EZIO POLICE DRONE

Drones are changing our lives

What is the next revolution?

How dangerous is it to be a Police officer?

Category: Police and sheriff's patrol officers Fatal injury rate: 14 per 100,000 workers Total deaths (2018): 108

How dangerous is it to be a police officer? Working as a police officer is about 4.1 times as dangerous compared with the average job nationwide, based upon the workplace fatality rate. Police officers have a workplace fatality rate similar to maintenance workers, construction workers, and heavy vehicle mechanics.

The most common cause of death for police officers at work is violence by persons.



How might we propose a new police drone concept that has greater endurance, faster flight speed, more advanced zoom-lens cameras and certain load capacity? This new police drone could significantly improve the efficiency of police officers in solving crimes and reduce the security risks to the police.





I paid attention to all the changes in business, technology, society, culture, and policies in the drone industry. I will collect the latest events and cutting-edge developments through secondary research methods. The data obtained through research can help me redefine the original problem and find new design opportunities.

Data Collection Methods:

- Secondary Research
- Popular Media Scan
- Publications Research
- Research Matrix
- Video Ethnography
- Survey
- Fly-on-the-Wall Observation
- Experiments
- In-Depth Interviews
- Expert Interviews





LAW ENFORCEMENT DRONE MARKET SIZE WORLDWIDE FROM 2020 TO 2030



INSIGHT

The global law enforcement drone market is anticipated to grow from 500 million U.S. dollars in 2020 to 2.8 billion U.S. dollars by 2030. Drones in law enforcement have the potential to be incredibly instrumental to police situational awareness as it provides aerial views of the scene and can enter areas inaccessible or dangerous for the personnel.(Lionel Sujay Vailshery , May 19, 2021) BVLOS (Beyond-Visual-Line-of-Sight) Operation allows the pilot to operate the drone beyond the line of sight which can prevent officers from staying in dangerous areas to operate their drones.





Campi (2019) proposed an innovative landing gear configuration that makes the drone compatible with wireless charging without increasing the weight of the drone. Ground base stations that automatically charge drones batteries after landing can greatly improve charging efficiency







Due to the poor endurance and load capacity of multi-rotor drones and the fixed-wing drones cannot take off vertically, the researcher decided to combine the two into one. This kind of drone is also called VTOL, which can take off vertically from the ground just like a quad-copter. VTOL combines the best of both fixed-wings and quad-copters. Vertical take-off is usually achieved by having 2 or more propellers that work as a bi-copter and take the aircraft up to a certain height, and then switch it to horizontal and enter plane flight mode (Paul, 2022). This turns it into a fixed-wing that can hover and that makes landing and taking off much easier. The researcher has concluded that VTOL is the most suitable type of drone for law enforcement officers.



SCREENER SURVEY | Potential Interviewee Breakdown by Role



DRONE ENGINEER PROFESSIONALS

Andrew Ashur Johnson City, TN

David Danielson, 40 LUCID Drone's CFO/ Co-Founder Dallas, TX

Rajas Chitanvis **Robotics Engineer** Grand Rapids, MI

Vincent Durham.. 32 Drone services operator Orlando, FL

Troy Boonstra Engineering Leader Northwest UAV

Yiwei Chen, 29 **DJI Product Designer** Shenzhen, China

STUDENTS

Zilan Zhou, 24 SCAD Student Savannah, GA

> Caron Ke. 24 SCAD Student Savannah, GA

Charles Chen, 23 SCAD Student Savannah, GA

Darcy Yuwen, 25 SCAD Student Savannah. GA

Patrick Guo. 24 SCAD Student Savannah, GA



EDUCATORS

Pramod Varshnev Distinguished Professor Syracuse University Syracuse, NY

Billy Reiter, 38 **3D Modeling Instructor** Orlando, FL

> Dr. Emad Boctor ECE assistant professor MUSiiC lab

Kelly Cohen Aerospace engineer University of Cincinnati Cincinnati, Ohio

Prof. M. Umit Uyar Electrical Engineering The City University of New York

RETAIL

er

DJI

DJI

Paul Pan. 42

Spencer Gore DJI product Manag-Impossible Aerospace

Mike Dziok . 38 Mark Taylor Assistant Manager CEO Of Arizona at Microdrones based Extreme Aeri-Houston, al Productions. ТΧ

Earl Dud-Romeo Durscher **Director of Public** ley, 35 Safety Integration at labama Surveyors Raleigh,

POLICES

Darren Deex Essex Police Chief Inspector

NC

Tom Shainberg Senior Drone Pilot of Devon & Cornwall Police

Terence Monahan Emergency Management Specialist UniNYPD Chief of Department

OTHER PROFESSIONALS

Skip Fredricks, 47 Accomplished filmmaker Orlando, FL

Brian Haines Hospitality Manager Graduate Hotels and Dish Pen Royal Oak, MI

Cammy Ng, 26 Real Estate Agent Orlando, FL

Jonathan Schibalski, 33 Small Business Owner Orlando, FL

Mike Rosso, 27 Downtown Orlando City Planner Orlando, FL

Kelsey Weideman, 22 Attractions Coordinator, Walt Disney World Orlando, FL

Krystal Chaisson, 27 Office Administrator Houston, TX

Andy Nagel, 62 Manager Of Integrations, Travelocity at Expedia

David Hoel International Business Development Manager. Nice San Antonio, TX

Matt Dimmer **Creative Director** Mcgarry Bowen Chicago, IL

Josh Ralya **Owner And Creative Direc**tor, Ideology Productions Ada, MI

David Vanderveen Chief Operating Officer New Age Beverage Company

Owner of C. Tumey Law Group Houston TX

> Rossel Kluwe, 27 Illustrator Savannah, GA

Laguna Beach, CA

Corev Tumev

Ziliang Luo, 26 Product Designer Shenzhen, China

Larry Leicht, 34 Audio Director. Freeman Av

Neely Adkins Communications Manager, Challenge Manufacturing Grand Rapids, MI

Robin Renzenbrink **Xreative Services Manag**er, Amway Ada. MI

James Froeschner, 58 IT Professional Dallas, TX Becky Burnside





US Police Drone questions

🗞 chengjundesign@gmail.com (未分享) 切换帐号	Ø	Yes
What is your gender?		() no
Male Female		Have you ever operated a drone?
How old are you?		O No
 Under 18 years old 18-25 years old 25-40 years old Over 40 years old 		Do you think drones should be used in the police force Yes No

What do you think is the purpose of police drones and what are their main applications?

