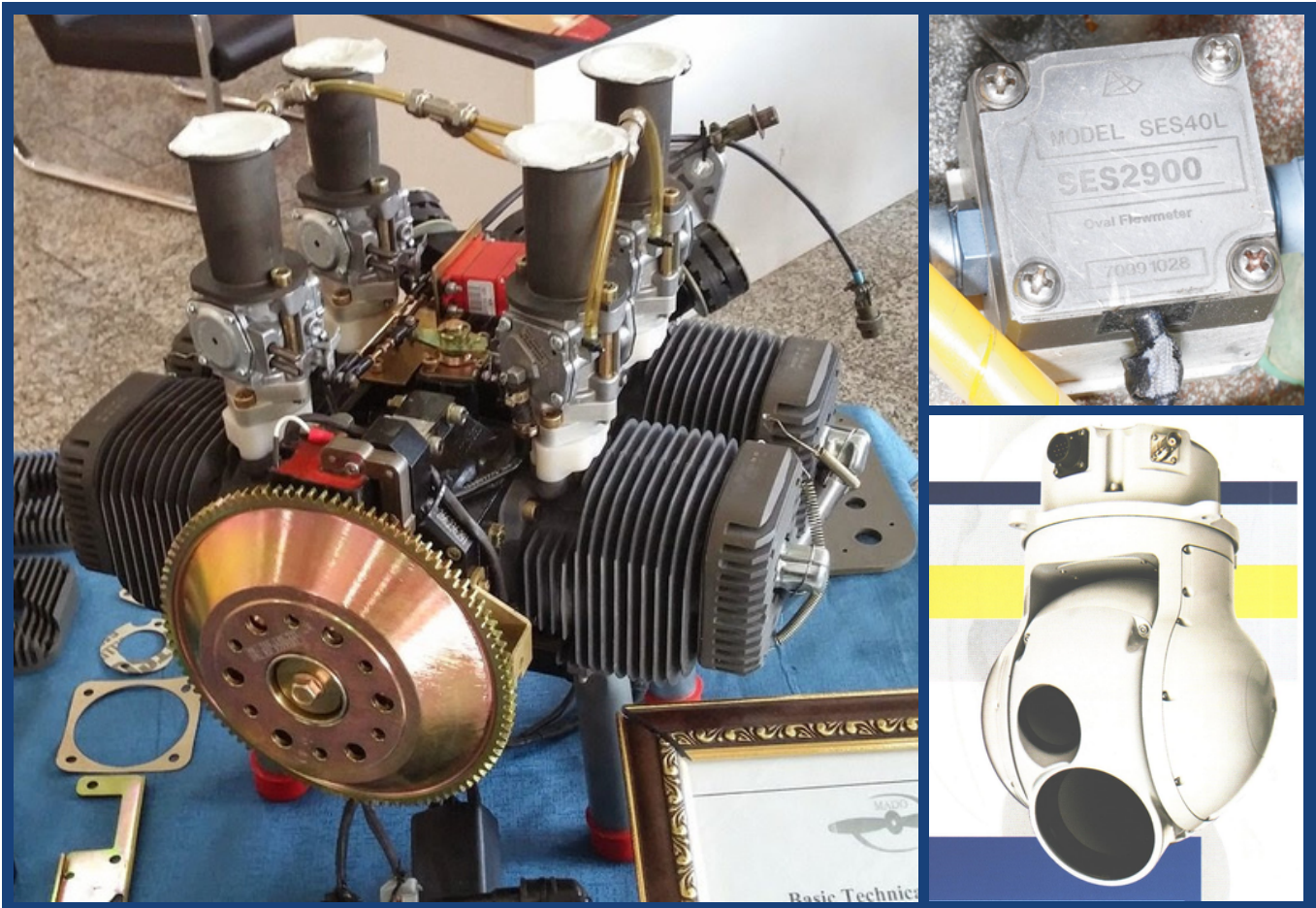




WISCONSIN PROJECT
ON NUCLEAR ARMS CONTROL



The Private Companies Propelling Iran's Drone Industry



John Krzyzaniak

IRAN WATCH REPORT

November 2023

Introduction

Drone warfare has come into its own in recent years, and Iranian companies that have invested in military drone technology are reaping the dividends of high demand for their products. At home, both the Islamic Revolutionary Guard Corps (IRGC) and the Artesh (Iran's regular army) operate unmanned aerial vehicles (UAVs). Abroad, numerous countries have lined up to purchase Iranian-made UAVs, from Russia and Belarus to Venezuela and Bolivia.¹ Consequently, Iran's domestic drone industry appears to be booming.

While the major players in this industry are relatively well understood, one type of entity is making a valuable but largely overlooked contribution to the industry: the privately-owned knowledge-based company. At a conference in November, Deputy Defense Minister Mahdi Farahi said that several thousand such companies are working with the Defense Ministry.² These companies, akin to defense contractors, provide the industry with substantial human capital and technical expertise.

To better understand the role that knowledge-based companies play in Iran's drone ecosystem, this report reviews the most notable examples of such entities identified in open sources. They have primarily carved out niches in the domestic manufacture of components and the supply of research and development (R&D) services. Several key entities have been established for decades, though evidence of new entrants points to the growing role of such companies. While some have a connection to the IRGC, these connections are usually not overt.

As a result, Iran's military drone program, already difficult to hold back with export controls because of the near-universal availability of the relevant technologies, may become even more inured to supply-side controls in the coming years. Targeted sanctions may also prove challenging to apply, given difficulties in confirming the connection between knowledge-based companies and Iran's military drone program. Perhaps more concerning, a similar dynamic involving knowledge-based companies may emerge in Iran's missile, space, and nuclear industries.

¹ Michael Lipin, "Q&A: Why Iranian Drones Are Appealing to Belarus, Bolivia," Voice of America, August 12, 2023, available at <https://www.voanews.com/a/q-a-why-iranian-drones-are-appealing-to-belarus-bolivia/7222336.html>.

² "Iran's Annual Arms Exports Total \$1 Billion," Tasnim News Agency, November 13, 2023, available at <https://www.tasnimnews.com/en/news/2023/11/13/2987926/iran-s-annual-arms-exports-total-1-billion>.

