drone	LIG Nex1	Mini	VTOL	2018	VTOL	2.2	1.4	5			0.65		145	96
USA	Voyeur/Tiger Moth	Lite Machines	Micro	VTOL	2007	Coaxial	0.1	0.683	1.8	0.45	32	0.5		111	97
USA	Terminator	Lockheed Martin		Fixed-Wing	2014	Conventional									98
USA	Harassment RPV	Lockheed Martin	Small	Fixed-Wing	1976	Twin-boom		2.13	54	18		6			99
Germany	DAR/Tucan	MBB	Small	Fixed-Wing	1986	Cruciform	2.26	1.81	150	50					100
UK	Fire Shadow	MBDA	Small	Fixed-Wing	2008	Conventional		4	200		100	6			101
USA	TIGER (Tactical Grenade Extended Range)	MBDA Missile Systems	Micro	Fixed-Wing	2009	Conventional	0.61	0.3	1.36	0.45	3.22	0.25		128	102
Sudan	Kamin-25	Military Industry Corporation (MIC)	Small	Fixed-Wing	2023	Conventional			25	7	50	1	250		103
Poland	WARble	MSP	Mini	Fixed-Wing	2019	Conventional	1.65	1.05	6		10	0.5		150	104
Taiwan	Chien Hsiang	NCSIST	Small	Fixed-Wing	2017	Delta					1100	5		600	105
Taiwan	Fire Cardinal	NCSIST	Mini	Fixed-Wing	2019	Conventional	2	1.2	6						106

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Taiwan	Unnamed LM	NCSIST	Mini	Fixed-Wing	2023	Tandem					10	0.25			107
India	Alfa-S	New Space	Small	Fixed-Wing	2022	Tandem			30		150	1	6000		108
France	Dard	Nexter	Mini	Fixed-Wing	2023	Flying Wing									109
China	Cruise Dragon 5	NORINCO	Mini	VTOL	2021	Quadrotor			10	6.5		0.75			110
China	Loitering Dragon 10A	NORINCO	Micro	Fixed-Wing	2021	Tandem			1		10	0.6		157	110
China	Loitering Dragon 300B	NORINCO		Fixed-Wing	2021	Tandem									111
China	Loitering Dragon 60B	NORINCO		Fixed-Wing	2021	Tandem						0.25	1000		112
USA	Jackal	Northrop Grumman		Fixed-Wing	2022	Conventional					100			483	113
USA	NV-135	Northrop Grumman	Small	Fixed-Wing	1976	Flying Wing	2.44	1.28	68			5			114
Ukraine	Fowler CUAS	Oleksandr Butkaliuk	Micro	VTOL	2022	VTOL	0.42	0.53	1.5		1.5		1000		115
Ukraine	AQ-100	One Way Aerospace	Mini	Fixed-Wing	2023	Conventional			5.5	1	100	1.5			116
Ukraine	AQ-400	One Way Aerospace	Small	Fixed-Wing	2023	Tandem			100	32	750	5.2			116
Ukraine	AQV-100 Scalpel	One Way Aerospace	Mini	VTOL	2023	Quadrotor			3	2	10	0.2		108	117
Ukraine	AQV-200 Flechette	One Way Aerospace	Small	VTOL	2023	Quadrotor			15	4	33	1			117
Ukraine	ACQ-300 Machete	One Way Aerospace	Mini	VTOL	2023	Helicopter			14	5	33	0.5			117
UK	Pholos	Overwatch Aerospace		VTOL	2018	Coaxial					1	0.1			118

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
South Africa	N-Raven	Paramount Group	Small	Fixed-Wing	2021	Conventional	3.6		55	13.5	100	4.5			119
South Korea	Personal Portable Combat Drone	Poongsan	Mini	VTOL	2020	Coaxial			7	3		0.5		50	120
Serbia	Ika-Bomber LM	PR-DC	Micro	VTOL	2023	Quadrotor									121
Armenia	Copter	Pride Systems	Mini	VTOL	2021	Quadrotor	0.6	0.8	5			0.5		200	122
Armenia	Drone	Pride Systems	Mini	Fixed-Wing	2021	Tandem			5		80	1		200	122
Indonesia	Minibe	PT Pindad	Mini	Fixed-Wing	2022	Flying Wing	1.3		6	0.6		0.25		250	123
Israel	Spike Firefly	Rafael	Mini	VTOL	2018	Coaxial	0.08	0.8	3	0.35	1.0	0.25		70	124
Ukraine	RZ-60	Ramzay	Small	Fixed-Wing	2022	Delta			60	3	40	1	6000	290	125
Singapore	RC-MS-03	Ray 10	Mini	Fixed-Wing	2019	Tandem	1.26	1	6	1.5	10	0.4			126
USA	Coyote Block 1	Raytheon	Mini	Fixed-Wing	2006	Tandem	1.5	0.9	5.9	2.25	200	1.5	7610	102	127
USA	Coyote Block 2	Raytheon		Fixed-Wing	2019	Tandem									
USA	Coyote Block 3	Raytheon		Fixed-Wing	2020	Tandem									
India	Achuk	Redon Systems	Mini	Fixed-Wing	2022	Tandem				1.5	30		3500		128
Germany	Taifun	Rheinmetall	Small	Fixed-Wing	2004	Conventional	2.3	2.1	160		200	4	2500	200	129
Germany	Hero-R	Rheinmetall,Uvision	Mini	VTOL	2022	Quadrotor			2.5	1		0.15		70	130
Turkey	Azab T200	Robit Teknoloji	Small	Fixed-Wing	2023	Delta	2		50	15	200	8	3000	270	131

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Turkey	Azab T150	Robit Teknoloji	Mini	Fixed-Wing	2023	Delta	1.5		7	3					131
France	Marula	Sagem, Aeronautique et Systems	Small	Fixed-Wing	1991	Delta	2.2		135	35	400	3	3000	280	132
Australia	Gannet Glide Drone	Skyborne Technologies	Micro	Fixed-Wing	2021	Conventional	0.64	0.57	1.6	0.6				150	133
Ukraine	Black Mam-ba	Skynet		Fixed-Wing	2022	Conventional									134
Azerbaijan	Qirgi	Smart Point		VTOL	2022	Quadrotor				0.25					135
Azerbaijan	Quzgun	Smart Point		VTOL	2022	Quadrotor				0.7					135
Israel	Ninox 40	SpearUAV	Micro	VTOL	2020	Quadrotor			0.25			0.7			136
Israel	Viper	SpearUAV	Micro	VTOL	2022	Quadrotor			1.2						137
Turkey	ILGAR	SPIRA	Mini	Fixed-Wing	2023	Tandem			3.5	1.5	20	0.25	5000	160	138
KSA	Revenger	SRB		Fixed-Wing	2023										139
