










Unmanned Aerial Vehicle (UAV) Occupations

Labor Market Analysis: San Diego County

November 2022

Summary

NEW PROGRAM RECOMMENDATION?	EVIDENCE OF A SUPPLY GAP?	AT OR ABOVE THE LIVING WAGE?	EXPECTED LEVEL OF EDUCATION
 Proceed with Caution	 	 	<input checked="" type="checkbox"/> Bachelor's Degree+ <input type="checkbox"/> Associate Degree <input type="checkbox"/> Some College or Certificate <input type="checkbox"/> HS Diploma or Equivalent <input type="checkbox"/> Less Than a HS Diploma <input type="checkbox"/> Apprenticeship
SUPPORT FOR PROGRAM MODIFICATION?	NUMBER OF INSTITUTIONS THAT PROVIDE TRAINING	NUMBER OF ANNUAL JOB OPENINGS	
 	MEDIUM 	HIGH 	

The Center of Excellence (COE) for the San Diego & Imperial Counties Community Colleges developed this brief to assist the region with strategic planning and program development. While the COE generally analyzes demand and supply to determine if there is a supply gap, traditional occupational demand data for *Unmanned Aerial Vehicle (UAV) occupations* is limited. However, with nearly 500 online job postings each year between 2019 and 2021, online activity suggests that employers have an increased need for these positions. Similarly, due to the small size of the programs training for these positions, the supply from region's institutions cannot be calculated. From 2019 to 2022, the average number of Part 107 licenses issued for UAV occupations was 1,528. Based on this information, it could be argued that an oversupply exists for UAV occupations. This brief recommends proceeding with caution when developing a new program and supports a program modification because 1) there is not enough information to determine if there is a supply gap; 2) there is a high number of annual job openings; and 3) entry-level and median wages are above the living wage. **Colleges should note that employers typically require a bachelor's degree as the minimum educational requirement for these occupations.** There may be an opportunity for the community colleges to market these programs to incumbent (existing) workers who may already have a bachelor's degree and simply need upskilling or additional training to qualify for these positions.

Introduction

This report provides labor market information in San Diego County for *Unmanned Aerial Vehicle (UAV) occupations*. Depending on the company, *UAV occupations* may have other titles, such as UAV Operators, Unmanned Aircraft Systems (UAS) Operators, UAS Mechanic, Commercial Drone Pilots/Operators and Remote Pilots/Operators. In this report, these jobs are collectively referred to as *UAV occupations*.

Unmanned aerial vehicles are remote-controlled airships and include four primary aerial platforms: fixed-wing aircrafts like airplanes; single-rotor helicopters; fixed-wing hybrid aircraft that include a rotor component; and multi-rotor multicopters, like quadcopters or octocopters.¹

As of December 2015, the FAA began requiring all commercial UAV pilots to have a Remote Pilot Certificate in accordance with the FAA's Small UAS Rule (Part 107), commonly referred to as a "Part 107 license." A Remote Pilot Certificate license costs \$175 and applicants must pass an aeronautical knowledge exam. Alternatively, pilots that hold a pilot certificate issued under FAA 14 CFR Part 61 and completed a flight review within the last 24 months are eligible to obtain a Remote Pilot Certificate after completing an online training course. Once the Remote Pilot Certificate is obtained, pilots are required to complete an online recurrent training course every 24 months.² In addition to a Part 107 license, all UAVs, except for those that weigh between .55 lbs and 55lbs, must be registered with the FAA.

The Federal Aviation Administration (FAA) announced 26 schools nationally have been chosen, so far, to participate in the Unmanned Aircraft Systems Collegiate Training Initiative (UAS-CTI); three of these colleges are in the San Diego-Imperial region: MiraCosta College, Palomar College, and Southwestern College.³ Palomar offers a Drone Technology Program; MiraCosta College's Technology Career Institute has an Unmanned Systems ROV/Drone Operator Technician Program; and Southwestern College offers a Drone Technology & Applications program. To assist these San Diego and Imperial Counties Community Colleges with strategic planning and program development, the labor market analysis provided in this brief includes an overview of demand, employers, supply, wages, education, skills, and certifications for *UAV occupations*.

