Remote control war

Unmanned combat air vehicles in China, India, Israel, Iran, Russia and Turkey

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List of abbreviations

AA	Anti-aircraft
AD	Air defence
ASM	Air-to-surface missile
ATC	Air traffic control
AWACS	Airborne warning and control system
BAMS	Broad area maritime surveillance
BDA	Battle damage assessment
BLOS	Beyond line of sight
C3I	Command, control, communications and intelligence
C4ISR	Command, control, communications, computers, intelligence, surveillance and reconnaissance
CEP	Circular error probable (a measure of missile accuracy)
COMINT	Communications intelligence (one part of SIGINT, non-ELINT related)
ECM	Electronic countermeasures (aka jamming)
ELINT	Electronic intelligence (one part of SIGINT, non-COMINT related)
EO	Electo-optical (i.e. camera Lens)
EW	Electronic warfare
FLIR	Forward looking infrared
FMV	Full-motion video
FOV	Field of view
GCS	Ground control station
GeoINT	Geospatial intelligence (IMINT plus weather and terrain analysis)
GMTI	Ground moving target indication (a radar mode of operation used to discriminate a moving target against stationary clutter)
HALE	High-altitude long-endurance
HE	High explosive
IMINT	Imagery intelligence (e.g. from satellite, UAV full-motion video or hand-held)
ISR	Intelligence, surveillance and reconnaissance

ISTAR	Intelligence, surveillance, target acquisition and reconnaissance
LOS	Line of sight
MALE	Medium-altitude long-endurance
MANPADS	Man-portable air-defence systems
MITL/HITL	Man in the loop/human in the loop
MOSP	Multi-purpose optical stabilised payload
MTOW	Maximum take-off weight
OPV	Optionally piloted vehicle
ORBAT	Order of battle
POP	Plug-in optronic payload
RCS	Radar cross-section
RPA	Remotely-piloted aircraft
RPV	Remotely-piloted vehicle (largely disused term)
RSTA	Reconnaissance, surveillance and target acquisition (US term for ISR)
SAR	Synthetic aperture radar (provides look-through capability of clouds, obscurants – e.g. smoke and limited cover)
SEAD	Suppression of enemy air defences
SIGINT	Signals intelligence (includes COMINT and ELINT)
TALD	Tactical air-launched decoys (used to confuse and saturate enemy air defences)
UAS	Unmanned aircraft system
UAV	Unmanned aerial vehicle
UAVS	Unmanned aircraft air system
UCAS	Unmanned combat air system
UCAV	Unmanned combat air vehicle
UGV	Unmanned ground vehicle
USV	Unmanned under-sea vehicle
UVAS	Unmanned vehicle air system
VTOL	Vertical take-off and landing
VTUAV	Vertical take-off and landing tactical unmanned air vehicle

Section I

Introduction

The introduction and development of unmanned aerial vehicles (UAVs) and unmanned combat air vehicles (UCAVs) by an increasing number of countries is creating both new opportunities and complex challenges. From an Intelligence, Surveillance and Reconnaissance (ISR) perspective, drones provide a hitherto unimagined ability to observe in real-time the terrain over which one may conduct operations, plus the location and disposition of enemy troops and equipment. However, we are on the cusp of employing armed variants in far greater numbers, with software that is gradually taking the human decision-maker out of the loop. It is akin to the World War I transition of aircraft from purely observation roles to that of fighters and the revolution in aerial combat systems that followed.

The development of UCAVs has been possible because of three converging trends. First, aircraft have become increasingly autonomous, with computers taking over more of the targeting and weapons delivery functions. Second, missiles have become more sophisticated and capable of functions, such as target selection, which were previously carried out by the weapons platform. Third, new technologies have made UAVs capable of greater performance levels. Their increasing use is partly down to a fourth trend: vastly improved ISR capabilities (itself partly thanks to UAVs), which allow high-value targets to be tracked and targeted while potentially reducing civilian casualties and other collateral damage.

Not surprisingly, there are countless challenges associated with this phenomenon. Chief among these from a military standpoint is the development of sound operational doctrine in order to successfully integrate these systems' capabilities. The speed with which drones are being developed is far surpassing the imaginations of military planners. When some of these first unmanned systems were used by US forces on the battlefield, impressed military decision-makers were criticised for acquiring a 'looking down the soda straw' perspective, whereby they favoured the images UAVs were returning at the expense of awareness of the wider battle space. This made them prone to imbalanced operational decisions. Since then, commanders have learnt how to better maintain situational awareness by viewing the capabilities of such platforms from a distance.

There are wider issues to consider though. Now that 'drone strike' has become a household term, a plethora of legal and ethical issues have rightly surfaced. Not least of all the fact that UCAVs are being used for missions that would not likely be approved if more traditional aircraft systems were being used. For example, it is hard to imagine the continued violation of Pakistani airspace by US bombers targeting remote villages in the northwest of the country. Somehow, the use of remotely-piloted systems has temporarily sidestepped international law. It is viewed as a grey area when, in fact, no such ambiguity really exists. They are weapons platforms. The location of the pilot and the type of platform used to deliver a missile should have no relevance to the legality of that strike.

Numerous other questions have arisen as the technology has outpaced our ability to control its use. Should we allow fully autonomous armed systems to be deployed? Do we need a proliferation control regime specifically for armed drones? What impacts do repeated attacks have on the psyche of targeted populations? Are drone pilots more or less likely to suffer from post-traumatic stress disorder than conventional pilots? While not within the scope of this study to address such wider issues, they bear mentioning from the outset.

Much of the debate over armed drones has focussed on their use by the United States. As the leading country in the development and use of UCAVs this is understandable. It has lowered the threshold for the use of lethal force and pushed back the limits of counter-terrorism efforts to include the targeted killing of its own citizens abroad. However, 75 other countries are known to have UAVs, with approximately 20 countries possessing armed drones (though estimates vary widely). Many of these countries warrant closer attention; after all, a risky precedent has been set.

This study focusses on six of these countries: China, India, Iran, Israel, Russia and Turkey. It identifies the UAVs in use by each state (see Annex A) and examines in more detail the UCAVs they have in their inventories (see Annex B). In doing so, Open Briefing has identified at least 200 different UAVs in use or in development by the countries in question, with 29 of these being UCAVs. The likely future use of armed drones by each country is also assessed in light of current military doctrines and national security realities.

Some general findings are worth highlighting here. The vast majority of military UAVs in each country's inventory are unarmed (used for ISR), though many of these can take various payload options, including missiles. In fact, UCAVs are being used to carry far heavier payloads than previously possible. China has the most diverse UCAV inventory, though Israel leads the way in terms of technology and export. All the countries studied are expanding their UCAV industries. Domestic manufacturers are preferred but countries are purchasing some modern drones from abroad. The proliferation of drones to state and non-state adversaries is leading several countries to seek to develop UAV countermeasures. Finally, with the development of loitering munitions and the retrofitting of legacy aircraft or development of new manned/unmanned systems, the lines between missiles and drones at one end and drones and aircraft at the other are increasingly blurred.

This study was commissioned by the Remote Control Project, a pilot project initiated by the Network for Social Change and hosted in London by Oxford Research Group. In undertaking this work, Open Briefing has drawn on a wide range of sources, including defence equipment exhibitions, defence company brochures, foreign media, defence news, military reference books, NGO databases and military forums.

It is clear that armed drones, their uses and their proliferation are issues that are widely misunderstood and surrounded by inaccuracies. This study is offered as one contribution to addressing that situation.

Section II

China

a) Existing drone inventory

Chinese research into unmanned aerial vehicles began in the late 1950s. More recently, China's economic boom has fuelled a substantial programme of military modernisation. Significant development has occurred in manned and unmanned aircraft, reconnaissance satellites and sophisticated ground-based infrastructure, which China will use as the foundation for its emerging network-centric military. There is reportedly a highly competitive domestic market for drone system research and development and manufacturing in China. China has developed approximately 50 designs to date, ranging from micro-size to much larger UAVs, thus allowing the government and military to be selective in its choices for further development or operational use.

Although much of China's drone research and development remains classified, Open Briefing has identified at least 46 different UAVs (plus variants) in use or in development by China (see Annex A), with 11 of these being UCAVs (see Annex B). Most of these are tactical, shorter-range UAVs. All bar one of their armed drones are Chinese designed and built. The exception is the Harop, made by Israel Aerospace Industries.

b) Future armed drone developments

The US Defense Science Board has called China's UAV developments 'alarming'. These concerns are linked to the United States' relatively new Pacific-centric doctrine of AirSea Battle and China's Anti-Access/Area-Denial (A2/AD) counter-strategy.

However, a second and equally noteworthy concern is the matter of Chinese drone proliferation. China is not a member of either the Missile Technology Control Regime or the Wassenaar Arrangement and can therefore provide their products more easily than the United States to customers in other Pacific-rim countries, Central Asia and the Middle East and North Africa, and at considerably reduced cost compared to US models. This makes drone technology available to poorer countries. The PLA lacks combat experience with their UCAV systems and exporting them may be a way of acquiring this needed (and marketable) quality. Any exported UCAVs used in regional conflicts by the operating country will give China the much needed 'combat proven' seal of approval, which will help increase sales abroad.

Any future developments of China's UCAV capabilities must be seen within the larger framework of their significant C4ISR advances. Chief among these is China's indigenous GPS alternative, the Beidou-2 satellite network, scheduled to achieve global coverage by 2020. If current trends in China's technological development continue over the next 15-20 years, the PLA will reap a vastly improved geolocation (and thus precision-strike) capability, a more persistent global satellite coverage and a range of military-related by-products, not the least of which would be an enhancement of their existing UCAV fleet.

Table 1. Summary of UCAVs identified as in use or in development by China.

UCAV designation	Manufacturer	Primary role
Anjian	Shenyang Aircraft Corporation	Stealth UAV/UCAV
ASN-229A	Xian ASN Technical Group	Reconnaissance and precision attack MALE UAV/UCAV
CH-3/3A	China Aerospace Science and Industry Corporation	Armed tactical MALE UAV (UCAV prototype)
CH-4	China Aerospace Science and Industry Corporation	Armed tactical MALE UAV (UCAV prototype)
CH-901	Aerospace Long-March International Trade Company Ltd	ISR, BDA, meteorological survey and precision attack UAV/UCAV for special forces
CH-92	Aerospace Long-March International Trade Company Ltd	ISR and air-to-surface strike UAV/UCAV
Harop	Israel Aerospace Industries	SEAD
Lijian	Hongdu-Shenyang Aircraft Corporation collaboration	ISR and air-to-surface strike UAV/UCAV
Wing-Loong	Chengdu Aircraft Industry (Group) Company	Surveillance MALE UAV/UCAV
WJ-600	China Aerospace Science and Industry Corporation	Armed reconnaissance UAV/UCAV
WZ-2000	Guizhou Aviation Industry Group Company	Jet-powered surveillance UCAV

There are likely to be three key developments in relation to China's UCAV programme in the coming years. First, an increase in high-altitude long-endurance systems, such as the Wing-Loong (4,000 km range), is likely. Second, an increase in the number of stealth UCAVs with reduced electronic size (reduced radar cross-section) is likely, possibly to cue long-range, land-based missiles such as the DF-21D anti-ship ballistic missile (or 'carrier killer'). (Note that the Anjian UCAV is an anomaly in this respect, as it appears more like a fighter jet or potential 'drone killer'.) Third, China is likely to develop and deploy newer and more potent air-to-surface missiles for use with longer-range UCAV platforms.

It is worth mentioning that a plastic model at an international defence exhibition does not indicate an operational UCAV. Intentional disinformation is a well-used item in China's tool-box. Furthermore, although China's development of these and other technologies is worth noting, hyperbole about such advances causing a regional arms race – particularly with Japan – is probably unfounded at present.

c) Armed drone deployment considerations

China faces a range of internal and external security challenges, any of which could see drones deployed in response.

Maintaining sovereignty over China's autonomous regions is of great importance to Beijing. Regions such as Tibet are crucial for resource security (oil, gas and water) and force projection. Drones are an ideal tool for surveillance and monitoring of these areas. Given Beijing's consistent characterisation of the East Turkestan Islamic Movement and World Uyghur Congress as terrorist organisations and its lack of criticism of US drone strikes in Pakistan, the PLA may also be leaving the door open for use of UCAVs in Xinjiang and Central Asia for counterinsurgency against such groups.

China is undoubtedly considering UCAVs for use in other security roles. For example, in February 2013, the Ministry of Public Security reported that a drone strike was considered to target a leader of one of the largest armed gangs in the Golden Triangle who was hiding in northeast Burma (Myanmar). The Ministry reportedly decided against the option and the suspect was instead apprehended alive in Laos.

In general, though, it is more likely that UCAVs will be used in maritime and territorial disputes and form part of China's A2/AD arsenal.

One of China's primary mid-term objectives is to push US naval forces out of what it regards as its backyard. PLA planners have not overlooked deploying UCAVs as a component of A2/AD and a means to limit the effectiveness of the United States' AirSea Battle strategy. As an example, China may be building up its drone capacity to undertake surveillance operations over Taiwan and the Taiwan Straits in order to monitor US/Taiwan military installations and preparedness. Increasing numbers of drone systems may also emerge as the critical enabler for PLA long-range precision strike missions within a 3,000 km radius of Chinese shores. As such, drones may become a critical (even key) component in the accuracy of the PLA Air Force's long-range strike capability.

A2/AD is not restricted to China's western Pacific coastline. Their String of Pearls strategy is aimed at establishing key commercial and military port developments adjoining Indian Ocean sea lanes of communication, which carry 70% of China's African and Middle Eastern oil imports. China is likely to be building considerable anti-piracy capabilities in these sea lanes, which may eventually include a UCAV fleet.