Brazil	Unnamed Loitering Munition	Stella Tecnologia	Small	Fixed-Wing	2023	Tandem			15	4					140
Turkey	Alpagu	STM	Micro	Fixed-Wing	2017	Tandem			1.9	0.4	5	0.25		120	141
Turkey	Alpagu Block II	STM	Mini	Fixed-Wing	2018	Conventional			3.7	3.15	10	0.4		120	141
Turkey	Alpagut	STM	Small	Fixed-Wing	2022	Conventional			45	11					142
Turkey	Kargu 2	STM	Mini	VTOL	2017	Quadrotor	0.6	0.6	7	1.3	10	0.25	2500	72	143

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Spain	Milvus Micro	Swarming Technologies and Solutions	Mini	Fixed-Wing	2022	Tandem	0.8		2.5	0.2	10	0.5		120	144
Spain	Milvus Mini	Swarming Technologies and Solutions	Mini	Fixed-Wing	2022	Tandem	1.2		7	0.4	40	0.6		140	144
Spain	Strix Micro	Swarming Technologies and Solutions	Mini	VTOL	2022	Quadrotor	0.46		2	0.2	4	0.3		80	144
Spain	Strix Mini	Swarming Technologies and Solutions	Mini	VTOL	2022	Quadrotor	0.7		5	0.3	10	0.6		80	144
Turkey	Simsek	TAI	Small	Fixed-Wing	2021	Conventional	1.5	2.3	70	5	200	0.75		648	145
India	ALS-50	Tata Advanced Systems Limited	Small	VTOL	2022	VTOL	3.8	2.4	50	6	50	1			146
KSA	ZD-180	Team4 Enterprise	Small	Fixed-Wing	2022	Tandem		1.65	20	4		1	4500		147
KSA	ZD-70	Team4 Enterprise	Mini	Fixed-Wing	2022	Tandem		0.94	7	1	15	0.6	4500	180	147
KSA	ZD-90	Team4 Enterprise	Mini	Fixed-Wing	2020	Tandem		1.07	10	2.5	15	0.6	4500	180	147
China	TS-10	Tengden	Small	Fixed-Wing	2022	Conventional								180	148
China	TS-20	Tengden	Small	Fixed-Wing	2022	Conventional					1000				148
Estonia	K12	Terramil	Mini	VTOL	2023	Quadrotor			4.4		5	0.28			149

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
USA	Battlehawk (Tactical Remote Aerial Munition)	Textron	Mini	Fixed-Wing	2011	Conventional		0.45	2.5		5	0.5			150
Estonia	Stream C VTOL Loitering Munition	Threod Systems	Small	VTOL	2019	VTOL	5	2.3	60	10	150	10		159	151
Turkey	DELI	Titra Technology	Mini	Fixed-Wing	2022	Conventional			13	3.1	85	1.15	3500	180	152
Turkey	Fedai 101	Transvaro	Mini	Fixed-Wing	2021	Conventional	2	1.1	7	1.7	40	0.5	1200	140	153
Turkey	Fedai 102	Transvaro	Mini	Fixed-Wing	2021	Conventional	2.25	1.4	8.5	2.4	65	0.5	5000	153	154
Ukraine	UJ-32 Lastivka	UKRJET	Mini	Fixed-Wing	2022	Conventional				1	40	0.4	2000	180	155
Ukraine	UJ-31	UKRJET		Fixed-Wing	2021	Conventional				4.5	200			180	155
Iran	Omid	Unknown	Small	Fixed-Wing	2022	Delta									156
China	RF200	Unknown	Small	Fixed-Wing	2017	Conventional	1.86		20	4.5	30	2		162	157
Iran	Samad-2/ UAV-X	Unknown	Small	Fixed-Wing	2018	Conventional	4.5	2.8	87.5	18	200	6	4572	250	158
Iran	Samad-3	Unknown	Small	Fixed-Wing	2019	Conventional	4.5	2.8	107.4	18	200	8		250	159
USA	XBQM-106	USAFFDL	Small	Fixed-Wing	1975	Conventional	3.63	3.07	106	50		5			160

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
Israel	Hero-120	UVision	Mini	Fixed-Wing	2015	Cruciform	1.5	1.34	12.5	4.5	40	1			161
Israel	Hero-1250	UVision	Small	Fixed-Wing	2018	Conventional			125	30	200				162
Israel	Hero-20	UVision	Micro	Fixed-Wing	2019	Cruciform	0.56	0.64	1.8	0.2	10	0.4			163
Israel	Hero-250	UVision	Small	Fixed-Wing	2015	Conventional	2.4	1.8	25	5	40	1			164
Israel	Hero-30	UVision	Mini	Fixed-Wing	2013	Cruciform	0.7	0.8	3	0.5	40	0.5			165
Israel	Hero-400	UVision	Small	Fixed-Wing	2013	Cruciform	3	2.2	40	8	150	4			166
Israel	Hero-400EC	UVision	Small	Fixed-Wing	2017	Cruciform	2.4	2.1	40	10	150	2			167
Israel	Hero-70	UVision	Mini	Fixed-Wing	2015	Cruciform	0.8	1	7	1.2	40	0.75			168
Israel	Hero-900	UVision	Small	Fixed-Wing	2015	Conventional	3.6	2.5	97	20	250	7			169
Poland	X-Fronter	WB Group	Micro	VTOL	2022	Quadrotor	0.09	0.3	1.15	0.4	1	0.6			170
Poland	Warmate	WB Group	Mini	Fixed-Wing	2014	Conventional	1.6	1.1	5.7	1.4	15	1	3000	150	171
Poland	Warmate 2	WB Group	Small	Fixed-Wing	2018	Conventional	2.5	2.5	30	5	20	2	3000	160	172
Poland	Warmate TL	WB Group	Mini	Fixed-Wing	2019	Conventional	1.7	1.1	4.5	1.4		0.5		120	173
Poland	Warmate V	WB Group	Mini	VTOL	2019	Coaxial Hexacopter			7	1.6	12	0.5		72	174
Poland	DragonFly	WZL 2	Mini	VTOL	2017	Quadrotor			5		10	0.4		80	175

Origin	Name	Manufacturer	Group	Type	Unveiled	Configuration	Wingspan (m)	Length (m)	MTOW (kg)	Payload (kg)	Range (km)	Endurance (hr)	Ceiling (m)	Max Speed (km/h)	Reference
South Korea	GANNET	Youngpoong Electronics	Mini	VTOL	2023	Quadrotor				1.1		0.4			176
Serbia	Gavran	Yugoimport	Small	Fixed-Wing	2021	Twin-boom	3.2	4.5	50	13	150	0.5	1500		177
Serbia	Gavran-145	Yugoimport	Small	Fixed-Wing	2021	Cruciform	2.4	2.2	50	15	200		2000	150	178