Iran's Drone Ecosystem: An Overview

The entities that contribute to Iran's development, production, and use of military drones can be subdivided into five major groups.

State-owned corporations such as Iran Aircraft Manufacturing Industries (HESA) and Qods Aviation Industries (QAI), which most notably produce the Ababil and Mohajer families of drones, respectively, have formed the backbone of the industry since it began taking shape in the 1980s.³ These corporations, nested within the Ministry of Defense and Armed Forces Logistics (MODAFL), are involved in all stages of the drone development process, including R&D, components, and mass production.

The **armed forces** play a leading role too, and not only as an end-user of complete UAVs. Branches of the IRGC have had a hand in prototyping and developing drones through their respective in-house R&D units, called Self-Sufficiency Jihad Organizations (SSJOs). The IRGC Ground Force SSJO, for example, has developed the Meraj series of one-way attack drones.⁴ More prominently, the IRGC Aerospace Force and its Shahed Aviation Industries are responsible for the notorious Shahed-series drones used by Russia against Ukraine.⁵ The Aerospace Force SSJO is headed by Brigadier General Abdollah Mehrabi,⁶ a key individual in Iran's drone industry.

Iranian **universities** both educate UAV engineers and undertake drone-relevant research, contributing to the industry's knowledge base and human capital. For example, researchers at Ferdowsi University of Mashhad and Shahrood University of Technology published a paper in 2019 along with a colleague at a British university aimed at improving UAV engine

³ "The Ababil 2, an Iranian Drone That Easily Monitors the Main Bases of the Enemy," Young Journalists Club, November 3, 2019, available at <http://www.yjc.ir/00TwOB>.

⁴ "Unveiling of the IRGC's 'Newest Suicide Drone' (+ Photos)," Asr-e Iran, August 22, 2023, available at <https://www.asriran.com/003nDh>.

⁵ "Treasury Targets Actors Involved in Production and Transfer of Iranian Unmanned Aerial Vehicles to Russia for Use in Ukraine," U.S. Department of the Treasury, November 15, 2022, available at <https://home.treasury.gov/news/press-releases/jy1104>.

⁶ "Treasury Sanctions Network and Individuals in Connection with Iran's Unmanned Aerial Vehicle Program," U.S. Department of the Treasury, October 29, 2021, available at <https://home.treasury.gov/news/press-releases/jy0443>.

performance.⁷ As another example, Mehrabi has served as an assistant professor and member of the scientific committee at the IRGC-run Imam Hussein University, where he has collaborated on aerospace research with students and faculty.⁸

The industry is further supported by seemingly countless and shifting **procurement agents and front companies** that import components from abroad, usually then funneling them directly to state-owned companies. An example is Pardazan System Namad Arman (PASNA), which changed its trade name to Feraz Tejarat Ertebat Company in 2018 after the U.S. Department of the Treasury added it to its Specially Designated Nationals and Blocked Persons (SDN) List.⁹ PASNA is a major supplier of electronic parts with military applications to the state-owned Electronic Components Industries (ECI). It operates front companies in Iran, Malaysia, and Singapore, which it uses to source electronics from east Asia and beyond.¹⁰

Finally, the role of **knowledge-based private companies** in this ecosystem is becoming increasingly clear. These are not mere procurement agents or front companies, although some of them may have initially established themselves in that role. Rather, they are firms with substantial human capital and technical expertise. Some have backdoor connections to the IRGC, but by and large their ownership and management seem to belong to private citizens. Their efforts have mostly centered on producing components and offering R&D services. Some, but not all, have been sanctioned by the United States and the European Union.

⁷ Ali Hassantabar, Ahmad Najjaran, and Mahmoud Farzaneh-Gord, "Investigating the Effect of Engine Speed and Flight Altitude on the Performance of Throttle Body Injection (TBI) System of a Two-Stroke Air-Powered Engine," *Aerospace Science and Technology*, Vol. 86, March 2019, p. 5, available at <https://doi.org/10.1016/j.ast.2019.01.006>.

⁸ Mohammad Golriz, Hassan Mohammad Khani, and Abdollah Mehrabi, "Wing Optimization at Supersonic Speed," *First International Conference on the Application of Engineering Sciences in the Development and Progress of Iran 1404*, accessed via Civilica, available at <https://civilica.com/doc/653639/>.

⁹ "Treasury Sanctions Individuals and Entities for Human Rights Abuses and Censorship in Iran, and Support to Sanctioned Weapons Proliferators," U.S. Department of the Treasury, January 12, 2018, available at <https://home.treasury.gov/news/press-releases/sm0250>.

¹⁰ "Pardazan System Namad Arman," *Iran Watch*, last updated August 25, 2023, available at <https://www.iranwatch.org/iranian-entities/pardazan-system-namad-arman>.

Knowledge-based Companies' Role in Iranian Drones

The Islamic Republic has long prioritized achieving self-reliance in matters of national defense, an urge driven by its relative isolation during the war against Iraq in the 1980s.¹¹ Drones are no exception in this regard. This is not to say that Iran has achieved such independence. An examination of the wreckage of several Iranian drones launched by the Russian military and recovered in Ukraine in 2022 revealed that they were "made almost exclusively of components produced by companies based in Asia, Europe, and the United States."¹²

Still, Iran has made significant progress in the domestic production of key components, beginning with engines.

Engines: Mado Company, Aseman Pishraneh, and Farzanegan Propulsion Systems

Oje Parvaz Mado Nafar Company (Mado Company) is an illustrative example of a knowledge-based company working on Iranian drones.¹³ It was established in Iran in 2013 by Yousef Aboutalebi and several of his family members.¹⁴ Abdollah Mehrabi, the IRGC general, was the first chairman of the company's board of directors and also held an ownership stake.¹⁵

Aboutalebi and his associates may have started out simply as procurement agents helping import engines from abroad, but, according to Aboutalebi himself, they began working on reverse engineering a Western-made engine at least as early as 2007.¹⁶ Since then, the

¹¹ See, for example, "Iranian Defense Industry Symbol of National Self-Reliance," Mehr News Agency, August 22, 2023, available at <https://en.mehrnews.com/news/204811/Iranian-defense-industry-symbol-of-national-self-reliance>.