Surveillance and monitoring of contested maritime space in the South and East China Seas is also likely to increase. This could be a significant escalatory risk if both China and Japan deploy drones over the disputed Senkaku/Diaoyu Islands and the threshold for engaging them is deemed lower than for manned aircraft. The same risk applies between China and India over the potential use of drones above the disputed border regions Arunachal Pradesh and Aksai Chin and the Line of Actual Control between the two countries.

Section III

India

a) Existing drone inventory

The Indian Armed Forces have been operating UAVs for over a decade. The Indian Army was the first service to acquire drones, in the late 1990s from Israel, and the air force and navy followed. Open Briefing has identified at least 21 different UAVs (plus variants) now in use or in development by India (see Annex A), with four of these being UCAVs (see Annex B).

Table 2. Summary of UCAVs identified as in use or in development by India.

UCAV designation	Manufacturer	Primary role
Aura	Defence Research and Development Organisation	Attack stealth UCAV
Harop	Israel Aerospace Industries	SEAD
Harpy	Israel Aerospace Industries	Loitering (anti-radar) attack UAV/UCAV
Rustom-2	Defence Research and Development Organisation	MALE UCAV

Of India's 21 different UAVs, 16 are produced by Indian companies and five are acquisitions from Israel. However, only one domestically-produced UAV – the Nishant short-range tactical UAV – is currently operational with India's armed forces (specifically the army), and then only deployed in small numbers. The Indian Army employs about 16 Israeli Herons and at least a dozen Searcher I/IIs for their longer-range surveillance needs. The Indian Navy's aviation arm has stood up three surveillance squadrons since 2006, with a fourth reportedly forming. For the moment, the squadrons are composite, most holding four Herons and six Searcher IIs. The Indian Air Force now has at least five UAV squadrons. Some of these are mixed (composite Heron/Searcher II), while others appear to be single-UAV type. Recent reports indicate that the air force has also acquired the Harpy and Harop UCAVs to meet their short-term requirements. Both are loitering munitions, intended for SEAD missions and, presumably, high-value targets.

Unlike most Western militaries, who increasingly work in joint (integrated service) environments, it should be noted that the Indian Armed Forces are very much tri-service – with the army, navy and air force vying with each other for resources. Although the overall FY2013 defence budget reflects the trend in Indian military spending for the army to receive the lion's share (spent mostly on salaries and operating costs due to the large number of personnel compared to the other two services), it is the navy and the air force who receive the majority of the procurement budget between them.

b) Future armed drone developments

India's UCAV programme is in its infancy. In early 2009, then Director General of the Defence Research and Development Organisation (DRDO), VK Saraswat, announced that they would be embarking on the development of an indigenous UCAV. On 26 August 2013, the new head of the DRDO, Avinash Chander, announced that the organisation would test fire precision guided munitions from UAVs within a couple of months.

New Delhi suspects that Beijing's massive drone research and development effort holds unhealthy implications for India. In particular, they are concerned about the mountainous Himalayan region adjacent to the border with China. Such a rugged and porous region might effect an infiltration by China using stealth UCAVs, which India could neither intercept nor interdict. One way to counter such a threat is for India to develop its own stealth UCAVs with an air-to-air combat capability. In fact, India is in the early stages of developing such a UCAV: the Aura.

Some well-orchestrated leaks to the press have revealed some of the desired capabilities of the Aura. However, given India's ongoing procurement problems, these have been labelled a 'pipe dream' by some defence analysts. The Aura's maiden flight could be as early as 2014 but it is not expected to be rolled out operationally before 2019-20. It should be noted that the Aura may have the payload capacity to carry a stripped-down nuclear device if so desired, giving India a powerful first-strike capability.

More realistic at present is the Rustom programme. India's two largest state-owned defence groups, Bharat Electronics Ltd (BEL) and Hindustan Aeronautics Ltd (HAL) have been selected by the Indian Ministry of Defence to assist in the development of an indigenous medium-altitude long-endurance UAV, the Rustom-1. The Rustom-2 is an armed variant being developed from a different design to the Rustom-1, being a near carbon copy of the General Atomics MQ-1 Predator. Its first flight is scheduled for February 2014.

However, as with all India's best-laid plans to modernise its military, these projects may run into difficulties if their procurement processes are not improved. Procurement is a major problem for India's embryonic defence industry and there are several ongoing corruption cases, causing some defence contracts to be suspended or cancelled. Given this, India remains largely dependent on foreign purchases of major combat equipment, notably from Russia and Israel. This includes expensive purchases of UCAVs to fulfil immediate requirements.

c) Armed drone deployment considerations

During the 2008 Mumbai terrorist attacks, the attackers approached by sea and ingressed to their targets via the busy port facilities. Following these attacks, the navy, coast guard and civil maritime police and port security were tasked with building an enhanced three-tier coastal surveillance grid, in which naval and coast guard air assets would play a pivotal role. Although priority may have been given to operational changes and more effective measures to react to such incidents, evolving joint command arrangements would be ideal for a concerted use of drones within the country's coastal security grid. However, due to the nature of the subject, public discussion about such operationally-sensitive matters has been and will remain minimal.

With Kashmir in mind, India has keenly watched the United States' successful use of UCAVs to prosecute attacks in Pakistan's tribal areas, such as Waziristan. While the Indian Army conducts aggressive patrolling, ambushes, cordon and search, and other operations related to counter-insurgency in Jammu and Kashmir, there is no policy of 'hot pursuit' (that is tracking and striking militants in their training and supply camps in Pakistan-administered Kashmir). Drones give India more options in this respect and the army and air force may well carefully consider their use against high-value targets and for other missions over the region. For now, UAVs are providing excellent inputs about any intrusions over the Line of Control and terrain analysis for operational planning purposes. Undoubtedly, they are also used in detection/engaging artillery missions from longer-range artillery and to aid short-range ballistic missiles.

Doctrinal and operational changes, including those that may relate to the future use of drones, are being hampered by poor cooperation between the armed services and the challenges in defence procurement already mentioned. Chief among these changes is the army's Cold Start doctrine. The Indian Army has evolved from a generally static defensive doctrine to that of offensive-defence, requiring highly flexible mobility. The aim is to form eight integrated battle groups, combining air force and army units under joint (in effect, army) command. While the focus is Pakistan, Cold Start may also take into account the need for India to fight a possible two-front war – against Pakistan to the northwest and China to the northeast.

Within this doctrine, what UAVs the army has would be tasked with battlefield surveillance and target identification for artillery, missiles or air strikes. The even fewer UCAVs that are allocated to the army would be used sparingly, such as in attacks on enemy headquarters, weapons of mass destruction (particularly nuclear weapons sites) and high-value targets, but would have little impact compared to the broader array of large-scale mechanised operations.

Also of interest is the Indian Navy's revised maritime doctrine published in August 2009. Notably, the navy is developing three carrier battle groups – recognising the need for aircraft beyond the range and abilities of shore-based maritime patrol aircraft. However, current planning discounts seaborne air superiority because of the age of their sole aircraft carrier, the INS Viraat, the delay in delivery of the INS Vikramaditya (the refitted Soviet/Russian Baku/Admiral Gorshkov) and the fact that the INS Vikrant will not be commissioned until 2018. While there will very likely be a future role for drones within this emerging doctrine, it is too early to say with confidence what that might be.

It is also worth noting that some state police agencies are deploying UAVs in response to internal security challenges. For example, Andhra Pradesh in southeast India reportedly has two drones for monitoring Naxal activities in the Nallamala forests and along the Andhra-Odisha border. Other rebel-affected states, including Jharkhand, Chhattisgarh, Odisha and Maharashtra, either have or are planning to procure UAVs. Reports indicate that the paramilitary Central Reserve Police Force is planning to acquire tactical shoulder-launched mini-UAVs and is demanding that it be allowed to acquire its own fleet of strategic UAVs. These and other developments make it clear that drones will play an increasingly important role in attempts to monitor and control the Naxalite/Maoist insurgency in India.

Section IV

Iran

a) Existing drone inventory

The international embargoes on Iran make their drone developments primarily reliant on domestic technology and reverse engineering. Iran possesses a limited, if growing, indigenous UAV production capability behind its frequent breakthrough claims in defence technology. Open Briefing has identified at least 17 different UAVs (plus variants) in use or in development by Iran (see Annex A), with six of these being UCAVs (see Annex B).

Table 3. Summary of UCAVs identified as in use or in development by Iran.

UCAV designation	Manufacturer	Primary role
Ababil-T	Iran Aircraft Manufacturing Industries	UCAV
Karrar	Iran Aircraft Manufacturing Industries	UCAV
Nazir	Farnas Aerospace Company	Reconnaissance (UAV) and strike (UCAV)
Ra'ad	Farnas Aerospace Company	Reconnaissance (UAV) and strike (UCAV)
Sarir H-110	Qods Aviation Industries	Reconnaissance (UAV) and strike (UCAV)
Shahed-129	Qods Aviation Industries	Reconnaissance (UAV) and strike (UCAV)

Much of Iran's drone development has been driven by the Islamic Revolutionary Guard Corps' own aerospace division. There is currently an array of models at different stages of production. This includes reproductions of US and Israeli drones. For example, the Sarir H-110 is based on the Israel Aerospace Industries Hunter and the Shahed-129 on the Elbit Systems Hermes-450. The Shahed-129, announced in September 2012, is reportedly capable of a missile payload for a non-stop 24 hour flight over 2,000 km. This is twice the range of the Karrar, a first generation Iranian UCAV revealed in August 2010. Such technological improvements are believed to have been made possible in part through reverse engineering of intercepted enemy hardware (such as the Lockheed-Martin RQ-170 Sentinel that Iran downed in December 2011).

Iran's UAV capabilities are partly reflected in Hezbollah's ability to field unmanned reconnaissance systems over Israeli territory. In 2010, a motorised balloon believed to have been dispatched by Hezbollah came close to Israel's Dimona nuclear facility before it was shot down, and in October 2012 an Iranian-made drone reportedly tarried in Israeli airspace for 30 minutes before finally being brought down. Iranian UAVs are also reportedly in the service of the Syrian government, which deploys them to monitor rebel movements.

b) Future armed drone developments

As most of Iran's legacy combat aircraft date back to the 1970s, their main impulse will be to redress the imbalance in its aerial vulnerabilities. Iran is very proud of its UAV capabilities, especially of its well-publicised ability to shadow US ships in the vicinity of the Straits of Hormuz. However, it is keenly aware of its limited UCAV capabilities.

In the short to medium term, enhanced targeting capabilities (such as through more robust GMTI software) will be pursued, thus refining their existing abilities. Also, the development and fielding of larger UCAVs seems in order as the type and size of anti-shipping munitions increases. IMINT analysts will undoubtedly want to pay close attention to Qeshm Island in the Strait of Hormuz, where most (if not all) of Iran's drones are tested before being operationally deployed.

In May 2013, Iran rolled out its new Sarir H-110 UCAV, claimed to be capable of air-to-air combat. Interestingly, this new drone has an older Misagh-1 shoulder-fired surface-to-air missile (SAM) rigged to its underside. The arming of UAVs with man-portable air-defence systems (MANPADS) is a discernible significant trend in Iran's UCAV development. In anticipation of air strikes against its nuclear facilities, the Iranians acquired several Russian Tor-M1 (Gauntlet SA-15) self-propelled SAM systems in December 2005, but were unsuccessful at that time in their attempts to secure any strategic SAMs (such as the S-300/SA-10) from the Russians. Since then, they have they been mass producing their own versions of the SA-7 and SA-14 MANPADS, designating them the Misagh-1 or Misagh-2. The fitting of MANPADS to UAVs helps Iran compensate for weaknesses in its conventional air force without the need to re-engineer their older combat aircraft.

Finally, Iran is also interested in developing anti-UAV measures, including the use of false GPS signals to interfere with US and Israel drones.

c) Armed drone deployment considerations

The primary national security concerns against which Tehran might deploy UCAVs include over the country's borders with Turkey, Iraq, Pakistan and Afghanistan; over the Persian Gulf, Straits of Hormuz and Caspian Sea; to protect nuclear and other energy-related installations and supply routes; and against Israel (both directly or indirectly, for example through supplying Hezbollah).

Over recent years, the standoff and ensuing conflict between Iran and the West and Israel over the former's disputed nuclear programme has acquired a highly covert, low-intensity character on multiple fronts both within and beyond Iran's borders. The Iranian leadership has responded in kind by prizing asymmetrical over conventional warfare. The increased use of drones fits this evolving strategy and theoretically allows Iran (or its proxies) to project long-distance reconnaissance or offense capabilities (for example, over Israel or to target the US Fifth Fleet in the Persian Gulf). In this context, it is worth noting that armed drones can be used to deliver unconventional munitions.

Section V

Israel

a) Existing drone inventory

Israel is the world's leading exporter of drones in terms of volume, variety and number of countries exported to. Israeli companies were responsible for 41% of all UAV exports worldwide between 2001 and 2011, according to the Stockholm International Peace Research Institute. International consulting company Frost & Sullivan reported that Israeli UAV sales have amounted to $4.6 billion over the past eight years, making up nearly 10% of Israel's total defence exports. This is projected to grow 5-10% per year until at least 2020.

Open Briefing has identified at least 52 different UAVs (plus variants) in use or in development by Israel (see Annex A), with four of these being UCAVs (see Annex B), though there are likely more being developed in this latter category.

Table 4. Summary of UCAVs identified as in use or in development by Israel.