Serbia	Gavran-2	Yugoimport	Small	Fixed-Wing	2021	Cruciform	2.4	1.8	60	20	80		2000		179
Russia	Lancet-1	Zala Aero Group	Mini	Fixed-Wing	2019	Cruciform			5	1	40	0.5		110	180
Russia	Lancet-3	Zala Aero Group	Mini	Fixed-Wing	2021	Cruciform			12	3	40	0.6		110	181
China	Fury	Zhong Tian Guide Control Technology Company	Small	Fixed-Wing		Conventional			20	3	50	2			182
China	ZT-1B	Zhong Tian Guide Control Technology Company	Mini	VTOL	2021	Coaxial			3.5	0.5	1.5	0.16		60	182
China	Heng 029	Zhuhai Xuanji Technology	Micro	VTOL	2021	Coaxial	0.058	0.19	0.35	0.1		0.9		40	183
China	Heng 029-100	Zhuhai Xuanji Technology	Micro	VTOL	2021	Coaxial	0.07	0.45	1.2	0.6		1.2		70	183
China	Heng 029-300	Zhuhai Xuanji Technology	Mini	VTOL	2021	Coaxial	0.1	0.8	4.5	2		1		96	183
China	Heng 029-50	Zhuhai Xuanji Technology	Micro	VTOL	2021	Coaxial	0.058	0.27	0.45	0.05		0.45		70	183
India	Trinetra	ZMotion Autonomous Systems	Mini	Fixed-Wing	2022	Conventional			5.5	1	15	1			184

References

1. Malyasov, D. (2020). "Ukrainian companies develop stealth combat drones." *Defence Blog*, 10 November. <https://defence-blog.com/ukrainian-companies-develop-stealth-combat-drones/> (accessed 5 Jan 2023).
2. "Пілум." A.Drones. <https://adrones.com.ua/drones/pilum/> (accessed 5 Jan 2023).
3. Army Recognition staff (2020). "UMEX 2020: Access We UAV System showcases Black Knight suicide drone." *Army Recognition*, 24 February. https://www.armyrecognition.com/umex_2020_news_official_online_show_daily_media_partner/umex_2020_access_we_uav_system_showcases_black_knight_suicide_drone.html (accessed 5 Jan 2023).
4. Sung-wook, J. (2019). "억세스위, 무인항공기 자폭용 드론 두바이 수출계약 체결." *DroneWe*, 5 December. <https://dronewe.com/article/%EC%8B%A0%EA%B7%9C%EC%9E%85%EA%B3%A0%EA%B3%B5%EC%A7%80%EC%82%AC%ED%95%AD/1/2536/> (accessed 5 Jan 2023).
5. Unmanned Airspace staff. "AerialX." Unmanned Airspace. <https://www.unmannedairspace.info/c-uas-search/aerialx/#:~:text=DroneBullet%20has%20a%20take%20off,learning%20and%20machine%20vision%20system>.
6. "Orbiter 1K MUAS." Aeronautics. <https://aeronautics-sys.com/home-page/page-systems/page-systems-orbiter-1k-muas/> (accessed 5 Jan 2023).
7. Flight Global staff (2007). "Aerovironment pulls out Switchblade UAV." *Flight Global*, 5 February. <https://www.flightglobal.com/aerovironment-pulls-out-switchblade-uav/71856.article> (accessed 9 Jan 2023).
8. "Switchblade." AeroVironment. <https://www.avinc.com/tms/switchblade> (accessed 5 Jan 2023).
9. "Switchblade 600 Loitering Missile." AeroVironment. https://www.avinc.com/images/uploads/product_docs/Switchblade_600_Datasheet_07192021.pdf (accessed 5 Jan 2023).
10. Insinna, V. (2022). "Meet 'Phoenix Ghost,' the US Air Force's new drone perfect for Ukraine's war with Russia." *Breaking Defense*, 21 April. <https://breakingdefense.com/2022/04/meet-phoenix-ghost-the-us-air-forces-new-drone-designed-for-ukraines-war-with-russia/>.
11. Airworker. "Suicide Drone – AW1." Airworker. <https://airworker.aero/uav/>.
12. Airworker. "Suicide Drone – AW17." Airworker. <https://airworker.aero/uav/>.
13. "CH-901 (BG-201) Chinese Suicide Unmanned Aerial Vehicle (UAV)." ODIN. [https://odin.tradoc.army.mil/mediawiki/index.php/CH-901_\(BG-201\)_Chinese_Suicide_Unmanned_Aerial_Vehicle_\(UAV\)](https://odin.tradoc.army.mil/mediawiki/index.php/CH-901_(BG-201)_Chinese_Suicide_Unmanned_Aerial_Vehicle_(UAV)) (accessed 5 Jan 2023).
14. Abuasvili, J. "Lietuva dar to nematė: gausybė dronų vienoje vietoje – nuo žvalgybinių iki kamikadzių, atskleidė ir kainas." *TV3.lt*, 23 August. <https://www.tv3.lt/naujiena/lietuva/lietuva-dar-to-nemate-gausybe-dronu-vienoje-vietoje-nuo-zvalgybiniu-iki-kamikadziu-atskleide-ir-kainas-n1185007>.
15. "Anvil." Anduril. <https://www.anduril.com/hardware/anvil/>.
16. "Altius-600." Area-I. <https://areai.com/altius-600-2/> (accessed 9 Jan 2023).
17. Reim, G. (2021). "Area-I reveals larger Altius-700 air-launched effect." *Flight Global*, 2 November. <https://www.flightglobal.com/military-uavs/area-i-reveals-larger-altius-700-air-launched-effect/146191.article> (accessed 9 Jan 2023).
18. Arquimea. "Loitering System Q-SLAM-40." Arquimea. <https://www.arquimea.com/products/q-slam-40-loitering-system/>.
19. Ascent Aero Systems. "NX30." Ascent Aero Systems. <https://ascentaerosystems.com/nx30/>.
20. Company brochure
21. "St-35 Silent Thunder." Athlon Avia. <https://athlonavia.com/en/st-35-silent-thunder/> (accessed 9 Jan 2023).