¹² "Dissecting Iranian Drones Employed by Russia in Ukraine," Conflict Armament Research, Ukraine Field Dispatch, November 2022, available at <https://storymaps.arcgis.com/stories/7a394153c87947d8a602c3927609f572>.

¹³ I thank Adam Rawsley for the many insights and leads about Mado Company and Aboutalebi. See Adam Rawsley, X (formerly Twitter), October 29, 2021, available at <https://twitter.com/arawsley/status/1454093333115113473?lang=en>.

¹⁴ This report makes extensive use of Iranian corporate records. More detailed sourcing information for factual claims in this report are available upon request.

¹⁵ "Treasury Sanctions Network and Individuals in Connection with Iran's Unmanned Aerial Vehicle Program," U.S. Department of the Treasury, October 29, 2021, available at <https://home.treasury.gov/news/press-releases/jy0443>

¹⁶ "Self-Sufficiency in the Production of an Engine for Unmanned Aerial Vehicles/Iranian Researchers Succeed in Building Engine for an Unmanned Aerial Vehicle," Iranian Students News Agency, July 27, 2010, available at isna.ir/xhrSt.

company has copied a number of piston and Wankel engine designs and has become the primary supplier of engines for Shahed-series one-way attack UAVs.¹⁷



An MD-550 engine made by Oje Parvaz Mado Nafar Company on display at an aerospace exhibition in Iran in October 2014. Credit: Uskowi on Iran website.

Mado Company's connections to China likely facilitated the import of Western-made engines to Iran initially. Later, however, those same connections may have become a means by which to sell Mado engines on the international market. Aboutalebi registered two trading companies in Hong Kong in 2013 and a third in mainland China in 2014.¹⁸ All three companies were dissolved by 2019, but a China-based company called Beijing Micropilot UAV Flight

¹⁷ "Council Implementing Regulation (EU) 2022/2430 of 12 December 2022 implementing Regulation (EU) 269/2014 concerning restrictive measures in respect of actions undermining or threatening the territorial integrity, sovereignty and independence of Ukraine," Official Journal of the European Union, December 12, 2022, pp. L 318 I/20-24, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R2430&from=EN>.

¹⁸ The companies were Mado Import and Export Company Limited, Kado Import and Export Company Limited, and Yiwu Madu Trading Company. Company profiles are available at <https://www.ltdtdir.com/companies/mado-import-and-export-company-limited/>; <https://www.ltdtdir.com/companies/kado-import-and-export-company-limited/>; and https://aiqicha.baidu.com/company_detail_40933942717574.

Control Systems continues to sell engines on Mado Company's behalf to any buyer willing to part with about \$18,000.¹⁹

Larger Iranian drones such as the Shahed-129 and Mohajer-6 have mostly relied on the Rotax 912 (or the turbocharged 914 variant), a four-cylinder engine built by the Austrian company BRP-Powertrain. To date, no Iranian company is known to have domestically reproduced the engine. But there is at least one private company, Aseman Pishraneh Engineering Services, that has extensive experience with it. Founded before 2003, Aseman Pishraneh is a subsidiary of Paravar Pars (discussed below). It offers repair, overhaul, and training services for Rotax-brand engines including the 912 and 914.²⁰ These activities facilitate the accumulation of tacit knowledge that would provide a solid foundation for a reverse-engineering effort.

Jet engines, which are more advanced than their piston-driven counterparts, have not seen very widespread use in Iranian drones, though they are used in Iranian cruise missiles. Such engines have so far been the exclusive remit of state-owned companies like the Aero Engines Design and Manufacturing Company (DAMA) and its predecessor Turbine Engineering Manufacturing. But there is evidence of a growing knowledge base in the private sector for miniaturized jet engines. For example, Farzanegan Propulsion Systems Design Bureau has designed and prototyped turbojet engines that could potentially be used in small UAVs.²¹ The company's head engineer, Hossein Pourfarzaneh, had previously been the managing director of DAMA before helping establish Farzanegan Propulsion in 2016 (he now works in the aviation division of MAPNA Group). According to the National Council of Resistance of Iran, Pourfarzaneh led a delegation to North Korea in 2009 for training on the production of cruise missiles.²² Although there is no other evidence to substantiate the North Korea claim, Pourfarzaneh has worked abroad in China, Russia, and Sweden by his own admission.²³

¹⁹ "Drone Gasoline Engine MDR208 rotary engine for Aircraft Drone Engine Long Range motor propeller personal aircraft," Alibaba World Wide Web site, available at https://www.alibaba.com/product-detail/Drone-Gasoline-Engine-MDR208-rotary-engine_1600836797096.html?spm=a2700.shop_plgr.41413.5.dfed316cHBxU6t.

²⁰ Home Page, Aseman Pishraneh World Wide Web site, available at <http://asmpish.com>.

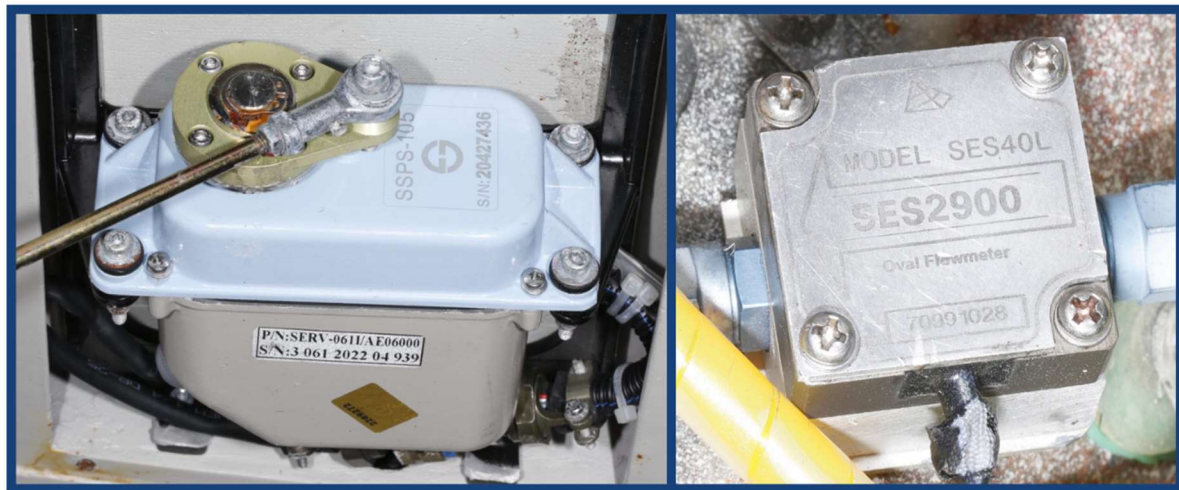
²¹ "Products," Farzanegan Propulsion Systems Design Bureau World Wide Web site, available at <https://farzaneganpb.com/products>.