¹ M. Hassanalian and A. Abdelkefi, "Classifications, Applications and Design Challenges of Drones: A Review," *Progress in Aerospace Sciences*, no. 91 (May 2017): 99-131, ResearchGate, accessed October 18, 2022, [researchgate.net/publication/316673697](https://www.researchgate.net/publication/316673697).

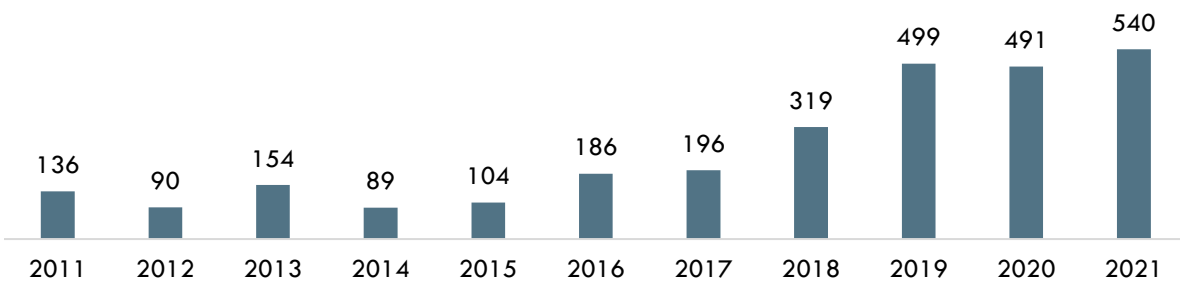
² "Become a Drone Pilot," Federal Aviation Administration, last modified April 30, 2020, accessed October 18, 2022, [faa.gov/uas/commercial_operators/become_a_drone_pilot](https://www.faa.gov/uas/commercial_operators/become_a_drone_pilot)

³ "UAS-CTI School Directory," Federal Aviation Administration, last modified July 2022, accessed October 18, 2022, [faa.gov/sites/faa.gov/files/2022-07/UAS-CTI-School_Directory_2022_July_0.pdf](https://www.faa.gov/sites/faa.gov/files/2022-07/UAS-CTI-School_Directory_2022_July_0.pdf).

Online Job Postings and Top Employers

Currently, there is no Standard Occupational Classification (SOC) code in the U.S. Bureau of Labor Statistics (BLS) occupational coding system for *UAV occupations* (e.g., drone pilots, drone technicians, drone photographers); therefore, traditional occupational demand data for these roles is limited. To better understand the current need for *UAV occupations*, this brief primarily analyzes online job postings data using 35 keywords related to these positions (Appendix A). Between 2011 and 2018, there was an average of 159 online job postings per year for jobs related to UAVs in San Diego County (Exhibit 1). In recent years (2019-2021), employers posted an average of 510 online job postings for the key words listed in Appendix A, suggesting an increased need for these positions.

Exhibit 1: Number of Online Job Postings for UAV Occupations in San Diego County (2011-2021)⁴



Between January 1, 2019 and December 31, 2021, the top five employers in San Diego County for *UAV occupations* were *General Atomics*, *Atlas Air*, *Qualcomm*, *Meggitt Plc*, and *TE Connectivity* based on online job postings (Exhibit 2).

Exhibit 2: Top Employers for UAV Occupations in San Diego County⁵

Top Employers	
<ul style="list-style-type: none"> • General Atomics • Atlas Air • Qualcomm • Meggitt Plc • TE Connectivity 	<ul style="list-style-type: none"> • Atlas Air Worldwide • U.S. Government • Solute • Citadel Defense • Northrop Grumman

⁴ Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2011-2021.

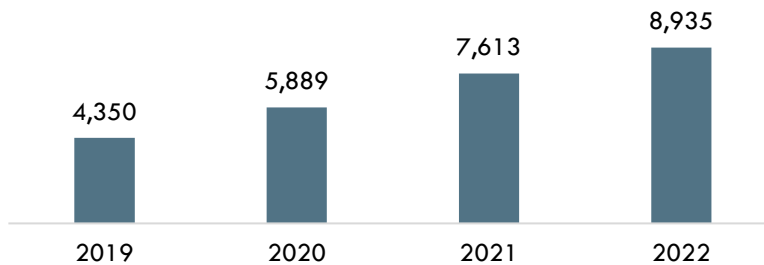
⁵ Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

Educational Supply

Educational supply for an occupation can be estimated by analyzing the number of related program completions, graduations, or awards. There are five community colleges in San Diego County that provide training for UAV-related jobs: [Grossmont College](#), [Palomar College](#), [MiraCosta College](#), [San Diego Miramar College](#), and [Southwestern](#). However, due to the small size of these programs, the supply from these colleges cannot be calculated.