22. Sahin, A. (2023). "BAYKAR'dan Bir İlk: KAGEM Kamikaze İHA." *Savunma Sanayi*, 22 February. <https://www.savunmasanayist.com/baykardan-bir-ilk-kagem-kamikaze-ihai/>.
23. Bharat Shakti (2020). "Bharat Forge displays New UAV." YouTube, 24 February. <https://www.youtube.com/watch?v=mndn8hzVqZM>.
24. Carrey, B. (2012). "Boeing Phantom Works Develops 'Dominator' UAV." *Aviation International*, 2 November. <https://www.ainonline.com/aviation-news/defense/2012-11-02/boeing-phantom-works-develops-dominator-uav>.
25. Munson, K. (1988). *World Unmanned Aircraft*. London: Jane's Information Group. 131-132.
26. Shephard News staff (2023). "New UAS family promises man-portable close air support." *Shephard News*, 15 March. <https://www.shephardmedia.com/news/landwarfareintl/new-uas-family-promises-man-portable-close-air-support/>.
27. "ASN-301 Chinese Anti-Radiation Radar Loitering Munition Unmanned Aerial Vehicle (UAV)." ODIN. [https://odin.tradoc.army.mil/mediawiki/index.php/ASN-301_Chinese_Anti-Radiation_Radar_Loitering_Munition_Unmanned_Aerial_Vehicle_\(UAV\)](https://odin.tradoc.army.mil/mediawiki/index.php/ASN-301_Chinese_Anti-Radiation_Radar_Loitering_Munition_Unmanned_Aerial_Vehicle_(UAV)) (accessed on 9 Jan 2023).
28. Novichkov, N. (2020). "Ukraine unveils new RAM loitering munition." *Janes*, 9 March. <https://www.janes.com/defence-news/news-detail/ukraine-unveils-new-ram-loitering-munition/>.
29. "RAM II UAV." Ramuav.com. <https://ramuav.com/> (accessed 9 Jan 2023).
30. Wong, K. (2021). "Airshow China 2021: CASC unveils CH-817 micro-surveillance and attack VTOL UAV." *Janes*, 1 October. <https://www.janes.com/defence-news/news-detail/china-likely-to-deploy-new-multiple-uav-launcher-in->

- [near-future](#) (accessed 9 Jan 2023).
31. Company brochure
 32. Tate, A. (2020). "China likely to deploy new multiple UAV launcher in near future." *Janes*, 21 October. <https://www.janes.com/defence-news/news-detail/china-likely-to-deploy-new-multiple-uav-launcher-in-near-future> (accessed 9 Jan 2023).
 33. Company exhibition
 34. Company exhibition
 35. Kaira, A. and Majumdar, O. (2023). "Aero India 2023: Cingularity displays UAVs for ISR, combat, kamikaze roles." *Jane's*, 20 February. <https://www.janes.com/defence-news/news-detail/aero-india-2023-cingularity-displays-uavs-for-isr-combat-kamikaze-roles>.
 36. Cobra Anti Drones. "Counter UAV." Cobra Anti Drones. <https://www.cobra-anti.com/counter-uav/>.
 37. "Soft Launching of Loitering Munition Rajata." Dahana. <https://www.dahana.id/news/soft-launching-of-loitering-munition-rajata/>.
 38. Dominguez, G. and Kim, D.Y. (2020). "RoKA to acquire three new small UAV types from 2021." *Janes*, 2 December. <https://www.janes.com/defence-news/news-detail/roka-to-acquire-three-new-small-uav-types-from-2021> (accessed 9 Jan 2023).
 39. Nersisyan, L. (2022). "Armenia minds the gap on loitering munitions and UAVs." *Shephard News*, 11 April. <https://www.shephardmedia.com/news/defence-notes/armenia-minds-the-gap-on-loitering-munitions-and-u/> (accessed on 16 Dec. 2022).
 40. "Unmanned Systems – Air: DefendTex Unmanned Aerial Vehicles." DefendTex. <https://www.defendtex.com/uav/> (accessed 9 Jan 2023).
 41. Fedutinov, D. (2022). "Trends in Azerbaijan's unmanned aircraft programs." Caspian Institute for Strategic Studies, 29 September. <https://caspian.institute/product/denis-fedutinov/trends-in-azerbaijan-s-unmanned-aircraft-programs-38307.shtml>.
 42. Geiger, W. (2023). "Libelle – Diehl Defence Enters the Loitering Munitions Race." *European Defence & Security*, 17 January. <https://euro-sd.com/2023/01/articles/29109/libelle-diehl-defence-enters-the-loitering-munitions-race/> (accessed 9 Jan 2023).
 43. Dornier Post staff (1986). "Programm Anti-Radar-Drohne." *Dornier Post* (March). 17-18.
 44. Heise, G. (1978) "Erprobungskampagne mit der Dornier Mini-Drohne." *Dornier Post* (March), 14-15.
 45. Munson, K. (1988). *World Unmanned Aircraft*. London: Jane's Information Group. 147-148.
 46. TK
 47. Pubby, M. (2022). Indian-developed loitering munitions tested at 15,000 ft." *The Economic Times*, 11 April. <https://economictimes.indiatimes.com/news/defence/indian-developed-loitering-munitions-tested-at-15000> (accessed 9 Jan 2023).
 48. "QX-1 Loitering Munitions." Adasi. <https://adasi.ae/product-detail/qx-1-loitering-munitions> (accessed 5 Jan 2023).
 49. "RW-24: Smart Loitering Precision Attacking." Adasi. <https://media-files.edgegroup.ae/s3fs-public/2020-04/ADASI%20RW24%20ENG.pdf> (accessed 5 Jan 2023).
 50. "SHADOW 25." Adasi. <https://edgegroup.ae/solutions/shadow-25>.
 51. "Shadow 50-P: Powerful Precision Long Range Speed." Adasi. <https://edgegroup.ae/solutions/shadow-50-p>.
 52. "Latvijas aizsardzības industrijas uzņēmumi Ādažu bāzē prezentē jaunākos izstrādājumus." *SARGS.LV*, 27 May. <https://www.sargs.lv/lv/uznemejdarbiba-un-inovacijas/2022-05-27/latvijas-aizsardzibas-industrijas-uznemi-adazu-baze> (accessed 9 Jan 2023).
 53. Halcon (2021). "EDGE Unveils New Additions to its Portfolio of Reconnaissance and Combat Unmanned Aerial Vehicles." EDGE Halcon, news release, 14 November. <https://halcon.ae/news/edge-unveils-new-additions-its-portfolio-reconnaissance-and-combat-unmanned-aerial/>.