²² "Iranian Regime's Attack on Saudi Oil Installations," Organization of Iranian American Communities, October 5, 2019, available at <https://oiac.org/iranian-regimes-attack-on-saudi-oil-installations/>.

²³ "Speech of the Honorable Dr. Hossein Pourfarzaneh," Sharif University of Technology Graduate Society, December 27, 2016, 16:06 to 16:16, available at <https://www.aparat.com/v/2tT3A>.

Mechanical Parts: Sarmad Electronic Sepahan and Rayan Roshd Afzar

Iranian companies have not limited themselves to supplying engines. For example, Sarmad Electronic Sepahan Company specializes in the design and manufacture of navigation and avionics equipment for UAVs.²⁴ It has produced servomotors and flowmeters copied from Japanese-origin parts, and these copies have been found in Mohajer-6 and Shahed-131 UAVs, respectively.²⁵ Although the incorporation of Sarmad parts into Iran's military drones may have begun only in the last few years,²⁶ the company was established in the 1990s.²⁷ It is owned and run by three members of the Movahed Abtahi family.



A servomotor and flow meter produced by Sarmad Electronic Sepahan, recovered from UAVs in Ukraine. Credit: Conflict Armament Research.

In July 2017, the U.S. Treasury identified Rayan Roshd Afzar as a company that "has produced technical components" for the IRGC's drones.²⁸ Reportedly established in 2001,²⁹ Rayan

²⁴ "About Us," Sarmad Electronic Sepahan World Wide Web site, available at sarmades.com/company/?lang=en.

²⁵ "Iran's Domestic Production of Drone Components," Conflict Armament Research, Ukraine Field Dispatch, July 2023, available at <https://storymaps.arcgis.com/stories/2969f34c694a4f6bb6b33332d9a39bf6>.

²⁶ Ibid.

²⁷ "About Us," Sarmad Electronic Sepahan World Wide Web site, available at sarmades.com/company/?lang=en.

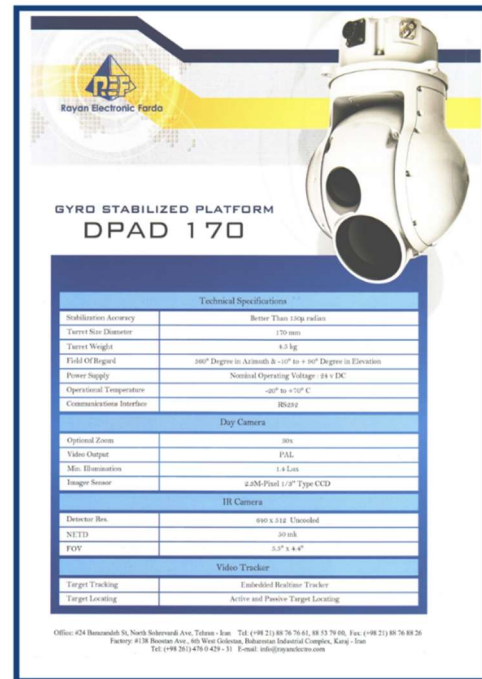
²⁸ "Treasury Targets Persons Supporting Iranian Military and Iran's Islamic Revolutionary Guard Corps," U.S. Department of the Treasury, July 18, 2017, available at <https://home.treasury.gov/news/press-releases/sm0125>.

²⁹ "Rayan Roshd Afzar Company," Rasm.io World Wide Web site, available at <https://rasm.io/company/10102168390/%D8%B1%D8%A7%DB%8C%D8%A7%D9%86%20%D8%B1%D8%B4%D8%AF%20%D8%A7%D9%81%D8%B2%D8%A7%D8%B1/>.

Roshd Afzar sells a variety of optical equipment with military applications, making it perhaps a competitor or a supplier of the state-owned Sairan Electro-Optic Industries (formerly known as Isfahan Optic Industries). According to an archived version of its website, Rayan Roshd Afzar products include electro-optical sensors specifically made for UAVs.³⁰

Rayan Roshd Afzar is majority-owned by the Iran-based Rayan Fan Kav Andish Company. The remaining shares are divided among five individuals: Seyed Reza Ghasemi, Farshad Hakemzadeh, Ali Homaie, Mohsen Parsajam, and Jalal Rohollahnejad. Several of those individuals also hold shares in Rayan Fan Kav Andish,³¹ which itself owns several other companies, including Rayan Pardazesh Pezhvak Company, Rayan Laser Test Company, and Rayan Electronic Farda Company. Some of those companies also produce UAV components.

Like Mado Company, Rayan Roshd Afzar has substantial ties to China, and it is not entirely clear which of its products are produced domestically and which are sourced from abroad. The United States has identified Rohollahnejad and the China-based Wuhan IRCEN Technology Co., Ltd., where he served as executive director, as involved in the procurement of goods on behalf of Rayan Roshd Afzar.³² Further, the U.S. Treasury has stated that Parsajam and Hakemzadeh have obtained dual-use items from China on behalf of Rayan



A catalogue page from Rayan Electronic Farda advertising a sensor ball for UAVs. Credit: Jangavaran website.

³⁰ "Products," Rayan Roshd World Wide Web site, Web Archive version of October 19, 2010, available at https://web.archive.org/web/20101019191556/http://www.rayroshd.com/products_02.asp?xcat=AiRoborne%20Camera.

³¹ Although corporate documents do not explicitly lay out the ownership of Rayan Fan Kav Andish, a joint stock company's board of directors must be selected from among the shareholders. As of May, the board of directors of Rayan Fan Kav Andish included Seyed Reza Ghasemi, Farshad Hakemzadeh, Ali Homaie, Mohsen Parsajam, and Abbasali Zabeli.