UCAV designation	Manufacturer	Primary role
Harop	Israel Aerospace Industries	SEAD
Harpy	Israel Aerospace Industries	Loitering (anti-radar) attack UAV/UCAV
Heron TP	Israel Aerospace Industries	High-altitude long-endurance UAV/UCAV
Sparrow-N	EMIT Aviation Consult	Tactical mini-UAV and UCAV

At least 20 Israeli companies are involved in the UAV market, producing them both domestically and via overseas subsidiaries. The two largest stakeholders are Israel Aerospace Industries and Elbit Systems Ltd, with the former producing three out of the four identified UCAVs. Israeli UAV companies export to customers across Asia, Africa and Latin America. Searcher-II, Heron and Harpy UAVs have been sold to India and Azerbaijan has purchased $1.6 billion worth of Israeli military hardware, including Searchers, Herons and Hermes. Of the countries studied for this report, the Harop and Harpy UCAVs are in service with India and Turkey, and China uses the Harop.

b) Future armed drone developments

Israel's combat doctrine has, over time, shifted from conventional warfare characterised by classic battlefield force concentration, to one typified by close-quarter and often low-intensity urban warfare in highly built-up civilian centres. The prime thrust of this lighter military footprint now includes intelligence gathering, surgical strike capabilities and greater use of aerial assets including drones. Part of the expected benefit – in theory at least – is a reduction in civilian deaths. Drones (both surveillance and armed) will therefore continue to play a crucial role in Israel's existing theatres of conflict in Lebanon (Hezbollah) and Gaza, and even potentially against Iran in the future.

As part of this and over the medium to long term, a further refining of the Israeli Defence Force's (IDF) existing drones can be expected. They are likely to develop newer, miniature (nano) UAVs for use by special forces in hostile urban terrain and confined spaces.

As Israel's adversaries, including Hezbollah, expand their drone inventories, Israel will undoubtedly be enhancing its own anti-UAV capabilities. This currently includes air defence systems, such as Iron Dome. In future, they may (with US assistance) re-visit earlier efforts to deploy a laser defence system. They may also seek more effective methods of intercepting or blocking control signals to enemy drones. Conversely, they are likely to develop counter-countermeasures, including stealth technology and secure GPS devices to prevent the GPS signal to their own drones being jammed – particularly given Iran's apparent abilities in this area.

c) Armed drone deployment considerations

Both UCAVs and dedicated surveillance UAVs will play an increasingly crucial role in Israel's existing theatres of conflict.

Apart from Gaza and occasional operations over the West Bank, Israel's areas of concern are mainly around the Sinai Peninsula and the Egyptian border to the west; Syria and Lebanon (Hezbollah) to the north; and suspicious movements along the Jordanian border to the east. Movements of concern include air, land or sea shipments from Iran to Syria, Hezbollah and Hamas (despite the recently reduced level of support to the latter). The majority of Israel's UCAVs are designed for use against such local threats.

Further afield, it is Iran that presents the greatest potential threat, and at least one of Israel's UCAVs – the Heron TP (Eitan) – is capable of reaching targets in Iran.

In the short to medium term, an increasing number of expendable drones (such as the Harop) are likely to be used in SEAD missions and possibly decapitation strikes at enemy leaderships. Israel is one of only three countries (together with the United States and Britain) known to have successfully used UCAVs for lethal strikes. There is nothing to suggest that this is not something Israel will continue to do in the future. Coupled with Israel's robust HUMINT and ELINT capabilities, the IDF will continue to be at the forefront of developing new tactical and operational doctrines using the latest drone technologies.

Section VI

Russia

a) Existing drone inventory

Russia has been building UAVs for several decades but has not achieved the kind of performance found in Israeli or US models. There have been overt calls by senior military leaders to 'buy Russian' but this all changed after Russia's conflict with Georgia in 2008. During that conflict, Russia was at pains to even detect Georgia's Israeli-made UAVs with its existing air defence radars, much less shoot them down. As a result, Georgian situational awareness was far superior to the Russians'. With a clearer intelligence picture, they were able to respond more dynamically to Russia's superior numbers.

In exasperation, Russia began to look abroad for high-quality UAVs. In 2009-10, Russia elected to purchase 12 drones from Israel. These included two Searcher IIs, eight I-Views and two Bird Eye 400s. With this purchase of Israeli UAVs, the Russian military gained some hands-on experience with some of the best UAVs available. Their engineers also got a closer look at how competitive UAVs are designed and built.

Including these imported items, Open Briefing has identified at least 54 different UAVs (plus variants) in use or in development by Russia (see Annex A), with five of these being UCAVs (see Annex B). Various press reports have indicated that Russia was also considering purchasing a number of United 40 UCAVs from United Arab Emirates' ADCOM Systems. However, at the time of writing, this cannot be confirmed or repudiated and so they have not been included in this report.

Table 5. Summary of UCAVs identified as in use or in development by Russia.

UCAV designation	Manufacturer	Primary role
Altius	Sokol and Tranzas	UAV and UCAV
Inokhodyets	Sokol and Tranzas	UAV and UCAV
Proryv-U	Yakovlev	UCAV
Skat	MIG	SEAD UCAV
Voron	Yakovlev	Multi-role UAV; possible UCAV

b) Future armed drone developments

Russia's future with UCAVs will be inconsistent. Although senior military commanders echo the popular importance of 'buying Russian', they acknowledge (at least tacitly) that they have neither the experience nor an industry sufficiently refined for high-quality UCAV production. Thus, whatever UCAV developments there are will likely come from their own reengineering efforts or from off-the-shelf purchases from countries that do have the expertise.

While Russia is likely to continue purchasing foreign UAVs from market-leading Israeli companies, some form of trade agreement with China should not be ruled out. (It is worth noting that the 2009 purchases from Israel were only possible because Russia agreed not to pass on particular defence equipment to Syria or Iran.)

In the meantime, those UCAVs which Russia does have (for example, the Proryv-U) may become a test-bed for further reengineering of its legacy/fixed-wing aircraft into armed drones.

c) Armed drone deployment considerations

Russia's future use of UCAVs will be problematic. They have no tactical/operational doctrine for their use, with the possible exception of a Cold War holdover termed the reconnaissance-strike complex (the integration of missiles with precision-guided sub-munitions, area sensors and automated command and control). Nor is there sufficient evidence that concerted thinking on the use of UCAVs is being undertaken.

The matter is further compounded by the fact that military planners do not have high confidence in their own GPS constellation (GLONASS) – critical for target engagement. The future role of UCAVs in Russian national military strategy will thus likely be limited until confidence in these space-based assets increases.

It therefore is unclear what operational role armed drones will play. However, those indigenous and foreign-purchased UCAVs that are deployed will likely appear in regions (such as the Caucasus) where any conflict over Russia's territorial integrity arises. Another role in which these systems may be deployed in future is for site security of remote Strategic Missile Forces bases, where they are currently deploying the Taifun (Typhoon) M counter-sabotage vehicle in conjunction with small VTOL UAVs (for example, the Eleron-3).

Finally, it should be noted that Russia has very significant economic and military interests in protecting its northern/Arctic transit route to ensure not only the production and transit of oil and gas, but also the movement of strategic naval assets. The implications of this for UCAV development are currently unclear, but it is possible that Russia will deploy mixed (manned/unmanned) regiments to the region in future. However, at present any possible deployments would be limited to high-altitude long-endurance UAVs for surveillance and reconnaissance only.

Section VII

Turkey

a) Existing drone inventory

Turkey considers itself, rightly or wrongly, to be one of the top developers of UAVs in the world. In 2010, Turkey possessed about 250 drones. The army was using the Falcon 600/Firebee, the Canadair CL-289 and about two dozen of their own indigenous Bayraktar tactical UAVs. Their air force elected to use the Gnat 750/I-GNAT ER and the Heron. Their fleet has expanded greatly since then.

Open Briefing has identified at least 24 different UAVs (plus variants) in use or in development by Turkey (see Annex A), with four of these being UCAVs (see Annex B).

Table 6. Summary of UCAVs identified as in use or in development by Turkey.

UCAV designation	Manufacturer	Primary role
Anka +A	Turkish Aerospace Industries Inc.	UCAV
Anka-TP	Turkish Aerospace Industries Inc.	UCAV/strategic UAV
Harop	Israel Aerospace Industries	SEAD
Harpy	Israel Aerospace Industries	Loitering (anti-radar) attack UAV/UCAV

Turkey operates a special variant of the Israeli Heron. It uses Turkish-designed sub-systems and a more powerful engine for enhanced performance. They are considered to be the best Herons operating worldwide. However, Turkey has a fractious relationship with Israel and diplomatic tensions have repeatedly affected their drone acquisition, maintenance and training programmes.

b) Future armed drone developments

Turkey's current UCAV inventory is limited. However, Ankara has signalled the seriousness of its UCAV ambitions through the development of a National Unmanned Combat Aircraft (MISU) programme, which will follow on from the Strike UAV (SIHA) project currently being developed by Turkish Aerospace Industries (using the Anka platform). The MISU is forecast to be delivered to the Turkish Air Force by 2030, with the first squadron stood up by 2035.

Unlike other countries, which have focused on small and medium UCAV designs, Turkey has taken a different route, with its own armed drones capable of carrying very large payloads. The Anka +A and Anka-TP (being developed from the existing Anka MALE UAV) are estimated to have payload capacities of between one and three tons. Their size and capacity puts them in the same class as the Broad Area Maritime Surveillance (BAMS) UAVs (like the MQ-4C Triton).

Turkey has successfully demonstrated its ability to sell its UAV models to clients in the Middle East, such as Qatar and Saudi Arabia. As Turkey consolidates its position as a regional power, more opportunities will likely arise for sales of their indigenous UAVs to Middle Eastern countries.

Closer military and trade cooperation with Russia (including drone sales) is also very likely, despite Turkey's NATO membership and the recent differences over Syria. It is worth noting that Turkey is now in high-level discussions with Russia over the purchase of new attack helicopters (for example, the KA-52 Alligator), the S-300V (SA-20 Gargoyle) air defence system and possibly coastal defence systems (such as the SS-N-26). Ankara will need to tread a careful line with Tel Aviv and Washington, though, as it will likely still want to purchase Israeli and US drones as it continues to build up its domestic drone programmes.

c) Armed drone deployment considerations

The need for persistent surveillance of border regions will likely see Turkey using their new UCAVs extensively. This will include wide-area surveillance of their borders with Armenia, Iran and Iraq, the strategically important Bosphorus Straits, the eastern Mediterranean (especially Cyprus), the Turkish-Greek aerial and sea borders in the Aegean, and their coastline along the Black Sea. Turkey has further ongoing border security concerns with the PKK, though it is making headway in resolving the Kurdish question. The mountainous southeast of the country, where the PKK operates, demands the use of aerial intelligence gathering, reconnaissance and offensive capabilities, for which drones are ideal. Such missions will likely be undertaken by their air force, which carries most of the burden of strategic and operational surveillance in the region.

More sensitive deployments may occur along the Turkish border with Syria. Turkish UAV mission planners will be monitoring any progress made by Syria in acquiring S-300 series air and ballistic missile defence systems from Russia. Planners will ensure that drones maintain a respectable distance from the border if such systems are eventually obtained. After all, Turkey had one of its dedicated reconnaissance aircraft (a RF-4E Phantom) shot down by Syrian air defence assets in June 2012, possibly by a Russian-made Pantsir-S1E.

Turkey's deployment of indigenous UCAVs along or into any of the border/coastal areas mentioned will likely be carried out under the stated proviso that Turkey is acting in its own national interests to protect its territorial sovereignty, and that any use of on-board missiles was purely in self-defence. In fact, drones are likely to be largely limited to non-lethal mission roles so as to not risk further jeopardising Turkey's EU ambitions, which were damaged by Prime Minister Recep Tayyip Erdoğan's heavy-handed response to the 2013 political protests in Istanbul and elsewhere.

Section VIII

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Annexes

UAVs and UCAVs by country

Annex A

Unmanned aerial vehicles by country

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Anjian (Dark Sword)	**Shenyang Aircraft Corporation**	**Stealth UAV/UCAV**	**In development.**
ASN-104/105B	Xian ASN Technical Group	Reconnaissance and surveillance UAVs	Can provide real-time reconnaissance and surveillance for up to two hours. Payloads consisting of an 18 x 18 cm panoramic camera and an LLTV (low light) camera with zoom lens; the latter can cover an area of 1,700 km^2 (656.4 sq miles) during a typical mission.
ASN-15	Xian ASN Technical Group	Lightweight, low-cost reconnaissance and surveillance UAV	Man portable, hand launched, with CCD camera with real-time video downlink, or film camera.
ASN-206	Xian ASN Technical Group	Short-range multirole UAV	Military and civil applications include day and night reconnaissance, battlefield surveillance, artillery target spotting, etc.
ASN-207	Xian ASN Technical Group	Medium-range multirole UAV	Appears to be an enlarged development of the ASN-206, with enhanced capability.
ASN-209	Xian ASN Technical Group	Multirole tactical UAV	Military payloads can include GMTI radar, ground target designators, ELINT/EW and communications relay. Likely autonomous, with LOS and BLOS datalinks.