 54. Aljundi staff (2022). "The Hunter 2-S: HALCON develops AI-powered swarming drones." Aljundi, 1 June. <https://www.aljundi.ae/en/profile/the-hunter-2-s-halcon-develops-ai-powered-swarming-drones/> (accessed 9 Jan 2023).
 55. Emir, C. (2022). "Israel's Elbit Systems unveils its tiny but powerful search and attack drone." *Interesting Engineering*, 15 November. <https://interestingengineering.com/transportation/lanius-search-and-attack-drone> (accessed 9 Jan 2023).
 56. "Sky Striker Tactical Loitering Munitions for covert and precise strikes." Elbit Systems. <https://elbitsystems.com/landing/wp-content/uploads/2018/07/Sky-Striker.pdf> (accessed 9 Jan 2023).
 57. Egozi, A. (2008). "British Army selects EMIT Sparrow for precision artillery programme." *Flight Global*, 11 February. <https://www.flightglobal.com/british-army-selects-emit-sparrow-for-precision-artillery-programme/78696.article>.
 58. Taylor, J.W.R. (1979). *Jane's All the World's Aircraft, 1984-85*. New York: Franklin Watts Inc. 853.
 59. Company brochure.
 60. Company brochure
 61. Zhen, L. (2022). "China's military is watching closely to see how US-made 'tank-killer' drones perform in Ukraine." *South China Morning Post*, 11 April. <https://www.businessinsider.com/chinese-military-watching-us-tank-killer-drones-in-ukraine-2022-4>.
 62. Frontliner (@FrontlinerUV) (2022). "Balidan Micro UAV by Hawk-Ing Defence." Twitter, 12 July. <https://twitter.com/frontlineruv/status/1547067701583290368?lang=ca>.
 63. TRADOC (2023). "Ababil-2 Iranian Tactical Unmanned Aerial Vehicle (UAV)." ODIN, last accessed 20 April 2023.
 64. "HESA Qasef-1." Military Factory, last edited 22 June 2022. https://www.militaryfactory.com/aircraft/detail.php?aircraft_id=2155.
 65. TRADOC (2023). "Shahed-131 Iranian Kamikaze Unmanned Aerial Vehicle (UAV)." ODIN, last accessed 20 April 2023. https://odin.tradoc.army.mil/WEG/List/ORIGIN_iran-2087b4.

66. TRADOC (2023). "Shahed-136 Iranian Loitering Munition Unmanned Aerial Vehicle (UAV)." ODIN, last accessed 20 April 2023. https://odin.tradoc.army.mil/WEG/List/ORIGIN_iran-2087b4.
67. "Mini Harop." Israel Aerospace Industries, accessed 9 Jan 2023. <https://www.iaiaco.il/p/mini-harop>.
68. "Harop." Israel Aerospace Industries, accessed 9 Jan 2023. <https://www.iaiaco.il/p/harop>.
69. TRADOC G-2 (2016). "Worldwide Equipment Guide Volume 2: Air and Air Defense Systems." TRADOC G-2. 27.
70. "Harpy." Israel Aerospace Industries, accessed 9 Jan 2023. <https://www.iaiaco.il/p/harpy>.
71. "Mini Harpy." Israel Aerospace Industries, accessed 9 Jan 2023. <https://www.iaiaco.il/p/mini-harpy>.
72. Israel Aerospace Industries (2023). "Israel Aerospace Industries unveils POINT BLANK – a hand-launched electro-optical guided missile." News release, 19 January. <https://www.iaiaco.il/news-media/press-releases/israel-aerospace-industries-unveils-point-blank-hand-launched-electro> (accessed 20 Jan 2023).
73. "Rotem." Israel Aerospace Industries, accessed 9 Jan 2023. <https://www.iaiaco.il/p/rotem>.
74. Defense Update staff (2010). "Suicide Micro Drones." *Defense Update*, 31 December. https://defense-update.com/20101231_suicide_uavs_5.html (accessed 9 Jan 2023).
75. Atherton, K.D. (2018). "This new suicide drone delivers a big bang in a small body." *C4ISRNET*, 29 May. <https://www.c4isrnet.com/unmanned/2018/05/29/the-predator-ax-1-is-slovakias-new-suicide-drone/> (accessed 9 Jan 2023).
76. "AX-2 Predator High Precision Weapon System." Incoff Arms. <https://arms.incoff.sk/AX-2%20PREDATOR%20datasheet%20EN%20-%20NEW.pdf> (accessed 9 Jan 2023).
77. Innovaero (2022). "Innovaero hosts Federal Shadow Minister for Defence, the Hon Andrew Hastie MP." Innovaero, 7 November. <https://innov.aero/news/innovaero-hosts-federal-shadow-minister-for-defence-the-hon-andrew-hastie-mp/>.
78. Company brochure
79. Author correspondence
80. Iran Press staff (2022). "Me'raj-504 suicide UAV, Me'raj-113 training UAV; two new IRGC achievements." *Iran Press News Agency*, 16 July. <https://iranpress.com/content/62212/meraj-504-suicide-uav-meraj-113-training-uav-two-new-ircg-achievements>.
81. Cetiner, Y. (2022). "The Iranian Revolutionary Guards' Newest Meraj-521 Kamikaze Drone Is On Its Way To Russia." *Overt Defense*, 31 October. <https://www.overtdefense.com/2022/10/31/the-iranian-revolutionary-guards-newest-meraj-521-kamikaze-drone-is-on-its-way-to-russia/>.
82. Defense Post staff (2019). "Iran unveils Kian reconnaissance and attack drone." *Defense Post*, 2 September. <https://www.thedefensepost.com/2019/09/02/iran-kian-drone/>.
83. Focus Taiwan staff (2022). "Asymmetrical warfare focus has Taiwan drone companies upping the ante." *Focus Taiwan*, 10 September. <https://focustaiwan.tw/sci-tech/202209100016>.
84. "Johnette JM-1." Johnette. <https://www.johnnette.com/jm1.html> (accessed 5 Jan 2023).
85. "Johnette JM-2." Johnette. <https://www.johnnette.com/jm2.html> (accessed 5 Jan 2023).
86. Military Review staff (2021). "Belarus presented two new UAVs at exhibition." *Military Review*, 21 June. <https://en.topwar.ru/184275-belorussija-predstavilana-vystavke-dva-novyh-bpla.html>.
87. Aero India staff (2023). "Above Horizons: A Glimpse of Indian Aero-Industry." Aero India. https://www.aeroindia.gov.in/front/updated_assets/conclave.pdf.