³² "Addition of Entities to the Entity List, and Revision of Entry on the Entity List," U.S. Department of Commerce, Bureau of Industry and Security, Federal Register, Vol. 85, No. 14794, March 16, 2020, pp. 14794-14799, available at <https://www.federalregister.gov/documents/2020/03/16/2020-03157/addition-of-entities-to-the-entity-list-and-revision-of-entry-on-the-entity-list>.

Roshd Afzar.³³ Both have held ownership stakes, along with the Chinese national Emily Liu (Liu Bao Xia), in several Chinese companies, including Raybeam Optronics Co. Ltd. and Abascience Tech Co. Ltd. (Sunway Tech Co. Ltd.).³⁴ These China connections may facilitate more than the procurement of components, however; it is possible that they serve as an avenue for the Iranian Rayan companies to benefit from Chinese R&D and technical expertise.

Straddling the Civilian-Military Divide: Baharestan Kish and Paravar Pars

Baharestan Kish Company has manufactured UAVs and "was working on" Shahed UAV components as of 2021, according to the U.S. Treasury.³⁵ Open sources reveal little else about the company's activities, but it has connections to the IRGC. A press report in 2015 asserted that the IRGC Cooperative Foundation (Bonyad Taavon Sepah) was among Baharestan Kish's shareholders, and corporate documents show that several of the companies represented on its board of directors count the IRGC Cooperative Foundation among their shareholders.³⁶ Further, a former chairman of Baharestan Kish's board of directors, Abulfazl Salehnejad, is an IRGC commander who served as deputy commander for industrial research in the IRGC SSJO.³⁷ And Baharestan Kish appears to have connections to Saber Kish Company, which the U.S. Treasury has labeled "IRGC-owned."³⁸ Still, its managing director Rahmatollah Heidari seems to be a businessman with connections to several other companies in various industries.

Paravar Pars Company has served Iran's military industries in numerous ways, including work related to drones. Officially established in 1992, its headquarters are located at the Sepehr Airport in east Tehran, adjacent to the IRGC-run Imam Hussein University. The National Council of Resistance of Iran has asserted that Paravar Pars "belongs to the Aviation Research

³³ "Treasury Targets Persons Supporting Iranian Military and Iran's Islamic Revolutionary Guard Corps," U.S. Department of the Treasury, July 18, 2017, available at <https://home.treasury.gov/news/press-releases/sm0125>.

³⁴ "Raybeam Optronics Co. Ltd.," Iran Watch, August 7, 2017, available at <https://www.iranwatch.org/suppliers/raybeam-optronics-co-ltd>; "Abascience Tech Co. Ltd.," Iran Watch, August 7, 2017, available at <https://www.iranwatch.org/suppliers/abascience-tech-co-ltd>.

³⁵ "Treasury Sanctions Iranian Persons Involved in Production of Unmanned Aerial Vehicles and Weapon Shipment to Russia," U.S. Department of the Treasury, September 8, 2022, available at <https://home.treasury.gov/news/press-releases/jy0940>.

³⁶ Companies include Baharan Company, Meteorite (Shahab Sang) Mineral Industries Company, Combatants' Homebuilding Jihad Company, and Dynamic Celestial Sphere (Pouya Aflak Sepehr) Company.

³⁷ "Salehnejad: We've Become Self-Sufficient in the Manufacture of Air Defense Radars," Mashregh News Agency, February 19, 2011, available at mshrg.h.ir/30511.

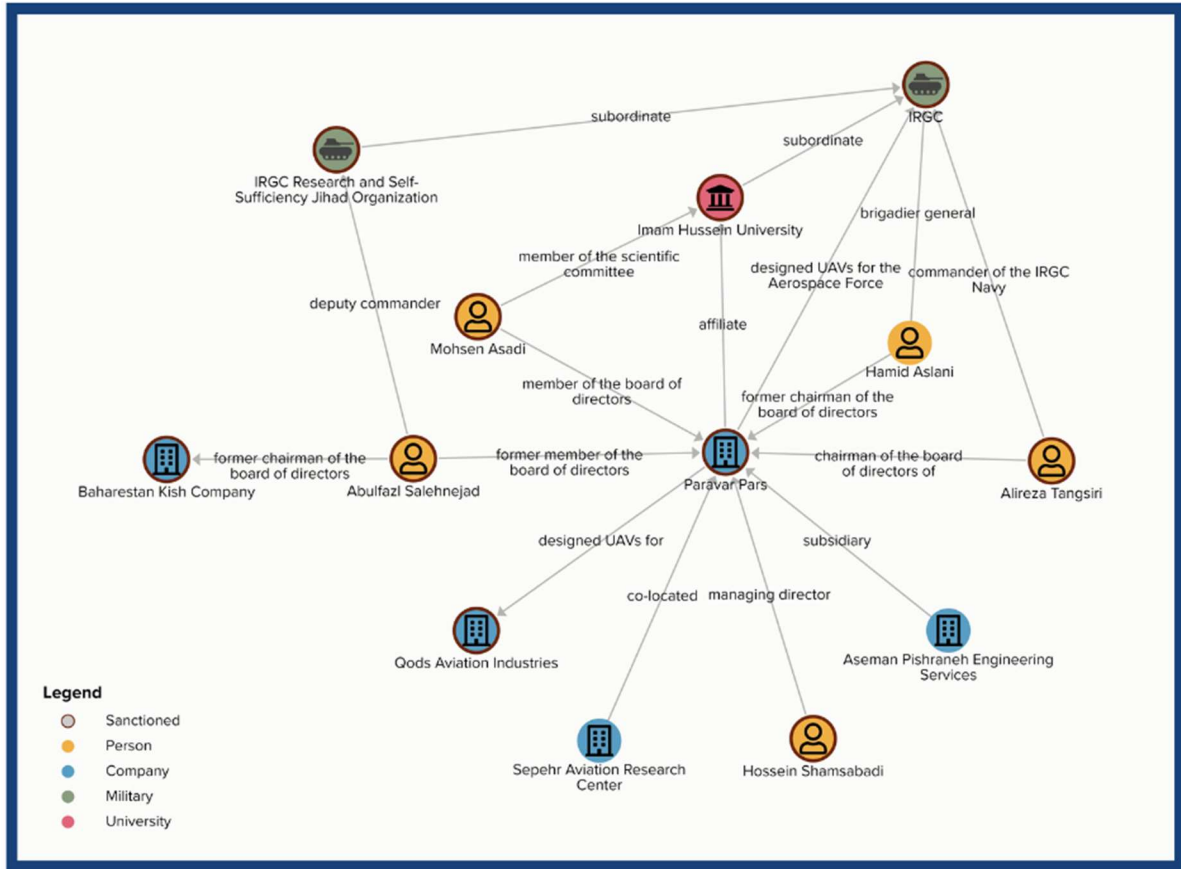
³⁸ "Treasury Sanctions Actors Supporting Iran's Missile and UAV Programs," U.S. Department of the Treasury, October 18, 2023, available at <https://home.treasury.gov/news/press-releases/jy1820>.