Because the Federal Aviation Administration (FAA) requires that drone pilots have licenses and registered drones, this report analyzes data from the FAA registry to estimate the labor supply based on the number of registered Part 107 licenses for unmanned aerial vehicles in San Diego County. From 2019 to 2022, the number of Part 107 licenses doubled from 4,350 to 8,935 with an average of 1,528 licenses being issued a year in San Diego County (Exhibit 3).

Exhibit 3: Number of Part 107 Licenses in San Diego County, 2019-2022



As of 2022, there were 8,935 registered persons with a Part 107 license in San Diego County (Exhibit 4). The city with highest number of people licensed for unmanned aerial vehicles is the City of San Diego with 3,786 licenses or 42 percent of all licenses in San Diego County.⁶

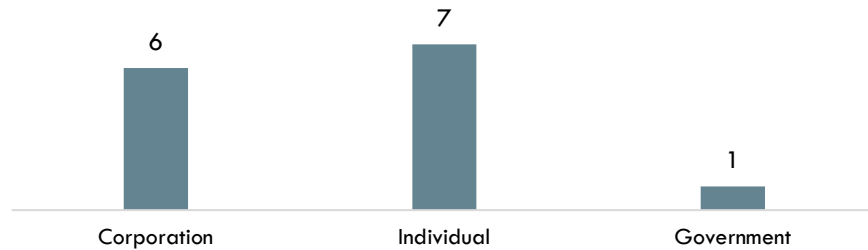
Exhibit 4: Number of Part 107 Licenses by City in San Diego County, 2022

Area	Registrations	Area	Registrations
San Diego	3,786	Bonita	50
Chula Vista	559	Valley Center	47
Carlsbad	448	Imperial Beach	40
Oceanside	438	Cardiff By The Sea	37
Escondido	400	Rancho Santa Fe	27
El Cajon	369	Lemon Grove	26
La Mesa	331	Jamul	25
San Marcos	327	San Ysidro	24
La Jolla	242	Bonsall	11
Vista	230	Borrego Springs	10
Temecula	201	Julian	8
Encinitas	182	Pauma Valley	4
Santee	137	Pine Valley	4
Poway	134	Campo	3
Spring Valley	111	Lincoln Acres	3
National City	101	Warner Springs	3
San Clemente	100	Camp Pendleton	2
Fallbrook	97	Descanso	2
Lakeside	91	MCAS Miramar	2
Ramona	89	Boulevard	1
Del Mar	68	Guatay	1
Solana Beach	59	Jacumba	1
Alpine	51	Pala	1
Coronado	51	Potrero	1

⁶ "Unmanned Aerial System (UAS) & Small Unmanned Aerial System (sUAS)," Federal Aviation Administration, last modified October 4, 2022, accessed October 19, 2022, [faa.gov/foia/electronic_reading_room/uas#registrants](https://www.faa.gov/foia/electronic_reading_room/uas#registrants).

As of October 2022, there were 14 registered UAVs (.55 and up to 55 pounds) in San Diego County, with six registered to corporations, seven registered to individuals and one registered to the government (Exhibit 5). That is 260 (95 percent) fewer registered UAVs than in April 2017.⁷

Exhibit 5: Registered Unmanned Aircraft Vehicles in San Diego County as of April 2020⁸



The average cost of a UAV registered in San Diego County is \$1,564.33 and the median cost is \$1,799.00. Exhibit 5 shows only the UAV registered through the Federal Aviation Administration, not the multitude of small UAV operated by hobbyists who are not required to register if the UAV weighs less than .55 pounds. Refer to Appendix B for more information on registered drone models in San Diego County and their respective costs.

Demand vs. Supply

A complete labor market demand and supply analysis could not be completed for this report due to a lack of data. However, based on online job postings San Diego County saw an average of 510 online job postings per year since 2019; therefore, it could be estimated that employers have a labor market demand of 510 UAV occupations per year. Additionally, because the FAA requires that drone or UAV pilots register with the Federal Aviation Administration, it could be estimated that 1,528 registered individuals constitute the supply for UAV occupations. With 1,528 drone pilots and 510 job postings per year for UAV occupations, it could be argued that there is an oversupply for this occupation.