88. Aero India staff (2023). "Above Horizons: A Glimpse of Indian Aero-Industry." Aero India. https://www.aeroindia.gov.in/front/updated_assets/conclave.pdf.
89. Company brochure
90. "KYB-UAV," ZALA Aero Group, accessed on 19 January 2021, <https://zala-aero.com/en/production/bvs/kyb-uav/>.
91. Hambling, D. (2016). "Loiter with Intent." *Aviation Week & Space Technology* 178, no. 9 (April–May): 54
92. McDaid, H. and Oliver, D. (1997). *Smart Weapons: Top Secret History of Remote Controlled Airborne Weapons*. Barnes & Noble, Inc. 59.
93. Mikhail Khodarenok (2020). "Пулеметы, дроны, истребители: что нового покажут на «Армии-2020»," *Gazeta.ru*, 23 August. <https://www.gazeta.ru/army/2020/08/23/13207327.shtml>.
94. Holland Michel, A. and Gettinger, D. (2017). "Loitering Munitions in Focus." Center for the Study of the Drone at Bard College. <https://dronecenter.bard.edu/files/2017/02/CSD-Loitering-Munitions.pdf> (accessed 9 Jan 2023).
95. Williams, H. (2022). "ADEX 2022: Lentatek working on new Kargi-based loitering munition." *Janes*, 10 September. <https://www.janes.com/defence-news/news-detail/adex-2022-lentatek-working-on-new-kargi-based-loitering-munition>.
96. MTN (2022). "[K디펜스] "적 없으면 원대복귀" K신통 쏘 자폭드론도 허 내돌러 /머니투데이방송." YouTube, 25 March. <https://www.youtube.com/watch?v=a5yx-RpVioC0>.
97. Defense Update staff (2009). "Voyeur – Expendable, Air Insertable Hovering Mini-UAV." *Defense Update*, 5 January. https://defense-update.com/20090105_voyeur.html/.
98. Hambling, D. (2014). "Meet Terminator, the deadly hand-launched military drone." *Wired*, 5 January. <https://www.wired.co.uk/article/terminator> (accessed 9 Jan 2023).
99. Munson, K. (1988). *World Unmanned Aircraft*. London: Jane's Information Group. 166.
100. Munson, K. (1988). *World Unmanned Aircraft*. London: Jane's Information Group. 49.
101. Think Defence staff. "Fire Shadow Loitering Munition." Think Defence (blog), 5 November. <https://www.thinkdefence.co.uk/2022/11/fire-shadow-loitering-munition/>.

102. Sanders, R. (2009). "Tactical Grenade-Extended Ranger (TGER): A Precision Small Unit Tactical Weapon." Presentation for the Precision Strike Technology Symposium, October.
103. Binnie, J. (2023). "IDEX 2023: Sudan displays UAV-launched loitering munition." *Janes*, 24 February. <https://www.janes.com/defence-news/news-detail/idex-2023-sudan-displays-uav-launched-loitering-munition>.
104. Company brochure
105. Papadopoulous, L. (2022). "Taiwan showcases its suicide drone designed to kill enemy radars." *Interesting Engineering*, 17 November. <https://interesting-engineering.com/innovation/taiwan-drone-kill-enemy-radars> (accessed 16 Dec. 2022).
106. Wong, K. (2019). "TADTE 2019: NCSIST unveils Fire Cardinal mini-UAV." *Janes*, 16 August. <https://www.janes.com/defence-news/news-detail/tadte-2019-ncsist-unveils-fire-cardinal-mini-uav> (accessed on 16 Dec. 2022).
107. Focus Taiwan staff (2023). "Military research unit unveils Taiwan-made 'suicide drone'." *Focus Taiwan*, 14 March. <https://focustaiwan.tw/politics/202303140009>.
108. Kunde, Raunak (2022). "NewSpace Developing Tube Launched Alfa-S Loitering Munition System." IDRW, 26 October. <https://idrw.org/newspace-developing-tube-launched-alfa-s-loitering-munition-system/>.
109. Gain, N. (2023). "SOFINS 2023 : comment Nexter embarque sur le projet Colibri." *Forces Operations Blog*, 28 March. <https://www.forcesoperations.com/sofins-2023-comment-nexter-embarque-sur-le-projet-colibri/> (accessed 28 March 2023).
110. Company brochure
111. Roman, J. (2021). "Loitering drones from the Zhuhai Airshow 2021." Twitter, 7 October. <https://twitter.com/jesusfroman/status/1446088262607585290>.
112. Woessner, F. (2022). "China shows its kamikaze drone 'Loitering Dragon 60B' at the Zhuhai Airshow 2022." Twitter, 6 November. <https://twitter.com/jesusfroman/status/1446088262607585290>.
113. Woessner, F. (2022). "China shows its kamikaze drone 'Loitering Dragon 60B' at the Zhuhai Airshow 2022." Twitter, 6 November. <https://twitter.com/jesusfroman/status/1446088262607585290>.
114. Munson, K. (1988). *World Unmanned Aircraft*. London: Jane's Information Group. 177.
115. Panasovskyi, M. (2022). "Ukrainian developers created the Fowler - a drone that can intercept enemy UAVs at speeds up to 180 km/h." *gagadget.com*, 11 October. <https://gagadget.com/en/uav/175977-ukrainian-developers-created-the-fowler-a-drone-that-can-intercept-enemy-uavs-at-speeds-up-to-180-kmh/>.
116. "LONG RANGE SERIES." One Way Aerospace. <https://onewayaerospace.com/long-range-series/>.
117. "VERTICAL SERIES." One Way Aerospace, <https://onewayaerospace.com/vertical-series/>.
118. Wang, Z. et. al. (2022). "The Application of Micro Coaxial Rotorcraft in Warfare: An Overview, Key Technologies, and Warfare Scenarios." *IEEE Access*, 12 April. <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9755973>.
119. defenceWeb staff (2021). "Paramount launches N-Raven long range swarming UAV system." *defenceWeb*, 22 February. <https://www.defenceweb.co.za/aero-space/paramount-launches-n-raven-long-range-swarming-uav-system/> (accessed 16 Dec. 2022).
120. 테크논스 - 신기술 IT 자동차 (2022). "육군이 도입하려는 군사용 드론을 보고 왔습니다!" YouTube, 27 August. <https://www.youtube.com/watch?v=G-WUF3XYxw08>.
121. Elisabeth Gosselin-Malo (2023). "The company was exhibiting for the first time its latest platform, part of the Ika Bomber series..." Twitter, 23 February. <https://twitter.com/elisabethmalom1/status/1628713975918612480>.