Unit" of Imam Hussein University and that it "has been placed under the control of the IRGC Aerospace Force since 2005."³⁹ The chairman of the company's board of directors is Alireza Tangsiri, the commander of the IRGC Navy, and Mohsen Asadi, a former managing director and current board member, is a member of Imam Hussein University's scientific committee.⁴⁰ Hamid Aslani, also a high-ranking IRGC commander, was previously chairman of the board,⁴¹ and Salehnejad—the former chairman of Baharestan Kish—was also previously a board member, representing the IRGC SSJO in that capacity. Given these extensive connections to the IRGC, it is debatable whether Paravar Pars can truly be considered a private company; but, similar to Baharestan Kish, it seems to straddle the line as a privately-run entity with some level of IRGC backing.

³⁹ *IRGC's Rising Drone Threat: A Desperate Regime's Ploy to Project Power, Incite War* (Washington, D.C.: National Council of Resistance of Iran, 2021), pp. 35-36 (Kindle version).

⁴⁰ "Scientific Committee," First National Conference on Navigation, Sharif University of Technology, available at http://nnc.strik.sharif.ir/page_343.html.

⁴¹ "Hamid Aslani," Publication Database of the Works of Shahid Hassan Bagheri, available at <https://www.bagheri.ir/featured/id,105/%D8%A2%D8%B4%D9%86%D8%A7%DB%8C%DB%8C-%D8%A8%D8%A7-%D8%AD%D8%B3%D9%86.html>.



A network map showing entities connected to Paravar Pars Company. Credit: Wisconsin Project

In any case, Paravar Pars's drone-related work runs the gamut. It produces the Oghab hand-launched UAV,⁴² which is identical to a reconnaissance drone that Qods Aviation Industries has marketed for export under the name Bina.⁴³ Moreover, according to the U.S. Treasury, the company was involved in the research, development, and production of the Shahed-171 UAV for the IRGC Aerospace Force and has been involved in efforts to reverse engineer Israeli- and American-made models.⁴⁴ The company also houses the Sepehr Aviation Research

⁴² "Hand Launched Oghab Drone," Paravar Pars World Wide Web site, available at <http://www.paravar-pars.com>.

⁴³ "Iran's Bina tactical UAV displayed at ADEX 2018," Army Recognition, September 27, 2018, available at https://www.armyrecognition.com/adex_2018_news_official_show_daily/iran_s_bina_tactical_uav_displayed_at_adex_2018.html.

⁴⁴ "Treasury Sanctions Iranian Persons Involved in Production of Unmanned Aerial Vehicles and Weapon Shipment to Russia," U.S. Department of the Treasury, September 8, 2022, available at <https://home.treasury.gov/news/press-releases/jy0940>.

Center, whose researchers have published academic work on UAV simulation and autopilot design.⁴⁵

Other Industry Players: Bespar Sazeh Composite and Kimia Part Sivan

The National Council of Resistance of Iran asserts that Bespar Sazeh Composite Company manufactures UAV airframe parts, including for Mohajer-series drones.⁴⁶ Such an assertion is plausible, as the company was originally located next door to Qods Aviation Industries in an industrial area along the Lashgari Expressway near Mehrabad airport, where several other aircraft parts manufacturers are located. Moreover, the company's website indicates that it is equipped to supply metal and composite parts for the aviation industry, among other industries.⁴⁷ Mohammadreza Khosrojerdi and Masoumeh Kakavand founded Bespar Sazeh Composite in 2014 and still apparently run it.

Finally, Kimia Part Sivan Company (KIPAS), established in 2011, could be considered a knowledge-based company working on UAVs. Although it purportedly specializes in the manufacture of fiberglass products for civilian applications, according to the U.S. Treasury, KIPAS has supplied the IRGC Qods Force with drone components sourced from abroad, conducted drone flight tests, and provided technical assistance to the IRGC.⁴⁸ The claim about "technical assistance" in particular suggests a level of human capital exceeding that which a run-of-the-mill procurement company might have to offer. Its publicly available business records reveal no overt connections to the military or to state-owned enterprises, however.

New Entrants?

Beyond the companies whose roles have been well-established in open sources, Iranian corporate records reveal a network of recent entrants apparently positioning themselves to claim a portion of the now-booming drone business. Some of these companies are newly established, while others are shifting their focus to drone-related work. These companies,

⁴⁵ "UAV Simulation and Autopilot Design Using Software-in-the-loop and Hardware-in-the-loop Tests," *Journal of Aerospace Science and Research*, Vol. 2, No. 3, Fall 2009, available at https://jasr.srbiau.ac.ir/article_3140_621d0baa0bd84b07a06bad776010cc75.pdf.

⁴⁶ *IRGC's Rising Drone Threat: A Desperate Regime's Ploy to Project Power, Incite War* (Washington, D.C.: National Council of Resistance of Iran, 2021), p. 30-31 (Kindle version).

⁴⁷ "Mission," Bespar Sazeh Composite World Wide Web site, available at <http://www.bscomposite.com/index.aspx?&siteid=1&pageid=137>.

⁴⁸ "Treasury Sanctions Network and Individuals in Connection with Iran's Unmanned Aerial Vehicle Program," U.S. Department of the Treasury, October 29, 2021, available at <https://home.treasury.gov/news/press-releases/jy0443>.

and the individuals behind them, may also be aiming to benefit from the newfound reliance of Russia on Iranian-designed drones.