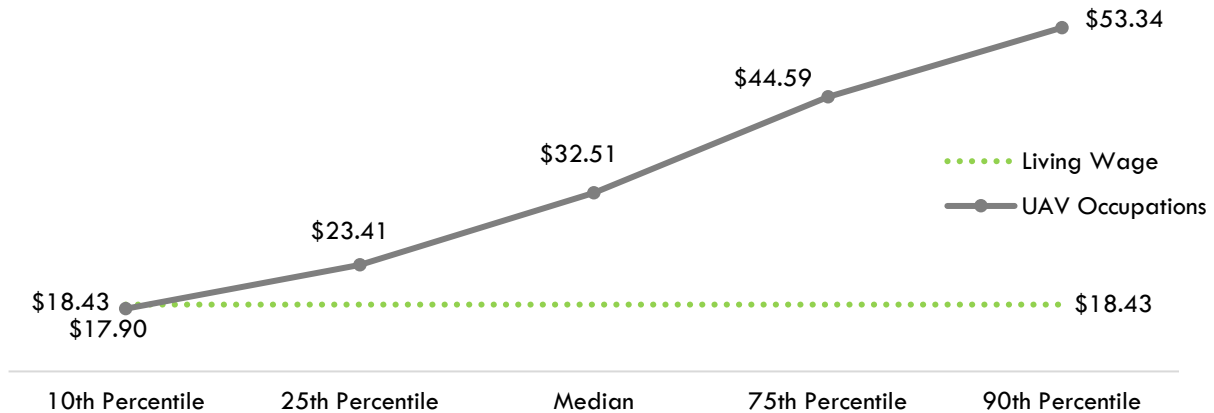
⁷ Daniel Wheaton, "San Diego is Mostly a No-Drone Zone, at Least According to the Rules," *San Diego Union Tribune*, April 6, 2017, accessed October 17, 2022, [sandiegouniontribune.com/news/data-watch/sd-me-faa-drone-20170406-story.html](https://www.sandiegouniontribune.com/news/data-watch/sd-me-faa-drone-20170406-story.html).

⁸ "FAA Registry: State and County Inquiry," Federal Aviation Administration, last modified April 30, 2020, accessed October 18, 2022, registry.faa.gov/aircraftinquiry/Search/StateCountyInquiry.

Earnings

According to online job postings data, *UAV occupations* have entry-level hourly earnings of \$23.41; this is more than the living wage for a single adult in San Diego County, which is \$18.43 per hour (Exhibit 6).⁹

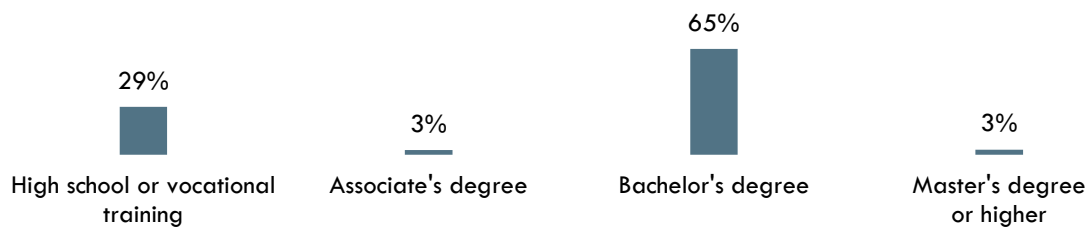
Exhibit 6: Hourly Earnings¹⁰ for UAV Occupations in San Diego County¹¹



Education, Skills, and Certifications

Because there is no SOC code associated with *UAV occupations*, no national educational attainment data illustrating the typical education obtained by individuals employed in this occupation is provided in this report. However, based on online job postings between January 1, 2019 and December 31, 2021, the top listed educational requirement for UAV occupations is a **bachelor's degree** (Exhibit 7).¹²

Exhibit 7: Educational Requirements for UAV Occupations in San Diego County¹³



*may not equal 100 percent due to rounding

⁹ "Family Needs Calculator (formerly the California Family Needs Calculator)," Insight: Center for Community Economic Development, last updated 2021. insightccd.org/family-needs-calculator/.