122. Nersisyan, L. "IDEX 2021: Armenian loitering munitions take a bow." *Shephard News*, 22 Feb. 2021. <https://www.shephardmedia.com/news/uv-online/idex-2021-armenian-loitering-munitions-take-bow/> (accessed 16 Dec. 2022).
123. "Pt Pindad Indonesian Company Presented Its Kamikadze Drones In Jakarta." Tashkent University of Information Technologies. <https://tuit.uz/en/post/jakarta-da-indoneziyaning-pt-pindad-kompaniyasi-ozining-kamikadze-dronlari>.
124. Rafael. "SPIKE FIREFLY Miniature Tactical Loitering Weapon." Rafael Advanced Weapons Systems. <https://www.rafael.co.il/wp-content/uploads/2019/03/FIREFLY.pdf> (accessed 16 Dec. 2022).
125. Company Brochure
126. BMPD (2019). "Барражирующие боеприпасы на выставке IDEX-2019." BMPD (blog), 28 February. <https://bmpd.livejournal.com/3549894.html>.
127. Cione, J. "6. Small Unmanned Aerial Vehicle Experiment (SUAVE)." NOAA, 2015. https://www.aoml.noaa.gov/hrd/HFP2015/6-SUAVE_exp.pdf (accessed 16 Dec. 2022).
128. Redon Systems. "Loitering Munitions – Achuk." Redon Systems Unmanned Aerial Vehicles. <https://redonsystems.in/loitering-munitions-achuk/>.
129. Army Technology staff (2004). "TARES Unmanned Combat Aerial Vehicle." *Army Technology*, 23 August. <https://www.army-technology.com/projects/tai-fun/>.
130. Fiorenza, N. (2022). "Rheinmetall and UVision develop Hero-R rotary-wing loitering munition." *Janes*, 15 December. <https://www.janes.com/defence-news/news-detail/rheinmetall-and-uvision-develop-hero-r-rotary-wing-loitering-munition>.
131. Akbas, Y. (2023). "Savunma Sanayi ile İlgili Son Gönderiler Daha Fazlası Türkiye'nin yeni kamikaze İHA'sı: Azab." *DonanimHaber*, 20 March. <https://www.donanimhaber.com/robit-teknoloji-azab-ih-a-ozellikleri--161732>.
132. Aviation Week staff (1994). "Business Strategies Focus on Niches." *Aviation Week & Space Technology*, 26 September.
133. Defence Connect staff (2021). "Skyborne Unveils New Gannet Glide Drone." *Defence Connect*, 9 July. <https://www.defenceconnect.com.au/strike-air-combat/8371-skyborne-unveils-new-gannet-glide-drone>.
134. BuildingTech staff (2022). "Разведывательный беспилотник «Черная мамба», украинской компании Skynet, готов к серийному производству." *Build-*

- ingTech, 24 November. <https://building-tech.org/%D0%A1%D0%BE%D0%BE%D0%B1%D1%89%D0%B5%D1%81%D1%82%D0%B2%D0%BE/razvedivatelniy-bespylotnyk-%C2%ABchernaya-mamba%C2%BB-ukraynskoy-kompanyy-skyonet-gotov-k-seryynomu-proyzvodstvu>.
135. Williams, H. "ADEX 2022: Smart Point unveils 'attack' UAVs." *Janes*, 10 September. <https://www.janes.com/defence-news/news-detail/adex-2022-smart-point-unveils-attack-uavs>.
136. "Ninox 40 MT." SpearUAV. <https://spearuav.com/solutions/?tab=ninox40>.
137. Hughes, R. "SpearUAV unveils Viper micro-tactical loitering munition." *Janes*, 6 Oct. 2022. <https://www.janes.com/defence-news/news-detail/spearuav-unveils-viper-micro-tactical-loitering-munition> (accessed 16 Dec. 2022).
138. Company brochure
139. "Our UAS Solutions." SRB. <https://www.srbuavs.com/militaryuas>.
140. Caiafa, R. (2023). "Brasileira Stella Tecnologia entra no mercado de drones kamikaze." *Infodefensa.com*, 4 May. <https://www.infodefensa.com/texto-diario/mostrar/4152002/brasil-entra-no-mercado-loitering-munitions-com-stella-tecnologia>.
141. Ami Rojkes Dombe (2017). "Turkey Unveils Alpagu 2 Tactical Attack UAV," *Israel Defense*, 5 December. https://www.israeldefense.co.il/en/node/32067?_cf_chl_managed_tk__=pmd_pmNsF_quW22ZQeR9vzol3ND2XFj07UMe62w2VE45eC8-1630168300-0-gqNtZGzNArujcnBszQg9.
142. Ozberk, T. (2022). "Turkey's STM, Roketsan develop 'Alpagut' loitering munition." *C4ISRNet*, 28 October. <https://www.c4isrnet.com/newsletters/unmanned-systems/2022/10/28/turkeys-stm-roketsan-develop-alpagut-loitering-munition/>.
143. Shephard News Team (2021). "STM's Kargu passes precision strike test," *Shephard Media*, 19 July. <https://www.shephardmedia.com/news/uv-online/stms-kargu-uas-passes-precision-strike-test/>.
144. "UAVs and Loiters." Swarming Technologies and Solutions. <https://swarmingts.com/uavs/>.
145. Ozberk, T. (2021). "Turkey converts Simsek training system into a kamikaze drone." <https://www.defensenews.com/unmanned/2021/04/30/turkey-converts-simsek-training-system-into-a-kamikaze-drone/>.
146. Aero India staff (2023). "Above Horizons: A Glimpse of Indian Aero-Industry." Aero India. https://www.aeroindia.gov.in/front/updated_assets/conclave.pdf.
147. Valpolini, P. "More on the Chinese ZD UAS and loitering munition family." *EDR Magazine*, 12 April 2022. <https://www.edrmagazine.eu/more-on-the-chinese-zd-uas-and-loitering-munition-family>.
148. 军迷天 (2022). "双尾蝎"无人机近距离展示 模块化巡飞子机曝光! "军迷天花板"偶遇 "英雄试飞员"都聊了啥? | 军迷天下." YouTube, 21 November. <https://www.youtube.com/watch?v=m44nzXOM-1IQ>.
149. Gosselin-Malo, E. (2023). "Estonia's drone-buying spree finds local vendors eager for deals." *Defense News*, 22 February. <https://www.defensenews.com/global/mideast-africa/2023/02/22/estonias-drone-buying-sprees-finds-local-vendors-eager-for-deals/>.