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
ASN-211	Xian ASN Technical Group	Close-range Tactical UAV	Evidently aims to address a need for a close-range reconnaissance/surveillance system for use by front-line troops. Electric-powered biomimetic imitation of insect flight, including short and/or vertical take-off and landing and ability to hover over a target. EO and IR Sensors assumed.
ASN-213	Xian ASN Technical Group	Technology demonstrator	No payload stated, but presumably would consist mainly of test measuring equipment.
ASN-216	Xian ASN Technical Group	Close-range tactical mini-UAV	Undernose ISR sensor turret.
ASN-217	Xian ASN Technical Group	Close-range mini-UAV	Thought to be in use in civil applications such as disaster relief, weather monitoring, aerial mapping, search and rescue, and powerline/pipeline inspection.
ASN-229A	**Xian ASN Technical Group**	**Reconnaissance and precision attack MALE UAV/UCAV**	**Xian's largest UAV/UCAV.**
AW Series	Beijing Wisewell Avionics Science and Technology Company	Small observation and intelligence-gathering UAVs	Hand-launched with TV camera and video downlink.
BA-5	Shenyang Aircraft Corporation	Target drone	Developed from MIG-15 BIS (J2) aircraft frames. Used for fighter pilot and air defence training.
BZK-005	Beijing University of Aeronautics and Astronautics	Multirole HALE UAV	EO/IR turret under nose, with real-time data transmission.

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
CH-3 (Rainbow-3)	**China Aerospace Science and Industry Corporation**	**Armed tactical MALE UAV (UCAV prototype)**	**CH-3 noted carrying two air-to-ground missiles akin to the AGM-114 Hellfire in 2010.**
CH-4	**China Aerospace Science and Industry Corporation**	**Armed tactical MALE UAV (UCAV prototype)**	**UCAV.**
CH-901	**Aerospace Long-March International Trade Company Ltd**	**ISR, BDA, meteorological survey and precision attack UAV/UCAV for special forces**	**Includes meteorological, wind speed, temperature and humidity sensors and an unspecified type of warhead for use in the precision attack role.**
CH-91	Aerospace Long-March International Trade Company Ltd	Tactical surveillance UAV	Production began in 2013. Roles include ISR, precision targeting and artillery fire correction, battle damage assessment, Geographic Information System (GIS) data collection, wildfire and pipeline monitoring, meteorological measurement and emergency communications establishment.
CH-92	**Aerospace Long-March International Trade Company Ltd**	**ISR and air-to-surface strike UAV**	**Under development and scheduled for production during 2014.**
FK-11/12	Huahang Airship Development Group	Remotely piloted airships	Experimental only.
HALE UAV	Chengdu Aircraft Industry (Group) Company	Multirole HALE UAV	A model of this conceptual HALE design was shown at Airshow China, Zhuhai, in October/November 2006. No details were disclosed. Configuration is closer to the US Global Hawk than GAIC's Soar Dragon (Xianglong) design.

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Harop (Harpy 2)	**Israel Aerospace Industries**	**SEAD**	**For attack, the aircraft carries a high explosive fragmentation warhead.**
Harrier Hawk	AVIC Defence Company	General purpose UAV	Typical, but unspecified, reconnaissance and surveillance sensors for civil and/or military applications or communications relay. Real-time imagery downlink.
I-Z	Nanjing Research Institute on Simulation Technique	Remotely piloted autogyro	Four-blade rotor; simple fuselage with short-span wings; elevators on tailplane; no rudder on tailfin. Twin, fixed, mainwheels and tail bumper.
Lijian (Sharp Sword)	**Hongdu-Shenyang Aircraft Corporation collaboration [?]**	**ISR and air-to-surface strike UAV**	**UCAV**
LN60F	Liaoning General Aviation Research Institute	Fixed-wing technology demonstrator UAV	China's first hydrogen fuel cell powered UAV, reported to have made its maiden flight from an unidentified facility in Shenyang on 30 July 2012.
LT Series	China Aerospace Science and Industry Corporation	Micro-UAV	Prototypes each fitted with video camera allowing live transmission of imagery.
M-22	Beijing University of Aeronautics and Astronautics	Small remotely-piloted helicopter	No further information.
Night Eagle	AVIC Defence Company	Short-range tactical UAV	First seen in 2010. No R&D details. Undernose ISR sensor turret.
SH-1/SH-3	China Aerospace Science and Industry Corporation	Long-range miniature UAV	First unveiled at the 2008 Zhuhai Air Show. Flying wing design. Can loiter up to 6 hours. SH-3 is scaled down version of SH-1, but with twin-boom shape.

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Shen Zhou-1/2	Shanghai Aircraft Research Institute	A development study for these two airships	Experimental only.
Soar Bird	Nanjing University of Aeronautics and Astronautics	Remotely-piloted helicopter	Digital flight control system; telemetry and telecontrol system with GPS and laser altimeter; real-time imagery display.
Sunshine	AVIC Defence Company	Remote sensing UAV	Debut in model form, displayed under AVIC I banner at Airshow China, Zhuhai, in October/ November 2006. Few details.
SVU-200	Ewatt Technology (Fetters Aerospace US)	VTUAV	Based on the Star-Lite VTUAV multi-task helicopter. First China-US joint venture.
Tianyi (Sky Wing)	Chengdu Aircraft Industry (Group) Company	Short-range tactical UAV	Unknown payload, but EO and/or IR sensors assumed.
U8	China National Aero-Technology Import & Export Corporation	VTOL UAV	Little information available. EO sensor turret under nose.
V750	A joint venture between Brantly International Inc, Qingdao Wenquan International Aviation Investment Co., Ltd, and Qingdao Brantly Investment Consultation Co., Ltd	Small VTOL UAV	Maiden flight was completed on 7 May 2011, and received an order from unnamed (likely US) customer. Little other information available.

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
W-30/W-50/ PW-1/2	Nanjing Research Institute on Simulation Technique	Surveillance UAVs	Video camera with real-time telemetry and imagery downlink.
Whirlwind Scout	AVIC Defence Company	VTOL micro UAV	AVIC claims it is inaudible at a stand-off range of 125 m (410 ft), can detect a human being at 560 m (1,837 ft) and identify him at 70 m (230 ft).
Wing-Loong (Yilong)	**Chengdu Aircraft Industry (Group) Company**	**Surveillance MALE UAV/UCAV**	**Includes day/night EO/IR and laser designator, ECM and small underwing air-to-surface missiles.**
WJ-600	**China Aerospace Science and Industry Corporation**	**Armed reconnaissance UAV**	**UCAV.**
WP-13 Xianglong (Soaring Dragon/Eagle)	Guizhou Aviation Industry Group Company	HALE multirole UAV, including ISR, BDA and communications relay	Bears striking resemblance to UAE's ADCOM-produced United 40 Block 5 UAVs. Two possibly purchased by Russia.
WZ-2000	**Guizhou Aviation Industry Group Company**	**Jet-powered surveillance UCAV**	**No specific information on payload, but EO, IR and/or SAR expected, plus ELINT-collection sensors and real-time datalinks likely.**
WZ-5 (Chang Hong 1)	Beijing University of Aeronautics and Astronautics	High-altitude air-launched multi-purpose UAV; strategic (deep) reconnaissance (maximum range: 2500 km)	Based on the Northrop Grumman BQM-34A Firebee aerial target. Currently able to carry appropriate and more modern sensors for reconnaissance, atmospheric sampling, geological survey or target drone missions.

Country: China			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Z-2	Nanjing Research Institute on Simulation Technique	Remotely-piloted helicopter	Payload as required for such roles as reconnaissance, traffic surveillance or radio relay.
Z-3	Nanjing Research Institute on Simulation Technique	Remotely-piloted helicopter	Payload as required for such roles as reconnaissance, traffic surveillance or radio relay.

Country: India			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Altius Mk II	Aurora Integrated Systems Ltd.	Medium-range surveillance mini-UAV	Payload is daytime TV camera, FLIR, laser rangefinder, laser designator and analogue or digital video downlink.
AURA (Autonomous Unmanned Research Aircraft)	**Defence Research and Development Organisation**	**Attack stealth UCAV**	**In development. Project is likely classified.**
Erasmus	MKU Private Ltd	Medium-range tactical UAV	Dual gimballed EO and thermal imaging sensors. Image exploitation, targeting and tracking software. Encrypted datalink.
FireBee	Kadet Defence Systems	Close-range battlefield surveillance UAV	Options include fixed EO camera with ×10 zoom; fixed thermal imager; or stabilised pan-and-tilt camera gimbal with option for automatic object tracking, object metadata and interchangeable (EO/thermal imager) nosecone. Analogue video link standard; digital secure video link optional.
Harop (Harpy 2)	**Israel Aerospace Industries**	**SEAD**	**Undernose EO/IR turret was deemed to be an IAI Tamam POP-200. A satcom datalink is reported to be fitted. For attack, the aircraft carries a high explosive fragmentation warhead.**
Harpy	**Israel Aerospace Industries**	**Loitering (anti-radar) attack UAV/UCAV**	**Largely covert programme until the late 1990s. Israeli-developed passive radar seeker (recently upgraded to cover a wider range of frequencies) and high-explosive warhead. Upgraded version equipped with a dual (electromagnetic and EO) sensor and datalink, to allow Harpy to get updates on potential targets and be directed against a specific emitter.**

Country: India			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Heron 1	Israel Aerospace Industries	Medium-altitude long-endurance UAV	Standard payload is dual (TV/IR) or triple sensor (TV/IR/laser rangefinder) undernose IAI Tamam MOSP. In addition, can have Elta EL/M-2055, SAR/GMTI or EL/M-2022U maritime surveillance radar in large ventral radome, capable of multi-target track-while-scan of up to 32 targets. Other payloads can include Elta EL/K-7071 COMINT; EL/L-8385, ESM/ELINT; Ku-band satcom; data/voice relay packages; or customer-furnished payloads. Single real-time data and video downlink.
Imperial Eagle	Aeronautical Development Establishment, Indian Ministry of Defence	Close-range mini-UAV	Nose-mounted daylight colour TV camera with ×10 optical and ×4 digital zoom; or Miricle 307 KS uncooled thermal imager with 39° field of view. S-band telemetry and imagery downlink.
Kapothaka	Aeronautical Development Establishment, Indian Ministry of Defence	Close-range concept validation UAV	Payloads for target applications can include Luneberg lens and/or corner reflectors for radar signature enhancement, smoke generators, IR flares and miss-distance indicator.
Lakshya	Defence Research and Development Organisation	Target drone	Pilotless Target Aircraft (PTA) is a reusable aerial target system. Lakshya is remotely operated from ground to provide aerial target for training of gun and missile crew and air defence pilots for all three services.
Nishant (Dawn)	Aeronautical Development Establishment, Indian Ministry of Defence	Short-range tactical UAV	Nishant is designed for Army use in the day/night battlefield reconnaissance, surveillance, target tracking and localisation and artillery fire correction roles. 14 in inventory.
RUSTOM-1 (Warrior)	Defence Research and Development Organisation	MALE UAV	To include (reportedly Israel-sourced) EO and IR sensors, SAR and maritime patrol radars, communications relay, ELINT and COMINT packages. Intended to replace/supplement the Heron UAVs in service.

Country: India			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
RUSTOM-2 (Warrior)	**Defence Research and Development Organisation**	**MALE UCAV**	**In development. To include (reportedly Israel-sourced) EO and IR sensors, SAR and maritime patrol radars, communications relay, ELINT and COMINT packages. Intended to replace/supplement the Heron UAVs in service.**
Searcher I	Israel Aerospace Industries	Long-endurance multirole UAV	Normal EO payloads are IAI Tamam POP (TV/IR) or MOSP (TV/IR/laser rangefinder) with single real-time data and video downlink; 1.5 kW onboard electrical power supply. COMINT and ESM integration capability. Other payloads to customer's choice.
Searcher II	Israel Aerospace Industries	Long-endurance multirole UAV	Elta EL/M-2055 synthetic aperture radar, introduced on Searcher II in 2001, enhances night/all-weather capability. COMINT and ESM integration capability. Other payloads to customer's choice. Loiter time of 20 hours.
Skimmer	Swallow Systems Ltd.	Close-range mini-UAV	Options include switchable (forward/side-looking) daylight colour TV camera, a standard daylight camera with ×10 zoom, LLTV camera or an uncooled thermal imager. Real-time video downlink.
Sky Dot	Aurora Integrated Systems Ltd.	Covert urban surveillance UAV	Options are daylight EO camera or LLTV for nighttime operations.
Slybird	Aeronautical Development Establishment, Indian Ministry of Defence	Close-range mini-UAV	Various and interchangeable payloads including EO, IR, bio-chemical and meteorological sensors.
TERP	MKU Private Ltd.	Close-range tactical UAV	Standard payloads are an LLTV camera with ×40 zoom or a thermal imaging camera, mounted on a gimbal which retracts into the fuselage and is enclosed by beetle-wing doors.

Country: India			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Trogon	Kadet Defence Systems	Close-range reconnaissance and surveillance mini-UAV	Fixed-view, forward-looking CCD day camera with real-time imagery downlink.
Urban View	Aurora Integrated Systems Ltd.	Close-range surveillance UAV	Three payload options are offered: dual EO; EO camera with lock-on targeting and tracking; FLIR.

Country: Iran			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Ababil-B	Iran Aircraft Manufacturing Industries	Multirole RPV or UAV	Initial production version, in service from 1993. Used mainly as aerial target for Iranian Army air defence units.
Ababil II	Iran Aircraft Manufacturing Industries	Close-range UAV	Reportedly first flown in October 1997, but not revealed until March 1999. Improved flight control system; may have been prototype for Ababil-S.
Ababil-S	Iran Aircraft Manufacturing Industries	MALE UAV	Medium-range reconnaissance and surveillance UAV version, announced early 2000. A UAV shot down by US fighters over Iraq on 25 February 2009 was reported to have been an Iranian-operated Ababil. Possibly being used in Syria against FSA and other rebels.
Ababil-T	**Iran Aircraft Manufacturing Industries**	**UCAV**	**Short/medium-range attack UAV, with 45 kg (100 lb) HE warhead. Distinguishable by twin-tailed configuration. Can engage both fixed and mobile targets. In use by Hezbollah (designated Mirsad-1).**
Karrar	**Iran Aircraft Manufacturing Industries**	**UCAV**	**Single 227 kg (500 lb) precision-guided MK 82 type bomb on the centreline or two underwing stations for 113 kg (250 lb) bombs, Kosar anti-shipping missiles (Iranian variant of the Chinese C-701) or Nasr-1 short-range cruise missiles.**
Mohadjer 2	Qods Aviation Industries	Short-range multirole UAV family.	Mohadjer 2 is baseline reconnaissance and surveillance version; skid landing gear only.
Mohadjer 3 (Dorna/Bluebird)	Qods Aviation Industries	Short-range multirole UAV	More capable than Mohadjer 2 but lacks the GPS of Mohadjer 4. Choice of skid or wheel landing gear.