¹⁰ 10th and 25th percentiles could be considered entry-level wages, and 75th and 90th percentiles could be considered experienced wages for individuals who may have been in the occupation longer, received more training than others, etc.

¹¹ Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

¹² Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2011-2021.

¹³ Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2011-2021.

Exhibit 8 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2019 and December 31, 2021.

Exhibit 8: Top Skills for UAV Occupations in San Diego County¹⁴

Specialized Skills	Soft Skills	Software Skills
<ul style="list-style-type: none"> • Ground Control • Repair • Software Development • Software Engineering • Scheduling • Data Acquisition • Schematic Diagrams • Customer Service • Project Management • Data Collection • Soldering • Customer Contact • Debugging • Hand Tools • Quality Assurance and Control 	<ul style="list-style-type: none"> • Communication Skills • Planning • Teamwork / Collaboration • Research • Troubleshooting • Written Communication • Writing • English • Physical Abilities • Problem Solving • Detail-Oriented • Organizational Skills • Computer Literacy • Editing • Creativity 	<ul style="list-style-type: none"> • C++ • Python • MATLAB • Linux • User Interface (UI) Design • Microsoft Excel • Real-Time Operating System (RTOS) • Test Director • Ubuntu • Software Architecture • Microsoft PowerPoint • Microsoft Word • Java • Adobe Photoshop • MathWorks Simulink

Exhibit 9 lists the top certifications that appeared in online job postings between January 1, 2019 and December 31, 2021.

Exhibit 9: Top Certifications for UAV Occupations in San Diego County¹⁵

Top Certifications in Online Job Postings
<ol style="list-style-type: none"> 1. Security Clearance 2. Pilot Certification 3. Licensed Professional Engineer 4. Restricted Radiotelephone Operator Permit 5. Occupational Safety and Health Administration Certification 6. Licensed Professional Surveyor 7. Certified Flight Instructor (CFII) 8. First Aid CPR AED

¹⁴ Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

¹⁵ Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.

Appendix A: Keywords used in Burning Glass Search

Keywords

- aerial cinematography
- autonomous pilot
- drone
- drone operations
- drone operator
- drone photography
- drone pilot
- drone pilot and data analyst
- drone technician
- drone videographer
- Fixed Wing UAS operator
- Fixed Wing UAS pilot
- part 107 pilot
- Remote Pilot in Charge
- Remote Pilot in Command
- sUAS
- UAS mechanic
- UAS Operator
- UAS pilot
- UAS technician
- UAV mechanic
- UAV operator
- UAV pilot
- UAV Pilot and Data Analyst
- UAV Sensor Integration Technician
- UAV technician
- unmanned aerial system operator
- unmanned aerial system pilot
- unmanned aerial vehicle operator
- unmanned aerial vehicle pilot
- unmanned aircraft system operator
- unmanned aircraft system pilot
- unmanned aircraft vehicle operator
- unmanned aircraft vehicle pilot
- visual observer

Appendix B: Drone Models, Cost, and Website

Of the drone models registered in San Diego County, the following table lists the model name, cost, and website used to determine the cost. Models with “Experimental” in the “Cost” column have no cost associated because they are not sold commercially. An “X” in the “Cost” column means that no cost was found for the associated model name. The information listed is subject to change.

Model Name	Cost	Website
NIMBUS VTOL V2	\$2,719.00	https://bit.ly/2RCy46R
PHANTOM 4 PRO	\$2,038.95	https://bhpho.to/3MHzSXI
PHANTOM 3 PROFESSION (Two Registered with this model)	\$1,985.00	https://bit.ly/3MJJVvy
INSPIRE 1	\$1,799.00	https://bit.ly/3D4HujS
SPREADING WINGS S900	\$1,199.00	https://bit.ly/3VAeFTv
MAVIC PRO	\$1,099.00	https://bit.ly/3ScifAz
MAVIC AIR 2	\$939.00	https://amzn.to/3TxtBQq
SOLO	\$315.00	https://amzn.to/2xrpPmy
APQ-18	Experimental	https://bit.ly/3s38ABx
UER97000-5	Experimental	https://bit.ly/2VsfJL4
URBANE FLYER 30 MKII	Experimental	https://bit.ly/2KhpQxf
P2 MULTIROTOR	X	N/A
PHANTOM 2 FPV	X	N/A