Perhaps the most notable company within the network is Bonyan Danesh Shargh, a company that has previously been involved in Iran's space program and that has a track record of cooperation with Russian entities. In 2015, it inked an agreement with the Russia-based companies VNIIElectromekhaniki and BARL Research and Production Corporation on the development, creation, and operation of a remote-sensing satellite.⁴⁹ That satellite was launched from Russia in August 2022, and Bonyan Danesh Shargh is reportedly responsible for its in-orbit operation.⁵⁰ Further back, in 2011, the company reportedly signed a contract with a Russian company to deliver Orion-12 "ekranoplan" amphibious military transport aircraft to Iran.⁵¹

Although it was established in 1996, Bonyan Danesh Shargh has much more recently positioned itself to get into the drone business. In July 2023, it issued a public notice indicating that its company activities would now include "the production of unmanned aerial vehicles (UAVs) and quadcopters, and production of other unmanned vehicles."

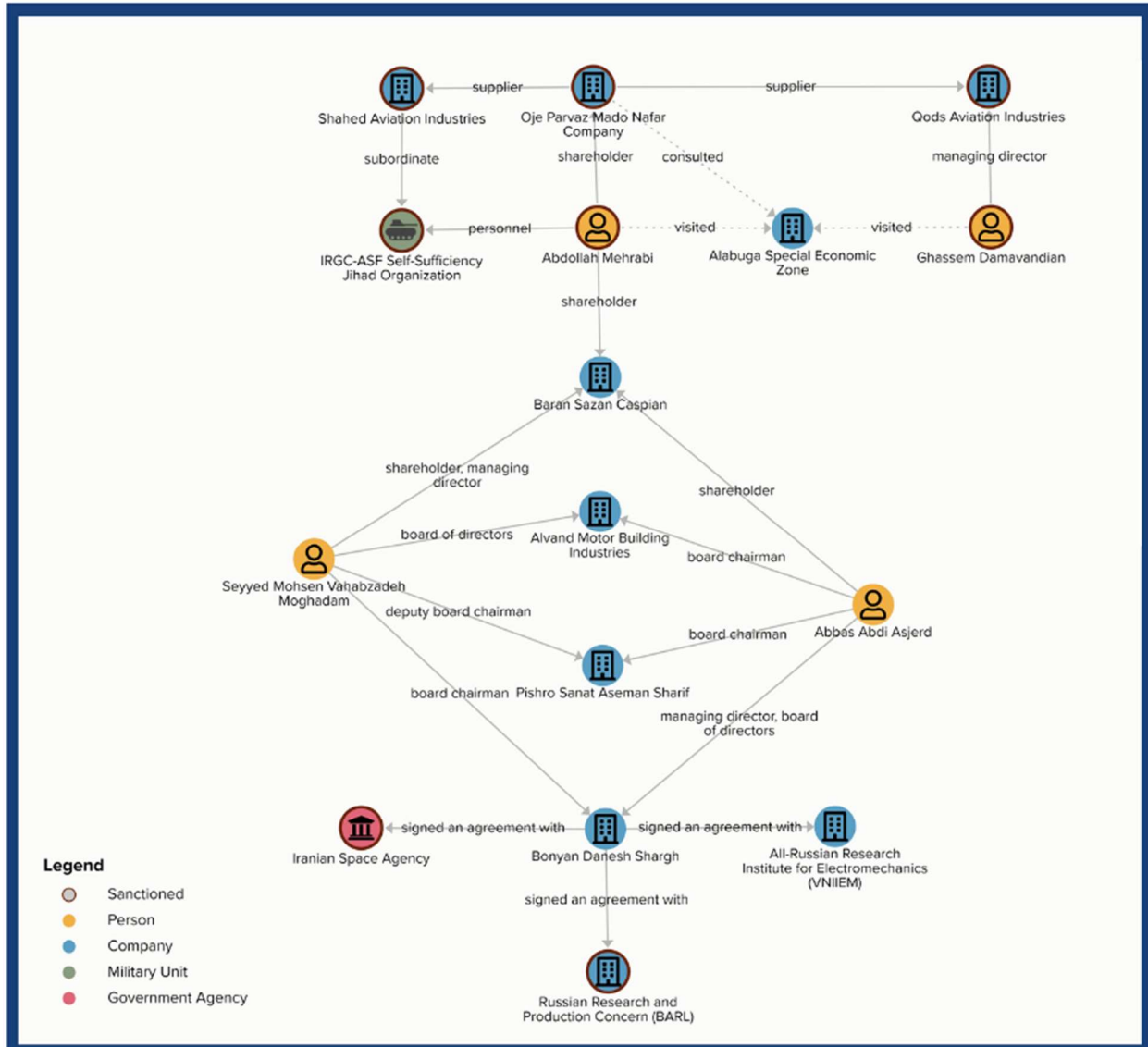
A gambit by Bonyan Danesh Shargh to get into the military drone business is coherent given that its two key officials, Abbas Abdi Asjerd and Seyed Mohsen Vahab Zadeh Moghadam, have a connection to Abdollah Mehrabi, who heads the IRGC Aerospace Force SSJO. Mehrabi, Asjerd, and Moghadam all hold shares in another company called Baran Sazan Caspian—putatively involved in water supply and cloud seeding but also authorized for imports and exports. Like Bonyan Danesh Shargh, Mehrabi has links to Russia: He is reported to have helped establish a drone production facility for Shahed-series UAVs in Russia's Alabuga Special Economic Zone.⁵²

⁴⁹ "Agreement on the Creation of a Remote Sensing Satellite for the Republic of Iran," JSC VNIIE Corporation World Wide Web site, August 25, 2015, available at https://www.vniie.ru/ru/index.php?option=com_content&view=article&id=718:2015-08-26-04-14-18&catid=36:2008-03-09-13-50-48&Itemid=50.

⁵⁰ Justin Mooney, "Russia Launches Soyuz Rocket with Iranian Satellite and Cubesats," NASA SpaceFlight, August 9, 2023, available at <https://www.nasaspaceflight.com/2022/08/russia-soyuz-iranian-satellite>.

⁵¹ "Russian Ekranoplans to Fly in Iran," Sputnik International, April 23, 2017, available at <https://sputnikglobe.com/20170423/russia-iran-ekranoplans-1052908731.html>.