Country: Iran			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Mohadjer 4 (Hodhod)	Qods Aviation Industries	Short-range multirole UAV	Most recent and most capable version of Mohadjer family. Can be used for communications relay. Also said to have impressive ECM capability. Equipped with GPS. Reported in use by Iranian Border Guards to detect illegal drug trafficking.
Nazir (Harbinger)	**Farnas Aerospace Company**	**Reconnaissance (UAV) and strike (UCAV)**	**Capable of performing reconnaissance missions at short ranges. It is manufactured in Iran at a plant in the northern province of Mazandaran. The Nazir has been optimised for flights at low altitude and features low radar cross section. The existence and mass production launch of the Nazir UAV was reported by the Iranian press in early February 2010.**
Ra'ad (Thunder)	**Farnas Aerospace Company**	**Reconnaissance (UAV) and strike (UCAV)**	**Said to be a short-range, low-altitude drone with reduced radar-detection signature. Also said to be capable of conducting long-range reconnaissance, patrolling, assault and bombing missions with high precision.**
Saeghe 1/2 (Lightning)	Qods Aviation Industries	Air defence gunnery training target	Saeghe 1 has simple radio command of flight path and manoeuvres, plus wings-level stabilisation. Portable (or mobile, in small van) GCS for Saeghe 2 has full, microprocessor-based autopilot control, programmable with or without operator control. In-sight flight unit for LOS control without telemetry data; or GPS-based programmable navigation allowing target to be controlled, tracked and viewed on monitor during both LOS and BLOS missions.
Sarir H-110	**Qods Aviation Industries**	**Reconnaissance (UAV) and strike (UCAV)**	**Claimed to be based on Israel's Hunter UAV.**
Shahed-129	**Qods Aviation Industries**	**Reconnaissance (UAV) and strike (UCAV)**	**Claimed to be capable of carrying out (air-to-air) combat and reconnaissance missions with an endurance of 24 hours, making it the first Iranian MALE UAV. Largely based on the Israeli Hermes 450 model.**

Country: Iran			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Sofreh Mahi (Eagle Ray)	Iran Aircraft Manufacturing Industries	Stealth UAV	Little is known about the drone but scaled down mock-ups shown during Iranian Army Day 2010 parade revealed a flat diamond shape body with twin vertical stabilisers.
Talash 1/2 (Endeavour)	Qods Aviation Industries	Close-range operator training UAV and target	Talash 1, the first unmanned aircraft produced by Qods, was developed to train ground operators in remote piloting techniques. Talash 2 was designed as a basic training target for AA gunnery systems.
Tolloue 4/5	Aviation Industries Organisation	Three-stage axial-flow turbojet engine	The Tolloue 5's existence was confirmed by an AIO spokesman in early 2001, at which time it was described as being larger and more capable than Tolloue 4, and developed to power the next generation of Iranian UAVs and high-speed targets. In January 2005, TEM stated that it was entering detail design, the concept and preliminary design phases having been completed, and was expected to fly within the next two to three years. The HESA Karrar armed UAV unveiled in August 2010 may be powered by the Tolloue 5, although this has not been confirmed.
Zohal (Saturn)	Farnas Aerospace Company	VTOL UAV	The utility of the Zohal is described as varied with aerial imaging provided as one example.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Aerolight, Aerosky, Aerostar	Aeronautics Defence Systems	Tactical UAVs	All off-the-shelf, to customer's requirements. Pan-tilt-zoom optical or stabilised Controp EO/IR camera in Aerolight; stabilised, gimbal-mounted day/night EO sensor standard in Aerosky and Aerostar. CommTact UAV datalink.
Air Wasp	UVision Air Ltd	Close-range tactical mini-UAV	Stabilised miniature sensor (daylight colour TV or night imaging system) with electronic tracker. Dual datalinks. Real-time continuous transmission of video and telemetry data.
Bird Eye 100	Israel Aerospace Industries	Mini-UAV	Ventrally mounted, gimballed video camera. Real-time day/night imagery downlink.
Bird Eye 400	Israel Aerospace Industries	Surveillance mini-UAV	Ventrally mounted and gimballed IAI Tamam POP day/night sensor with real-time imagery downlink.
Black Eagle 50 (STD-5 Helivision)	Steadicopter	Small rotary-wing UAV	A wide variety of payloads can be fitted, including IR, digital cameras, sensors and mission-oriented devices.
Blue Horizon/Sting	EMIT Aviation Consulting	Long-endurance surveillance UAVs	IAI Tamam POP specified for Blue Horizon. Up to 2.0 kW of electrical power available for payload and avionics operation.
Blueye	BlueBird Aero Systems Ltd	Small tactical UAV	Blueye carries a photogrammetric system that provides digital orthophotos (aerial photographs that are equivalent to a map of the same scale, thereby enabling exact measurement of distances on the Earth's surface).
Boomerang	BlueBird Aero Systems Ltd	Close-range tactical mini-UAV	Standard payload is a gyrostabilised, high-resolution daylight TV camera with ×10 optical zoom. IR camera for night observation optional. RS-232 datalink.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Canard	Unknown	Short-range surveillance and target acquisition UAV	Day observation sensor standard (1.8 kg; 4 lb gimballed and stabilised TV camera); night sensor or other payloads to customer's requirements. Independent camera control system optional.
Casper 200/250	Top I Vision	Surveillance mini-UAV	Options (nose-mounted) include day TV, thermal imager or radiology payload.
Casper 350	Top I Vision	Short-range tactical UAV	EO and IR cameras in underfuselage turret. Real-time, continuous video and telemetry downlink.
Delilah-GL	IMI	Air- or surface-launched expendable UAV	In the decoy role, Delilah simulates the presence of an attacking aircraft by the use of active and passive means of RCS augmentation. In its alternative main decoy function, the Delilah disrupts and neutralises enemy air defence systems by saturating the mission area with chaff before the arrival of an attack force. Alternative payloads for ground attack (high-explosive warhead), ECM, reconnaissance (EO/IR, with target autotracking) or aerial target roles can be incorporated to suit customer requirements.
Dominator II	Aeronautics Defence Systems	Multirole MALE UAV	Prototypes fitted with Rafael Recce-U EO/IR in undernose turret. Production versions could accommodate various optical, satcom or EW payloads.
Dragonfly 2000	EMIT Aviation Consult	Tactical UAV	Standard payload is an IAI Tamam POP day/night EO turret. Onboard power for payload is 1.8 kW.
ETOP (Electric Tethered Observation Platform)	Israel Aerospace Industries Ltd, Malat UAV Division	Tethered unmanned platform	Multi-sensor capability. A typical payload would be an EO/IR sensor ball turret. IAI describes ETOP as having single-click operation capability.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Ghost	Israel Aerospace Industries	Close-range helicopter mini-UAV	Flight tests have been undertaken with a NextVision MicroCam D daylight TV camera in a stabilised ventral turret; real-time video downlink. EO system also has a mapping capability that measures indoor space perimeters, permitting safe entry and manoeuvring within a room. IR option confers day/night capability; other sensors under consideration.
Harop (Harpy 2)	**Israel Aerospace Industries**	**SEAD**	**Undernose EO/IR turret was deemed to be an IAI Tamam POP-200. A satcom datalink is reported to be fitted. For attack, the aircraft carries a high explosive fragmentation warhead. Unlike Harpy, has MITL.**
Harpy	**Israel Aerospace Industries**	**Loitering (anti-radar) attack UAV/UCAV**	**Largely covert programme until the late 1990s. Israeli-developed passive radar seeker (recently upgraded to cover a wider range of frequencies) and high-explosive warhead. Upgraded version equipped with a dual (electromagnetic and EO) sensor and datalink, to allow Harpy to get updates on potential targets and be directed against a specific emitter.**
Hermes 1500	Elbit Systems Ltd	Medium-altitude, long-endurance UAV	Multiple payload capability. Intended primarily for surveillance and reconnaissance. Adaptable to visint (EO/IR staring, scanning or long-range oblique), SAR/GMTI or ISAR radar, communications relay, and virtually any SIGINT (COMINT or ELINT) payload, tailored to customer requirements. Up to 9 kW electrical power available.
Hermes 180	Elbit Systems Ltd	Short-range Tactical UAV	Any customer-specified payload (EO, IR, laser designator, SAR/GMTI or communications relay) within air vehicle's payload capacity. Typical configurations include Elop CoMPASS multisensor. Up to 1.2 kW of power available.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Hermes 450	Elbit Systems Ltd	Long-endurance tactical UAV	Any customer-specified payloads within air vehicle's capacity. Typical sensors include SAR/GMTI, Controp DSP-1 day/night EO or Elop CoMPASS IV multisensor, laser designator, SIGINT, ELINT, COMINT or communications relay. The electrical power available for payloads is 1.6 kW. **Possible candidate for weaponisation.**
Hermes 90	Elbit Systems Ltd	Short-range tactical UAV	Standard payload is an Elbit/Elop Micro-CoMPASS turret containing a daylight colour TV camera and MWIR (mid-wave infra-red) thermal imager (both with continuous zoom), plus a laser target illuminator. Optional alternatives include an EW (SIGINT/COMINT) or communications relay (multiband radios) suite.
Hermes 900	Elbit Systems Ltd	Tactical MALE UAV	Payloads include EO, IR imaging, laser rangefinder and laser designator, SAR/GMTI radar, COMINT D/F, ELINT and EW. Aircraft is also equipped with ATC radio, radio relay, IFF transponder and built-in autonomous emergency procedures.
Heron 1	Israel Aerospace Industries	Medium-altitude long-endurance UAV	Standard payload is dual (TV/IR) or triple sensor (TV/IR/laser rangefinder) undernose IAI Tamam MOSP. In addition, can have Elta EL/M-2055, SAR/GMTI or EL/M-2022U maritime surveillance radar in large ventral radome, capable of multi-target track-while-scan of up to 32 targets. Other payloads can include Elta EL/K-7071 COMINT; EL/L-8385, ESM/ELINT; Ku-band satcom; data/voice relay packages; or customer-furnished payloads. Single real-time data and video downlink.
Heron TP (Eitan)	**Israel Aerospace Industries**	**High-altitude long-endurance UAV**	**Larger version of Heron. Multiple ISTAR payload capability, including underwing stores/weapons.**
Hornet	AD&D	Short-range VTOL UAV	No specific information on payload, but bay geometry enables full 360° field of view for imaging sensors.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Hunter	Israel Aerospace Industries	Reconnaissance UAV	Good choice for weaponisation; potential UCAV. With the US, the RQ/MQ-5 system has been armed with the new Viper Strike munitions.
I-See	Israel Aerospace Industries Ltd, Malat UAV Division	Surveillance mini-UAV	Combined TV/FLIR sensor, or other to customer's requirements, with real-time video and telemetry via LOS datalink.
I-View (Eye View)	Israel Aerospace Industries	Close-range tactical UAV	Designed for front-line battlefield RSTA and artillery adjustment. IAI Tamam M-POP combined TV and FLIR sensor in Mk 50, POP in Mk 150 and MOSP in Mk 240/250; or others to customer's requirements. Real-time data and video downlink. The I-View 250 version was selected by the Australian Army in December 2005.
Micro B	BlueBird Aero Systems Ltd	Close-range tactical mini-UAV	EO/IR or other multisensor package in interchangeable nose module. Real-time imagery downlink.
MicroFalcon I	IMI	Tactical mini-UAV	Begun in 2007 as a mini system for 'over the hill' ISTAR missions. Standard payload is Controp D-STAMP in ventral location.
Mini Panther	Israel Aerospace Industries	Tiltrotor tactical UAV	Day/night camera (IAI Tamam Micro-POP).
Mini-Falcon I & II	IMI	Small tactical UAV	EO and/or IR surveillance sensors in ventral turret (IAI Tamam POP 200 typical), with real-time imagery downlink.
Mini-V	Elbit Systems Ltd	Close-range battlefield surveillance UAV	No further information.
Mosquito 1	Israel Aerospace Industries	Micro UAV	Video camera with real-time downlink.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
NRUAV	Israel Aerospace Industries Ltd, Malat UAV Division	Helicopter UAV	NRUAV potential payloads are viewed as including EO/IR radar, SIGINT and ESM packages. As proposed for the Indian Navy, these are reported to include a belly-mounted Elta EL/M-2022H(V)2 multi-mode radar that includes SAR/GMTI maritime radar, air-to air and navigation and weather avoidance. It can include a nose-mounted IAI Tamam MOSP sensor turret, Indian Defence Avionics Research Establishment RWR, secure two-way datalinks and an HAL Mk 12 Mode S IFF transponder. A future option may be the carriage of one or two torpedoes (making it a potential UCAV).
Orbiter I	Aeronautics Defence Systems	Close-range surveillance mini-UAV	Controp D-STAMP (day) or L-STAMP (LLTV) sensor or high-resolution, stabilised colour CCD camera. Night sensor optional. Real-time data transmission.
Orbiter III	Aeronautics Defence Systems	Small tactical UAV	Orbiter 3 can perform any ISTAR mission, including target designation. The system's enhanced performance makes it equally capable of performing missions of much larger and heavier UAS.
Panther	Israel Aerospace Industries	Tiltrotor tactical UAV	Day/night camera (IAI Tamam Mini-POP in Panther; Micro-POP in Mini Panther), combined with laser rangefinder, pointer or laser designator. Other sensors optional.
Picador	Aeronautics Defence Systems	Helicopter UAV	Can be equipped with a variety of payloads including EO/IR; laser pointer or designator; maritime or SAR; communications relay; ELINT or SIGINT packages; or other sensors to customer's requirements.
Scout	Israel Aerospace Industries	Multipurpose Tactical UAV	Payloads on Scouts of the Israel Defence Force are a Controp ESP-600 CCD colour TV day camera and a Controp FSP-1 FLIR for night use.
Seagull	Elbit Systems Ltd	Multirole Battlefield mini-UAV	Daytime CCD colour TV camera standard, with real-time continuous video and telemetry data transmission (reportedly via Tadiran Spectralink StarLink datalink). Night sensor (FLIR) or other payloads optional.