150. AFM staff (2011). "Air Force Association Technology Exposition 2011." *Air Force Magazine* (November): 66–73.
151. Company brochure
152. Defence Turkey staff (2022). "TÜBİTAK SAGE & TİTRA Debuts DELI Tactical Loitering Munition System at SAHA EXPO." *Defence Turkey*, 27 October. <https://www.defenceturkey.com/en/content/tubitak-sage-titra-debuts-deli-tactical-loitering-munition-system-at-saha-expo-5286/>.
153. Defence Turkey staff (2023). "TRANSVARO FEDAI Loitering Munition UAV Killer, New Laser Target Designator and EO Solutions." *Defence Turkey*, 23 February. <https://www.defenceturkey.com/en/content/transvaro-fedai-loitering-munition-uav-killer-new-laser-target-designator-and-eo-solutions-4983/>.
154. Daily Sabah staff (2021). "Turkish firms develop new kamikaze UAV against drone-borne threats." *Daily Sabah*, 6 October. <https://www.dailysabah.com/business/defense/turkish-firms-develop-new-kamikaze-uav-against-drone-borne-threats/>.
155. Company brochure
156. Binnie, J. (2022). "New Omid UAV used in Iranian exercise." *Jane's*, 26 August. <https://www.janes.com/defence-news/news-detail/new-omid-uav-used-in-iranian-exercise> (accessed 1 April 2023).
157. "RF200." ODIN. TRADOC. [https://odin.tradoc.army.mil/mediawiki/index.php/RF200_Chinese_Loitering_Munition_Unmanned_Aerial_Vehicle_\(UAV\)](https://odin.tradoc.army.mil/mediawiki/index.php/RF200_Chinese_Loitering_Munition_Unmanned_Aerial_Vehicle_(UAV)).
158. TRADOC (2023). "Sammad-2 (UAV-X) Yemeni Reconnaissance and Loitering Munition Unmanned Aerial Vehicle (UAV)." ODIN, last accessed 20 April 2023. https://odin.tradoc.army.mil/WEG/List/ORIGIN_yemen-e746ca.
159. TRADOC (2023). "Sammad-3 Yemeni Reconnaissance and Loitering Munition Unmanned Aerial Vehicle (UAV)." ODIN, last accessed 20 April 2023. https://odin.tradoc.army.mil/WEG/List/ORIGIN_yemen-e746ca.
160. Parsch, A. (2002). "USAF FDL BQM-106 Teleplane." Designation Systems. <https://www.designation-systems.net/dusrm/m-106.html>.
161. "Hero-120." Tactical Systems. UVision. <https://uvisionuav.com/portfolio-view/hero-120/>.
162. "Hero-1250." Strategic Systems. UVision. <https://uvisionuav.com/portfolio-view/hero-1250/>.
163. Eshel, T. (2019). "UVision Introduces New Multi-Mission Loitering Weapons." *Defense Update*, 20 June. https://defense-update.com/20190620_uvision-introduces-new-multi-mission-loitering-weapons.html.
164. Holland Michel, A. and Gettinger, D. (2017). "Loitering Munitions in Focus." Center for the Study of the Drone at Bard College. <https://dronecenter.bard.edu/files/2017/02/CSD-Loitering-Munitions.pdf> (accessed 9 Jan 2023).
165. "Hero-30." Tactical Systems. UVision. <https://uvisionuav.com/portfolio-view/hero-30/>.
166. "Hero-400." Operational Systems. UVision. <https://uvisionuav.com/es/portfolio-view/hero-400-4/>.
167. "Hero-400EC." Operational Systems. UVision. <https://uvisionuav.com/portfolio-view/hero-400ec/>.

168. "Hero-70." Tactical Systems. UVision. <https://uvisionuav.com/es/portfolio-view/hero-70-4/>
169. "Hero-900." Strategic Systems. UVision. <https://uvisionuav.com/portfolio-view/hero-900/>.
170. "X-Fronter." WB Group, accessed 1 May 2023. <https://www.wbgroup.pl/produkt/x-fronter/>.
171. "Warmate loitering munitions." WB Group, accessed on 18 January 2021. <https://www.wbgroup.pl/en/produkt/warmate-loitering-munitions/>.
172. "Warmate 2 loitering munitions." WB Group, accessed on 18 January 2021. <https://www.wbgroup.pl/en/produkt/warmate-2-loitering-munitions-2/>.
173. White, A. (2019). "WB Group unveils the Warmate TL variant." *Janes*, 29 May. <https://www.janes.com/defence-news/news-detail/wb-group-unveils-warmate-tl-variant>.
174. Company brochure
175. Glowacki, B. (2017). "Poland's WZL-2 reveals Dragonfly loitering munition." *Flight Global*, 11 September. <https://www.flightglobal.com/military-uavs/polands-wzl-2-reveals-dragonfly-loitering-munition/125337.article>.
176. AVING staff (2023). "영풍전자, 2023 드론쇼코리아 참가... 공격 및 감시 정찰 임무용 자폭형 드론 'GANNET' 출품!" Aving, 24 February. <https://kr.aving.net/news/articleView.html?idxno=1776664>.
177. "PRVI SRPSKI DRON UBICA: "Gavran" može da uništi bilo koji cilj, a jedna stvar čini ga savršenim za bojište." *Srbija Danas*, 9 March 2021. <https://www.srbijadanas.com/vesti/naoruzanje/srpski-dron-ubica-gavran-srpsko-oruzje-srpsko-naoruzanje-2021-03-08>.
178. Tony (@cyberspec1). "New Gavran-145 (#Raven_145) Kamikaze drone (loitering munition)." Twitter, 29 June 2021. <https://twitter.com/Cyberspec1/status/1410061824121208832>.
179. Silja Pluton (2022). "Dron ubica Gavran 2." YouTube, 31 August. <https://www.youtube.com/watch?v=SIVhhS588LY>.
180. "Zala Lancet." Military Factory, 15 July 2022. https://www.militaryfactory.com/aircraft/detail.php?aircraft_id=2521.
181. "Lancet-3." Army Recognition (blog), 29 April 2023. https://www.armyrecognition.com/russia_russian_unmanned_aerial_ground_systems_uk/lancet-3_loitering_munition_kamikaze_drone_russia_data_fact_sheet.html/
182. Company brochure
183. Wang, Z. et. al. (2022). "The Application of Micro Coaxial Rotorcraft in Warfare: An Overview, Key Technologies, and Warfare Scenarios." IEEE. <https://ieeexplore.ieee.org/document/9755973>.
184. "Trinetra Electric Loitering Ammunition System." ZMotion. <https://zmotion.in/trinetra>.