⁵² Dion Nissenbaum and Warren P. Strobel, "Moscow, Tehran Advance Plans for Iranian-Designed Drone Facility in Russia," Wall Street Journal, February 5, 2023, available at <https://www.wsj.com/articles/moscow-tehran-advance-plans-for-iranian-designed-drone-facility-in-russia-11675609087>.



A network map showing entities connected to Abdollah Mehrabi, Seyyed Mohsen Vahabzadeh Moghadam, and Abbas Abdi Asjerd. Credit: Wisconsin Project

Asjerd and Moghadam have embarked on a drone start-up spree, opening at least three new companies with drone ambitions in the last 18 months: Alvand Motorbuilding Industries Company, Pishro Sanat Aseman Sharif Company, and Moj Gostar Aseman Parvaz Company. All three were officially established in August 2022 or later, are authorized to conduct business related to UAVs or their components, and have a board of directors under the control of Asjerd and Moghadam.

Based on the information available, however, it is not possible to say conclusively that the network of companies led by Asjerd and Moghadam is actively supporting Iran's military

drone industry. Perhaps their stated interest in UAVs is still aspirational, or perhaps they are interested in drones with civil applications. But the corporate registration bonanza, connection to Abdollah Mehrabi, and existing contacts with Russia point to the possibility that Asjerd and Moghadam seek to tap into the booming military drone business, possibly including exports or the provision of services to Russia.

Conclusion

In November, Deputy Defense Minister Farahi stated that Iran's arms exports reached nearly \$1 billion in the Persian year 1401 (March 2022 to March 2023). Although this statistic may be exaggerated, data from the Stockholm International Peace Research Institute (SIPRI) and press reportage indicate that Iran's defense exports swelled in 2023, driven largely by drones.⁵³ These figures do not account for demand coming from Iran's own armed forces.

The full implications of this lucrative market drawing the private sector into Iran's drone industry are not yet clear, but one consequence concerns the effectiveness of supply-side controls in inhibiting Iran's drone industry. Experts have acknowledged that export controls face inherent limits when it comes to drones because many of the components found in Iranian drones are commercial grade and ubiquitous on the international market.⁵⁴ The growth of a domestic, knowledge-intensive industry that is capable of substituting or replicating complex parts—as Sarmad Electronic did with Japanese servomotors—complicates the picture further by driving down the level of items Iran procures abroad to more basic, harder-to-control inputs such as electronic chips.⁵⁵

The growth of private knowledge-based companies may also complicate the use of targeted sanctions to slow Iran's drone progress, given the difficulties in confirming the connection between the companies and Iran's military. Where private companies have connections to the IRGC, it is in many cases through their ownership and board of directors and can be multiple degrees removed. This information is not always easy to ascertain, and so these

⁵³ "TIV of arms exports from Iran, 1992-2022," Stockholm International Peace Research Institute Arms Transfers Database, last updated March 13, 2023, available at <https://armstrade.sipri.org/armstrade/page/values.php>.

⁵⁴ "Clipping Tehran's Wings: How Supply-Side Controls Can Impede the Iranian Drone Program," Iran Watch, February 15, 2023, available at <https://www.iranwatch.org/our-publications/roundtables/clipping-tehrans-wings-how-supply-side-controls-can-impede-iranian-drone-program>.

⁵⁵ Dion Nissenbaum, "Iran's Drone Industry Is Harder to Sanction Amid Sales to Russia," Wall Street Journal, July 13, 2023, available at <https://www.wsj.com/articles/irans-drone-industry-is-getting-harder-to-sanction-500839d7>.

companies may be able to operate freely for some time before attracting the attention of sanctioning authorities.

A final question is whether the robust private sector involvement is unique to the drone industry. Is the private sector's role in drone development a function of the relatively low-tech nature of the product? Or could Iran's more high-tech missile, space, or nuclear programs also tap private sector expertise as well?

There is some evidence suggesting that such investment is already beginning to take place. For example, the Kowsar imaging satellite unveiled in 2022 was reportedly built by a consortium of eight private companies. A government official stated at the time of the satellite's unveiling that the government supported the entry of private companies into the space-launch business, too.⁵⁶ Similarly, the U.S. Treasury sanctioned a private company, Fanavaran Sanat Ertebatat Company, in October 2023 for producing jam-resistant guidance systems for the IRGC Aerospace Force SSJO, likely for use in missiles.⁵⁷

⁵⁶ "The Support of the Presidential Space Technologies Development Headquarters to 4 Private Satellite Building Sectors in the Country," Islamic Republic News Agency, February 3, 2022, available at <https://irna.ir/xjHr3B>.

⁵⁷ "Treasury Sanctions Actors Supporting Iran's Missile and UAV Programs," U.S. Department of the Treasury, October 18, 2023, available at https://home.treasury.gov/news/press-releases/jy1820_

About the Author

John Krzyzaniak is a Research Associate at the Wisconsin Project on Nuclear Arms Control where he conducts research related to Iran's nuclear and military programs as well as the entities supporting them. Wisconsin Project Executive Director Valerie Lincy and Senior Research Associate John P. Caves III contributed to this report.

About the Wisconsin Project

The Wisconsin Project on Nuclear Arms Control is a non-profit, non-partisan organization based in Washington D.C. that conducts research, advocacy, and public education designed to inhibit the spread of nuclear, chemical, and biological weapons and the missiles to deliver them. The organization was founded in 1986 by Gary Milhollin, in cooperation with the University of Wisconsin.

The Wisconsin Project's mission is to reduce the risk that exports will accelerate the proliferation of weapons of mass destruction. The Project helps governments comply with the export restrictions in international agreements, and helps them ensure that their national controls on strategic goods are enforced. The Project also publicizes clandestine transactions in these goods, and draws attention to weaknesses in trade agreements and national laws. Through its research, testimony, and publications, the Project has influenced the export policies of major supplier countries.

About Iran Watch

Iran Watch is a website published by the Wisconsin Project that monitors Iran's capability for building nuclear weapons and long-range missiles. The purpose of the website is to increase public awareness of the strategic situation in Iran and to make detailed knowledge of Iran's weapon potential available to policymakers, the media, private scholars, and the public. The site contains thousands of primary source documents related to Iran, as well as reports on Iran's nuclear and missile programs, profiles of the entities involved in or supporting these programs, and analysis of the international effort to halt them.