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Searcher I	Israel Aerospace Industries	Long-endurance multirole UAV	Normal EO payloads are IAI Tamam POP (TV/IR) or MOSP (TV/IR/laser rangefinder) with single real-time data and video downlink; 1.5 kW onboard electrical power supply. COMINT and ESM integration capability. Other payloads to customer's choice.
Searcher II	Israel Aerospace Industries	Long-endurance multirole UAV	Elta EL/M-2055 synthetic aperture radar, introduced on Searcher II in 2001, enhances night/all-weather capability. COMINT and ESM integration capability. Other payloads to customer's choice. Loiter time of 20 hours.
Sheddon & Mini Sheddon	BTA Automatic Piloting Systems Ltd	Multirole close-range UAV's	Day observation sensor standard (1.8 kg; 4 lb gimballed and stabilised TV camera); night sensor or other payloads to customer's requirements. Independent camera control system optional.
Skylark I	Elbit Systems Ltd	Close-range tactical mini-UAV	Daylight colour CCD TV camera with ×10 zoom, FLIR. Real-time continuous downlink of video and telemetry data within LOS. Thermal imaging payload, weighing 700 to 800 g (25 to 28 oz), being evaluated by the IDF.
Skylark II	Elbit Systems Ltd	Close-range tactical mini-UAV	Elop Mini-CoMPASS triple-sensor turret (high-definition colour CCD TV camera, thermal imager and laser illuminator), mounted in nose of underfuselage pod.
Skyzer 100	AeroTactiX Ltd	Reconnaissance and surveillance mini-UAV	High-resolution daytime CCD TV camera; FLIR sensor for night use; or gimballed or fixed stills camera. Real-time imagery downlink; high-speed telemetry transceiver.
Sparrow-N	**EMIT Aviation Consult**	**Tactical mini-UAV and UCAV**	**Nose-mounted, stabilised Microview day/night EO/IR in surveillance role, with real-time, encrypted, video and data downlinks; 8 kg (17.6 lb) explosive charge in armed version.**

Country: Israel			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
SpyLite	BlueBird Aero Systems Ltd	Short-range Surveillance UAV	Three-axis stabilised payloads for surveillance; target acquisition, identification and designation; BDA; and law enforcement. Analogue or digital datalink with real-time video transmission. Backpack- or vehicle-mounted laptop GCS. Fully autonomous operation, with moving target tracking/tracker.
Thunder B	BlueBird Aero Systems Ltd	ISR	The UAV is primarily intended for intelligence and observation functions, but can also be used for mapping purposes. It has an endurance of approximately 20 hours with an ordinary engine and between seven and eight hours with an electrical engine. In many cases, there is a need for integrating between covert activity made possible by the silent engine and between a longer endurance. Will become operational by end of 2013.
Wander B	BlueBird Aero Systems Ltd	Mini-UAV	Especially designed for homeland security applications, featuring high safety, high reliability, short take-off and landing, redundant control and ease of use.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Aist (Stork)	Institut Kulon NII OAO	Multirole UAV	Potential military payloads could include RSTA sensors, EW systems or weapons. For civilian use, the BLA-06 is quoted as carrying a SON-100 dual-sensor turret containing a TV camera and thermal imager, with an X-band SAR or gas analyser as optional alternatives. Being tested as target designation for Iskander SSM. Project may have been cancelled.
Albatross and Expert	Yakovlev	Ship-based short-range V/STOL UAV	The Albatros is used in a system comprising the flying vehicle, ground control station and servicing equipment. This system may be based on a ship or two Kamaz-type trucks. The Expert is used in the integrated system comprising three RPV, ground control station, launcher and servicing equipment. This system is mounted on the minivan-type car.
Altius	**Sokol and Tranzas**	**UAV and UCAV**	**First reported in February 2013. R&D stage only. Part of a one billion rouble ($33 million) contract in 2011. Reported to have 'colossal range and endurance' and be capable of 'all missions, including strike'.**
Berta	ENICS JSC	Multirole tactical UAV	Standard payloads include colour TV, digital or IR cameras, signal repeater, jamming system, IR flares and decoys, Luneberg lens and corner reflector. Other customer-specified payloads can also be carried. Video downlink has a range of 60 km (37 miles).
Bird Eye 400	Israel Aerospace Industries	Surveillance mini-UAV	Two purchased. Part of April 2009 contract for 12 UAVs.
Dozor 50 (formally Dozor 2)	Transas Avia	Surveillance UAV	Standard payloads of video (forward-looking or oblique), IR or 12 MP digital photo cameras. Options include gas analysers, magnetometers and scanners. Data can be stored on board or downlinked in real time. Company also produces similar Dozor 85 and Dozor 100.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Dozor 600 (formally Dozor 3)	Transas Avia	MALE UAV	EO/IR, SAR, FLIR. $4 million per system (mobile ground control station/truck and 6 UAVs). First shown at MAKS 2009.
Eleron-10 (T-10)	ENICS JSC	UAV	The T-10 carries specific television, photo or infrared equipment to deliver it to target area and return to a landing site as per the predetermined route.
Eleron-3 (T-23)	ENICS JSC	Tactical mini-UAV	Roll-stabilised CCD colour TV camera or digital stills camera with 40° FOV. T-23 is military version.
I-View (Eye View)	Israel Aerospace Industries		Eight I-View MK150 tactical UAVs purchased for $37 million. Part of April 2009 contract for 12 UAVs
Igla	ENICS JSC	Tactical mini-UAV	Mid-mounted swept wings and tail surfaces; fighter-like fuselage; composites construction. No landing gear. Air vehicle designation is E26T. Little further detail.
Inokhodyets (Wanderer)	**Sokol and Tranzas**	**UAV and UCAV**	**First reported in February 2013. R&D stage only. Part of a one billion rouble ($33 million) contract in 2011.**
Irkut-1A	Scientific Production Corporation and Irkut JSC	Tethered aerostat surveillance system	Conventional helium-filled blimp with cruciform tail surfaces. Stabilised EOS-VB with colour TV and IR cameras.
Irkut-2F/2T	Scientific Production Corporation and Irkut JSC	Remote sensing UAV	Digital camera in Irkut-2F, imagery from which is stored on board and downloaded to GCS notebook PC after landing for visual processing and analysis. TV camera, TV transmitter or IR camera in Irkut-2T, with real-time imagery downlink.
Irkut-2M	Scientific Production Corporation and Irkut JSC	Remote sensing UAV	Stabilised EOS-2M turret with two (digital black and white and colour) cameras.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Irkut-3	Scientific Production Corporation and Irkut JSC	Surveillance mini-UAV	TV, IR or stills cameras, or other sensors, to customer's requirements. Real-time imagery downlink.
Irkut-10	Scientific Production Corporation and Irkut JSC	Short-range surveillance UAS	Gyrostabilised and interchangeable EO systems (TV, TV/still camera or IR).
Irkut-20	Scientific Production Corporation and Irkut JSC	Remote sensing UAV	TV camera, TV transmitter, IR camera or digital stills camera. Imagery downlink in real time from TV and IR, in near-realtime from digital camera.
Irkut-60	Scientific Production Corporation and Irkut JSC	Remote sensing UAV	TV camera, TV transmitter, IR camera or digital stills camera. Real-time imagery downlink. Utilises as the air vehicle a Ukrainian design, the Kharkov Aeronautical Institute KhAI-112.
Irkut-200	Scientific Production Corporation and Irkut JSC	Surveillance tactical UAV	Standard payloads include TVIR sensor turret; synthetic aperture radar optional.
Irkut-850	Scientific Production Corporation and Irkut JSC	Optionally piloted vehicle	TV and/or IR camera on gyrostabilised turret; automatic high-resolution digital stills camera; 3-D laser (lidar) mapping system; or relay unit. Real-time downlink of acquired data. Two underwing hardpoints for external payloads like medical kits or food supplies.
Iskatel (Searcher)	Popov Omsk Radio Factory	Light/portable UAV	Trials were reported to be conducted in early December 2012 with Russian Airborne Forces 106th Airborne Division. No further details.
Klest	Yakovlev	Reconnaissance UAV	Reported to be replacement for the Russian armed forces' Pchela-1s. First reported in November 2006. Still in R&D stages.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
LA-17R	Strela (Lavochkin)	Earliest UAV	Reconnaissance version, developed in 1958-59. Airframe and engine as earlier LA-17M, but with two AFBA-40 (high-altitude) or AFBA-21 (low-altitude) photographic cameras in underside of lengthened nosecone.
MBVK-137 (KA-137)	Kamarov	Helicopter UAV	The MBVK-137 is intended for air reconnaissance, border guard, police and ecology patrolling, urgent air delivery of special-purpose cargoes in emergency situations, as well as for transmitting information data from dangerous zones.
MI-34BP1/2	Mil Helicopters	Helicopter UAV	An unmanned version of the Mi-34S civil light helicopter used for various applications. Still camera, TV and/or IR sensors for day and night imagery collection and transmission. Project hampered by lack of proper funding. MI-34BP1 is piston-powered and MI-34BP2 is turbine powered.
Pchela-1/1T (aka Yak-61 Shmel, 'Bumblebee')	Yakovlev	Tactical UAV	$22 million per system (mobile ground control station, technological truck, loader/transporter, 10 Pchela with expendables). Based on Yak-60 model, launched off BMD armoured personnel carrier.
Proryv-U **(Breakthrough)**	**Yakovlev**	**UCAV**	**Based on YAK-130 (Trainer) with a maximum take-off weight of 10,000 kg (22,000 lb), including a payload of between 1,000 kg and 3,000 kg. Yakovlev reported to be developing Proryv-U Attack, Proryv-R Reconnaissance and Proryv-RLA AWACS platforms.**
Proryv-R	Yakovlev	Heavyweight reconnaissance UAV	Reported to have 9,800 kg MTOW including a payload of 1,000-1,200 kg, and offer a mission endurance of up to 20 hours.
R-90	ENICS JSC	Air-launched battlefield reconnaissance/ surveillance UAV	Nose-mounted TV camera; video downlink transmits imagery and air vehicle coordinates to GCS. Although described as a surveillance system, it has the potential for secondary use as a decoy.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Reis-D	Tupolev PSC	MALE UAV (reconnaissance and BDA)	Currently operationally fielded with 924 UAV Combat Training Centre (Egorevsk, near Moscow) w/AF Comd and 273 Indep UAV Sqn (3rd AF/AD Command) (Arseniev, Primorsky).
Searcher II	Israel Aerospace Industries	Multirole UAV	Two Searcher Mk II multi-mission UAVs purchased for $12 million. Part of April 2009 contract for 12 UAVs.
Seeker	Omsk Production Association	Tactical UAV	Consists of a base station that is placed in a backpack, tablet and two UAV T-4s each weighing 1.3 kg. Flight duration of 40 minutes, with maximum height of 4,000 metres.
Skat	**MIG**	**SEAD UCAV**	**Each internal weapons bay is said to be capable of accommodating an anti-radar or anti-ship missile, or a 250 or 500 kg bomb.**
Strekoza	Yakovlev	Short-range surveillance and environmental monitoring UAV	TV camera, IRLS and environmental monitoring sensors. Data transmitted by real-time downlink.
Tipchak (Nomad)	Lutch Design Bureau JSC	Tactical UAV	Dual-band (visible and infrared) linescanner standard. Options include SIGINT, chemical monitoring and communications relay packages. SHF imagery and telemetry downlink. Declassified in 2005, and underwent government trials in 2005-06.
Tu-141 Strizh	Tupolev PSC	Long-range jet-powered tactical reconnaissance/ surveillance UAV.	Can include frame or TV camera, IR sensor, laser rangefinder/designator or radiation detection equipment.
Tu-143/243/300	Tupolev PSC	Jet-powered tactical reconnaissance systems.	Tu-143 remains a standard Russian tactical reconnaissance/surveillance UAV system. Tu-243 is longer range variant, with day and night capability, unveiled in 1995 and entered service in 1999. Latest known variant is the Tu-300.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
Voron (Raven)	**Yakovlev**	**Multi-role UAV and possible UCAV**	**The turbojet-powered Voron is being designed for storage in a ready-use container, with the 500 kg-class design being considered for tri-service applications, including reconnaissance, electronic warfare and attack missions. To carry a 140 kg payload, the UAV will have a speed of up to 430 kt (800 kph), a service ceiling of 39,400 ft and an endurance of 2 hours. First reported in November 2006.**
YAK-133	Yakovlev	UAV	Pilotless version of Yak-130 Trainer Aircraft. Still in R&D stage.
ZALA 421-01	ZALA Aero Company	Close-range UAV	Compact GCS. Autonomous operation. Capability for simultaneous control of more than one air vehicle. For further details, see entry for ZALA 421-02.
ZALA 421-02	ZALA Aero Company	Small helicopter UAV	Daytime video camera in standard configuration. Able to carry other payloads, with real-time data downlinks, for civil and military missions including Earth remote sensing, oil and gas pipeline inspection, aerial survey, ground and maritime surveillance, targeting and communications relay, according to customer's requirements.
ZALA 421-03	ZALA Aero Company	Short-range reconnaissance and surveillance mini-UAV	Compact GCS. Autonomous operation, including launch and recovery. For further details, see entry for ZALA 421-02.
ZALA 421-04	ZALA Aero Company	Short-range reconnaissance and surveillance mini-UAV	Compact GCS. Autonomous operation, including launch and recovery. For further details, see entry for ZALA 421-02.
ZALA 421-06	ZALA Aero Company	Helicopter UAV	An unmanned aerial vehicle helicopter. Developed in 2007-08, this UAV can fly by programme (in fully autonomous mode) and in manual mode. Costs $380,000 (2011).

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
ZALA 421-08	ZALA Aero Company	VTOL micro-UAV	A small, portable and reliable UAV platform. Weighing only 9 kg it includes two aerial vehicles, compact ground control station, two spare power supply kits and backpack container used for transportation. Costs $172,000 per system (2011). Currently undergoing trials on integration with attack helicopters (e.g. KA-52, MI-28N).
ZALA 421-09	ZALA Aero Company	Endurance tactical UAV	Standard payloads, which are interchangeable, include still, video or thermal imaging cameras, and radar, on a gyrostabilised gimbal. The 421-09 has GPS/GLONASS satellite navigation.
ZALA 421-12	ZALA Aero Company	Short-range reconnaissance and surveillance mini-UAV	A small, portable and reliable UAV platform. Designed for front-line reconnaissance, overground and oversea surveillance. Costs $340,000 (2011).
ZALA 421-16	ZALA Aero Company	Reconnaissance and surveillance mini-UAV	General appearance of the 421-16 is broadly similar to that of the 421-03. High-resolution, gyrostabilised video and IR cameras, plus a built-in 10 megapixel digital camera. Onboard data recording and encrypted downlink.
ZALA 421-21	ZALA Aero Company	VTOL Micro-UAV	EO, video or IR camera, with real-time imagery transmission. Combined day video/IR payload also planned. UAV can land on structures ('perch and stare') to preserve power, while monitoring and listening in on a target.
ZOND-1	Sukhoi	Strategic UAV (with AWACS phased-array radar on top)	R&D stage. Sukhoi reveals no government funding, so looking for funders, possibly in concert with China.
ZOND-2	Sukhoi	UAV	With SAR. R&D stage. Sukhoi reveals no government funding, so looking for funders, possibly in concert with China.

Country: Russia			
UAV designation	**Manufacturer**	**Primary role**	**Comments**
ZOND-3	Sukhoi	UAV	With IR sensors. R&D stage. Sukhoi reveals no government funding, so looking for funders, possibly in concert with China.

Country: Turkey			
UCAV designation	**Manufacturer**	**Primary role**	**Comments**
Anka (Phoenix)	**Turkish Aerospace Industries Inc.**	**MALE UAV**	**First rolled-out in July 2010. ISR payloads include the Aselsan 300T EO/IR imager (Block A/B), a SAR radar (Block B, with GMTI and inverse SAR operating modes), an onboard recording capability and provision for SIGINT and communications relay equipment. Exported to Egypt, Qatar and Saudi Arabia. Anka +A and Anka-TP UCAV variants planned.**
ARI-1T	Aselsan Inc.	VTOL ISR UAV	Equipped with a nose-mounted stabilised gimbal that can accommodate daylight TV and IR cameras together with a laser pointer.
Baykuş	Turkish Aerospace Industries Inc.	Tactical UAV	Carries a two-axis gimbaled EO/IR camera, which relays its video in real-time telemetry
Bayraktar-B	Baykar	Mini-UAV	Bayraktar-B is fielded with small army units. As of 2012 has recorded more than 50,000 flight hours.
Bora (Gust)	Vestel Defence Industry AS	Fixed-wing training, R&D and ISR UAV	Provision for EO/IR sensor gimbal and a two-bladed tractor propeller. As of May 2013, development of the Bora (Gust) UAV was reported as being ongoing.
Caldiran	Turkish Aerospace Industries Inc.	Tactical UAV	Carries EO/IR camera, which relays its video in real-time telemetry.
CL-289	Canadair	Surveillance UAV	Redesigned version of the earlier CL-89 (produced jointly by Canada, the United Kingdom and West Germany in the 1960s). A larger UAV with better range and payload.
Falcon 600/Firebee	Ryan Aeronautical Company	Early UAV and target drone	Earliest UAV test vehicles.

Country: Turkey			
UCAV designation	**Manufacturer**	**Primary role**	**Comments**
Gnat 750/I-GNAT ER	General Atomics	MALE UAV	Can fly to an operational area from 2,000 km (1,240 miles) away and loiter there for 12 hours before returning home. The Turkish Air Force operates 6 x GNAT-750 and 16 x I-GNAT ER.
Gözcü	Turkish Aerospace Industries Inc.	Close-range tactical UAV	Daylight (EO) or night (IR) camera, with real-time video transmission.
Harop (Harpy 2)	Israel Aerospace Industries	SEAD	Undernose EO/IR turret was deemed to be an IAI Tamam POP-200. A satcom datalink is reported to be fitted. For attack, the aircraft carries a high explosive fragmentation warhead. Unlike Harpy, has MITL.
Harpy	Israel Aerospace Industries	Loitering (anti-radar) attack UAV/UCAV	Largely covert programme until the late 1990s. Israeli-developed passive radar seeker (recently upgraded to cover a wider range of frequencies) and high-explosive warhead. Upgraded version equipped with a dual (electromagnetic and EO) sensor and datalink, to allow Harpy to get updates on potential targets and be directed against a specific emitter.
Heron	Israel Aerospace Industries	Medium-altitude, long-endurance UAV	Turkish Herons use the ASELFLIR-300T airborne thermal imaging and targeting system designed and manufactured by ASELSAN of Turkey. The Turkish Herons also have stronger engines in order to compensate for the added payload created by the heavier ASELFLIR-300T. This is the same FLIR system currently used in the TAI/AgustaWestland T-129 attack helicopter.
Karayel	Vestel Defence Industry AS	Fixed-wing ISR UAV	Gimbal-mounted high-definition daylight (× 50 optical zoom) and IR (× 50 optical zoom) cameras, laser range-finder and laser pointer.
Keklik	Turkish Aerospace Industries Inc.	Radio-controlled tracking target drone	No further information.

Country: Turkey			
UCAV designation	**Manufacturer**	**Primary role**	**Comments**
Marti (Seagull)	Turkish Aerospace Industries Inc.	Radio-controlled surveillance UAV	The drone carries a two-axis gimbaled EO/IR camera, which relays its video in real-time telemetry.
Malazgirt	Baykar	Mini-VTOL helicopter	EO and IR camera fitted.
MUAS-1/2	Aselsan Inc.	Family of man-portable mini (fixed-wing) ISR UAVs	A two-axis, stabilised gimbal carrying a laser pointer together with either a continuous zoom daylight colour or an uncooled IR camera. As of May 2013, the MUAS recovery technique was uncertain.
Pelikan (aka IHA-X2)	Turkish Aerospace Industries Inc.	Radio-controlled reconnaissance surveillance and target acquisition UAV	Carries a two-axis gimbaled EO/IR camera, which relays its video in real-time telemetry.
R-300 (R-İHA)	Turkish Aerospace Industries Inc.	Multi-role helicopter UAV	Introduced in 2010. High-definition EO/IR turret with a fixed or moving target tracking capability. Alternative payloads can be installed to meet specific customer requirements.
Şimşek (Lightning)	Turkish Aerospace Industries Inc.	Turbojet-powered radio-controlled high-speed target drone	Looks like tactical air-launched decoys (TALD), which are used to confuse and saturate enemy air defences.
Turaç	Havelsan Inc and Istanbul Technical University Aeronautics Research Centre	Civil blended wing VTOL UAV	Described by manufacturer as being able to work with different payloads.
Turna	Turkish Aerospace Industries Inc.	Radio-controlled tracking target drone	No further information.
UAV-X1	Turkish Aerospace Industries Inc.	UAV	Two prototypes were completed by March 1992 under contract to the Turkish Ministry of National Defence. No production orders ensued.

Annex B

Unmanned combat air vehicles by country

Country: China					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Anjian (Dark Sword)	Shenyang Aircraft Corporation	Stealth UAV/UCAV	In development.	No confirmed details.	No further information.
ASN-229A	Xian ASN Technical Group	Reconnaissance and precision attack MALE UAV/UCAV	Payload capacity: 100 kg (220 lb). Length: 5.5 m (18 ft 1 in). Wingspan: 11 m (36 ft 1 in). Powerplant: 1 × piston engine. Max take-off weight: 800 kg (1,763 lb).	Max speed: 180 kph (112 mph) Range: 1998 km (1241 mi; 1079 nmi) Combat range: 650 km Endurance: 20 hrs (max) Service ceiling: 10,000 m (32,800 ft) Armament: Underwing small PGMs.	One of Xian's largest UAVs. Able to cruise at 180 kph and stay aloft for 20 hours. Performs reconnaissance, target location or artillery observation missions via a satellite data-link.

Country: China					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
CH-3/3A (Rainbow-3)	China Aerospace Science and Industry Corporation	Armed tactical MALE UAV (UCAV prototype)	Payload capacity: 60 kg (155 lb) [?] Powerplant: One piston engine (type and rating not revealed), driving a three-blade pusher propeller. Max take-off weight: 640 kg (1,410 lb)	Max speed: 200 kph (100 mph) Range: 2,398 km (1,490 mi; 1,296 nmi) Range: 8 km (5 miles) Combat range: 800 km [?] Endurance: 12 hrs Service ceiling: 5000 m (16,400 ft) Armament: Underwing AR-1 (x 2) ASMs (a semi-active laser homing solid rocket-powered guided missile designed primarily for tactical UAVs)	CH-3 noted carrying pair of 45 kg (99 lb) AR-1 air-to-surface missiles (akin to the AGM-114 Hellfire) underwing in 2010. In addition to attack platform, CH-3 is optimised for reconnaissance, artillery fire adjustment and ELINT/EW. The current developmental status of the CH-3 is unclear.
CH-4	China Aerospace Science and Industry Corporation	Armed tactical MALE UAV (UCAV prototype)	Similar to CH-3	Similar to CH-3	Stated as being better able to operate in inclement weather and able to utilise GPS guided bombs. The current developmental status of the CH-4 is unclear.
CH-901	Aerospace Long-March International Trade Company Ltd	ISR, BDA, meteorological survey and precision attack UAV/UCAV for special forces	Payload capacity: 2 kg (4 lb) Length: 1.5 m (4 ft 11 in) Wingspan: 2 m (6 ft 6 in) Powerplant: 1 × Piston Engine Max take-off weight: 9 kg (19 lb)	Max speed: 150 kph (93 mph) Radius: 15 km (9 mi; 8.1 nmi) Combat range: Endurance: 1 hr (precision attack mode); 2 hr (ISR/BDA/met survey modes) Max/min altitude: 1495 m (4900 ft)/10m (30 ft)	When being used as a strike weapon, CH-901 has a 5 m (16.4 ft) CEP accuracy, rising to 50 m (164 ft) CEP when the AV is being employed for targeting. Warhead is unspecified at present.

Country: China					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
CH-92	Aerospace Long-March International Trade Company Ltd	ISR and air-to-surface strike UCAV	Payload capacity: 60 kg (132 lb) Length: 4.1 m (13 ft 6 in) Wingspan: 9 m (29 ft 6 in) Powerplant: 1 × Piston engine Max take-off weight: 300 kg (661 lb)	Max speed: 190 kph (118 mph) Radius: 250 km (155 miles; 135 nm) Endurance: 10 hrs (max) Service ceiling: 5,975 m (19,600 ft) Armament: Underwing ASMs.	Under development and scheduled for production during 2014.
Harop (Harpy 2)	Israel Aerospace Industries	SEAD	Length: 2.5 m (8 ft 2 in) Wingspan: 3.00 m (9 ft 10 in)	Max speed: Unknown Range: 1,000 km (600+ miles) Endurance: 6 hrs Armament: Single HE warhead of 23 kg (51 lbs)	For attack, the aircraft carries a high explosive fragmentation warhead.
Lijian (Sharp Sword)	Hongdu-Shenyang Aircraft Corporation collaboration [?]	ISR and air-to-surface strike UCAV	Wingspan: 14 m (46 ft) Powerplant: Single jet engine, presumed to be the Shenyang WP7 (as used on J-7 fighter) Payload: Up to 2,000 kg (4,400 lbs)	Range: 130 km (80 miles) Armament: Possibly uses CM-506KG small-diameter glide-bomb weighing 150 kg each	Stealth UCAV.

Country: China					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Wing-Loong (Yilong)	Chengdu Aircraft Industry (Group) Company	Surveillance MALE UAV/UCAV	Payload capacity: 200 kg (440 lb) Length: 9.055 m (29 ft 8.5 in) Wingspan: 14 m (45 ft 11 in) Powerplant: One 74.6 kW (100 hp) turbocharged piston engine, driving a three-blade pusher propeller Max take-off weight: 350 kg (771 lb)	Max speed: 280 kph (174 mph) Range: 4,000 km (2,485 mi; 2,160 nmi) Combat range: 1,330 km Endurance: 20 hrs (max) Service ceiling: 5,000 m (16,400 ft) Armament: Underwing ASMs (e.g. HJ/KD-10)	Closely modelled on MQ-9 Reaper. However, price is reportedly only $1 million per unit (compared to $30 million for the Reaper). Includes day/night EO/IR and laser designator, ECM and small underwing air-to-surface missiles.
WJ-600	China Aerospace Science and Industry Corporation	Armed reconnaissance UAV/UCAV	Payload capacity: 130 kg (286 lb) Powerplant: 1 × Turbojet	Max speed: 600 kph (373 mph) Endurance: 6 hrs (estimated) Service ceiling: 10,000 m (32,800 ft) (estimate) Armament: At least 2 × KD2 (or TB1) air-to-surface missiles or ZD1 LGB noted in 2010.	Also able to designate for longer range coastal defence missiles. Ability to use SAR, data(link) relay and EW.

Country: China					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
WZ-2000	Guizhou Aviation Industry Group Company	Jet-powered surveillance UCAV	Payload capacity: 80 kg (176 lb) Length: 7.5 m (24 ft 7 in) Wingspan: 9.8 m (32 ft 2 in) Powerplant: 1 × WS-11 turbofan, 16.9 kN (3,800 lbf) thrust Max take-off weight: 1,700 kg (3,748 lb)	Max speed: 800 kph (497 mph) Range: 2,400 km (1,491 mi; 1,296 nmi) Combat range: 800 km (497 mi; 432 nmi) Endurance: 3 hrs Service ceiling: 17,983 m (59,000 ft) Armament: At least 2 × KD2 air-to-surface missiles. Additional number of ZD1 precision-guided bombs possible	No specific information on payload available, but EO, IR and/or SAR expected, plus ELINT-collection sensors and real-time datalinks likely.

Country: India					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
AURA (Autonomous Unmanned Research Aircraft)	Defence Research and Development Organisation	Attack stealth UCAV	No further information.	Must have low radar cross-section, high service ceiling and an expected range of 500 nm (925 km). Indian Government also wants it to carry precision-guided weapons in an internal weapons bay.	In development. Project is likely classified.
Harop (Harpy 2)	Israel Aerospace Industries	SEAD	Length: 2.5 m (8 ft 2 in) Wingspan: 3.00 m (9 ft 10 in)	Max speed: Unknown Range: 1,000 km (600+ miles) Endurance: 6 hrs Armament: Single HE warhead of 23 kg (51 lbs)	For attack, the aircraft carries a high explosive fragmentation warhead.
Harpy	Israel Aerospace Industries	Loitering (anti-radar) attack UAV/UCAV	Max take-off weight: Length: 2.7 m (6 ft 11 in) Wingspan: 2.1 m (6 ft 11 in) Powerplant: 1 × UEL AR731 Wankel rotary engine, 28 kW (38 hp)	Max speed: 185 kph (115 mph) Range: 500 km (311 miles) Armament: 1 × 32 kg (70 lb) high-explosive warhead	Largely covert programme until the late 1990s. Israeli-developed passive radar seeker (recently upgraded to cover a wider range of frequencies) and high-explosive warhead. Upgraded version equipped with a dual (electromagnetic and EO) sensor and datalink, to allow Harpy to get updates on potential targets and be directed against a specific emitter.

Country: India					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
RUSTOM-2 (Warrior)	Defence Research and Development Organisation	MALE UCAV	No further information.	No further information.	In development. To include (reportedly Israel-sourced) EO and IR sensors, SAR and maritime patrol radars, communications relay, ELINT and COMINT packages. Intended to replace/supplement the Heron UAVs in service.

Country: Iran					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Ababil-T	Iran Aircraft Manufacturing Industries	UCAV	Payload capacity: 40 kg (88 lb) Max take-off weight: 83 kg (182 lb) Length: 2.88 m (9 ft 5½ in) Wingspan: 3.25 m (10 ft 8 in) Powerplant: 1 × Toloue-4 or Toloue-5 non afterburner turbojet, 3.7 kN/4.4 kN	Max speed: 162 kt (300 kph; 186 mph) Range: 27 n miles (50 km; 31 miles) [LOS, mission, Ababil-T] or 81 n miles (150 km; 93 miles) (est) [mission, GPS, Ababil-T] Endurance: 1 hr 30 min Service ceiling: 4,265 m (14,000 ft)	Short/medium-range attack UAV, with 45 kg (100 lb) HE warhead. Distinguishable by twin-tailed configuration. Can engage both fixed and mobile targets. In use by Hezbollah (designated Mirsad-1). Ababil-5 reported, but not confirmed.
Karrar	Iran Aircraft Manufacturing Industries	UCAV	Payload capacity: 227 kg (500 lb) Max take-off weight: 700 kg (1,543 lb) (est) Length: 4 m (13 ft 1½ in) Wingspan: 2.5 m (8 ft 2½ in) Powerplant: 1 × turboject	Max speed: 900 kph (559 mph) Radius: 270 n miles (500 km; 310 miles) Hard points: 5 in total (4× under-wing, 1× under-fuselage)	Single 227 kg (500 lb) precision-guided MK 82 type bomb on the centreline or two underwing stations for 113 kg (250 lb) bombs, Kosar anti-shipping missiles (Iranian variant of the Chinese C-701) or Nasr-1 short-range cruise missiles.
Nazir (Harbinger)	Farnas Aerospace Company	Reconnaissance (UAV) and strike (UCAV)	Said to be short-range, low-altitude UAV with reduced radar-detection signature.	No further information.	It is manufactured in Iran at a plant in the northern province of Mazandaran. The Nazir has been optimized for flights at low altitude and features low radar cross section. The existence and mass production launch of the Nazir UAV was reported by the Iranian press in early February 2010.

Country: Iran					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Ra'ad (Thunder)	Farnas Aerospace Company	Reconnaissance (UAV) and strike (UCAV)	Said to be short-range, low-altitude UAV with reduced radar-detection signature.	No further information.	Said to be capable of conducting long-range reconnaissance, patrolling, assault and bombing missions with high precision.
Sarir H-110	Qods Aviation Industries	Reconnaissance (UAV) and strike (UCAV)	Claimed to be based on Israel's Hunter UAV. If so, its flight endurance could be 8-12 hours, its flight cap 3,500-5,500 m, and its carrying capacity 80-100 kg.	Claimed to have an air-to-air combat role. Reported in May 2013 with shoulder-launched missile, Misagh-1 (MANPADS) – a variant of the Chinese QW-1 Vanguard missile system.	Iran has been mass producing the Misagh-2 MANPAD since 2006, when attempts to acquire S-300/SA-10 strategic SAM systems failed. It is curious why they are using one of their older missiles on such an apparently new UCAV.
Shahed-129	Qods Aviation Industries	Reconnaissance (UAV) and strike (UCAV)	Reported to have a 1,700-2,000 km operational range and an alleged endurance of 24 hours. This is not confirmed.	Claimed to be capable of carrying out (air-to-air) combat and reconnaissance missions with an endurance of 24 hours, making it the first Iranian MALE UAV. Largely based on the Israeli Hermes 450 model.	Shahed 129 is said to be able to carry Sadid-1 missiles.

Country: Israel					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Harop (Harpy 2)	Israel Aerospace Industries	SEAD	Length: 2.5 m (8 ft 2 in) Wingspan: 3 m (9 ft 10 in)	Range: 1,000 km (600+ miles) Endurance: 6 hrs	UCAV carries single high-explosive warhead of 23kg (51 lbs). A loitering weapon. Exported to PRC.
Harpy	Israel Aerospace Industries	Loitering (anti-radar) attack UAV/UCAV	Max take-off weight: Length: 2.7 m (6 ft 11 in) Wingspan: 2.1 m (6 ft 11 in) Powerplant: 1 × UEL AR731 Wankel rotary engine, 28 kW (38 hp)	Max speed: 185 kph (115 mph) Range: 500 km (311 miles) Armament: 1 × 32 kg (70 lb) high-explosive warhead	Largely covert programme until the late 1990s. Israeli-developed passive radar seeker (recently upgraded to cover a wider range of frequencies) and high-explosive warhead. Upgraded version equipped with a dual (electromagnetic and EO) sensor and datalink, to allow Harpy to get updates on potential targets and be directed against a specific emitter.
Heron TP (Eitan)	Israel Aerospace Industries	High-altitude long-endurance UAV/UCAV	Payload capacity: 2,000 kg (4,400 lb) Max take-off weight: 4,650 kg (10,250 lb) Length: 13 m (43 ft in) Wingspan: 26 m (86 ft in) Powerplant: 1 × Pratt & Whitney PT6A, 900 kW (1,200 hp)	Max speed: 370+ kph Range: 7,400+ km (4,600+ miles) Endurance: 70+ hrs Service ceiling: 14,000+ m (45,000+ ft)	Larger version of Heron. Multiple ISTAR payload capability, including underwing stores/weapons.

Country: Israel					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Sparrow-N	EMIT Aviation Consult	Tactical mini-UAV and UCAV	Nose-mounted, stabilised Microview day/night EO/IR in surveillance role, with real-time, encrypted, video and data downlinks.	Fully fuelled Sparrow reported to weigh approximately 45 kg, carries a mission specific payload of 12 kg and cruises at 60-70 kts. for over 4 hrs. The UAV can be fitted with a larger fuel tank to facilitate extended flight duration.	One Sparrow-N system was acquired by the British Army in early 2008 for evaluation in the Loitering Munition Concept Demonstration (LMCD) phase of its Indirect Fire Precision Attack (IFPA) programme. 8 kg (17.6 lb) explosive charge in armed version.

Country: Russia					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristic**	**Performance**	**Comments**
Altius	Sokol and Tranzas	UAV and UCAV	5t-class medium-altitude long-endurance UAV.	No further information.	First reported in February 2013. R&D stage only. Part of a one billion rouble ($33 million) contract in 2011. Reported to have 'colossal range and endurance' and be capable of 'all missions, including strike'.
Inokhodyets (Wanderer)	Sokol and Tranzas	UAV and UCAV	1t-class system.	No further information.	First reported in February 2013. R&D stage only. Part of a one billion rouble ($33 million) contract in 2011.
Proryv-U (Breakthrough)	Yakovlev	UCAV	Based on YAK-130 (Trainer) with a maximum take-off weight of 10,000 kg (22,000 lb), including a payload of between 1,000 kg and 3,000 kg.	No further information.	Yakovlev reported to be developing Proryv-U Attack, Proryv-R Reconnaissance and Proryv-RLA AWACS platforms.

Country: Russia					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristic**	**Performance**	**Comments**
Skat	MIG	SEAD UCAV	Payload capacity: 2000 kg (4409 lb) Length: 10.25 m (33 ft 7.5 in) Wingspan: 11.5 m (37 ft 8 in) Powerplant: 1 × turbofan Max take-off weight: 10,000 kg (22,046 lb)	Max speed: 800 kph (497 mph) Radius: 1996 km (1,240 mi; 1,078 nmi) Combat range: 800 km (497 mi; 432 nmi) Service ceiling: 12,000 m (39,380 ft) Armament: Up to 2 tons of weapons in internal bays	Each internal weapons bay is said to be capable of accommodating an anti-radar or anti-ship missile, or a 250 or 500 kg bomb. On debut, the mock-up was displayed with Kh-31 (AS-17 'Krypton') ASMs (actually longer than the stated bay length) and KAB-500R TV-guided bombs. Weapon management system is credited to GosNIIAS. The new Kh-58UShKE anti-radiation missile may be intended for the Skat.
Voron (Raven)	Yakovlev	Multi-role UAV and possible UCAV	To carry a 140 kg payload, the UAV will have a speed of up to 430 kt (800 kph), a service ceiling of 39,400 ft and an endurance of 2 hours.	No further information.	Helicopter UAV designed for special operations in urban areas. The turbojet-powered Voron is being designed for storage in a ready-use container, with the 500 kg-class design being considered for tri-service applications, including reconnaissance, electronic warfare and attack missions. First reported in November 2006.

Country: Turkey					
UCAV designation	**Manufacturer**	**Primary role**	**Characteristics**	**Performance**	**Comments**
Anka +A	Turkish Aerospace Industries Inc.	UCAV	It is planned that Anka +A will carry Cirit missiles of Turkey's Roketsan. The weight will be more than 4 tons compared to Anka UAVs 1.5 tons. The engine for Anka +A UCAV has not yet been determined.	Weapons configuration not yet determined. Cirit is 70mm laser guided rocket used on attack helicopters (and reportedly exported to the United Arab Emirates for a total of $196.2 million).	First rolled-out in July 2010. ISR payloads include the Aselsan 300T EO/IR imager (Block A/B), a SAR radar (Block B, with GMTI and inverse SAR operating modes), an onboard recording capability and provision for SIGINT and communications relay equipment.
Anka-TP	Turkish Aerospace Industries Inc.	UCAV (strategic UAV)	A planed 5+ ton, turbo-fan powered, HALE version of the ANKA. It will have a span of 23 meters. Loitering time estimated at more than 20 hours, at a ceiling of 40,000 feet, and a cruise speed of around 200 to 250 kts.	Will feature a new mission computer, airframe and have the ability to carry 1-1.5 tons in armament.	BAMS type UCAV. Project formally announced at IDEF 2013.
Harop (Harpy 2)	Israel Aerospace Industries	SEAD	Length: 2.5 m (8 ft 2 in) Wingspan: 3 m (9 ft 10 in)	Range: 1,000 km (600+ miles) Endurance: 6 hrs	UCAV carries single high-explosive warhead of 23kg (51 lbs). A loitering weapon. Exported to PRC.

Country: Turkey					
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