- Students
- O Professional and technical staff
- O Technology / Internet / Computers
- O Corporate Management

What is your occupation?

- O Drone engineers
- O Drone retailers
- Law Enforcement
- () 其他:

	Search	and	rescue
_			

Traffic collision reconstruction

Have you ever seen a drone?

- Investigations of active shooter incidents
- Crime scene analysis
- Surveillance
- Crowd monitoring
- Emergency transportation
- □ 其他:

What are your concerns about police drones?

Image quality
Operab <mark>ili</mark> ty, stability
Drone load weight
Drone maintenance
Drone operator training

Privacy and legal concerns

□ 其他:

Do you think the work of police officers is dangerous?

Ves

Do you think that drones can facilitate the work of police officers?

◯ Yes

O No

What do you think about the use of drones in the work of police officers?

您的回答





What do you think is the purpose of police drones and what are their main applications?

What are your concerns about police drones?







IN-DEPTH INTERVIEW QUESTIONS FOR POLICE OFFICERS

General questions

Demographics

- 1. Name
- 2. Job description (ex: Chief of police)
- 3. How long have you been in this field?

Contextual questions

- 1. How do the police help the community?
- 2. What are the responsibilities of the police?
- 3. What does police officer do on a daily basis?
- 4. Is your job dangerous? Why?

Drone-based questions

1. Have you ever used a police drone and does the department currently have or have access to an unmanned or remotely piloted aerial vehicle (a "Drone")?

2. Does the department have specific plans to obtain a drone?

3. Does the department have specific purposes for which it would use a drone? for example: surveillance, search and rescue operations, or disaster relief?

- 4. Does the department have any policies, guidelines, or instructions on the department use of drones, including the legal process required?
- 5. What are the differences between police drones and commercial drones?
- 6. Is it possible for police drones to be equipped with weapons in the future?
- 7. What are the future design trends of police drones?
- 8. Have you ever operated a drone and do you think it is easy or difficult for you to operate a drone?
- 9. What are the positive/negative effects of drones on the work of the police?
- 10. What is the reason why the police department has not yet equipped with drones on a large scale?
- 11. In what areas do you think police drones can be improved in the future?

Warm-up question

1. What was your motivation to become a police?

2. What is your passion during your work? (Sense of accomplishment, love to help people, etc....)



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The safety of police drones is important	DJI drones currently do the best job of safety	Drone's blades ratate quickly and easily hit people	FPV is not suitable for police drories	PPV:s. faster and dises not have obstacle avoidance function	Dranes can reduce naise and improve investidity by flying higher	Paline dromen sam Ine Bread with resem sameras to anhance their shanning separatilities	Fit is drugs or approval and services, videod sates will be very diagreene.	Wednitheaur Salespool auss when we go act to the pole-stream stachman generally don't have generally don't have	We use blast chields, which are used to protect against kitnes	Dalian is equipped with police drones	The new signaryment satilant the traffic police dense opparient (mathly used in wallin police)	I think police drones are the future trend	police-drones can braadcast antomation of detuer rescue supplies
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Palas dense and cardination and carrying separity are greater, but also hander	Police drones do not consider portability	Cantesa modulec and sensars are the important components	Polis Enne can polis fere memoran again timetra again almana again almana again almana again alman	FPV is suitable for more feable small LMHs	MPVIS.not recommended for patice applications	Privat-main operations new official bencom operators have to present a list of information in a theory particular from	we protect property	we protect people's rights	hapingadhan pa ang bagadhan pa ang bagadhan bir agan ang baga bir agan ang bagan bir agan ang baga bir agan ang baga baga bir agan ang baga baga bir agan ang baga baga baga bir agan ang baga bagan ang baga bagan ang baga baga	Lans aduatly Ustang a Incenting course Incenting course Incention my 307 Intentio	A hulpst request for draws for our palse department for this next sensing part	I'm also applying for a Separation of Parasiand Geounty gues right new avails	Gradiene sent, antinose specificas et nor inpurserpurper foragaine dones
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declarationality and declarationality pate-solitantian pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality pate-solitantian declarationality declarationality declarationality declarationality declarationality declarationality 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							The same of balanguan and maintenance same are much higher dura three of determ.	The use of police drames is fraught with many legal Nowes	Paul a support all because process and sup many second states many second second phase of the solution				















https://www.durangoherald.com

♯POLICE PILOT

ABOUT OFFICER DAN KELLERMEYER

Kellermeyer is a primary pilot for the Durango, Colorado Police Department. He obtained his drone pilot license 5 years ago. Kellermeyer is currently using DJI's Mavic 2 enterprise, which is equipped with a zoom camera and a thermal-imaging camera for nighttime searches. Accessories include a loudspeaker and searchlights. The cost of this drone is between US\$5,000 and US\$6,000. However, Kellermeyer wanted a more specialist drone as an aerial tool for the police depart,ment. He thought that the wind resistance and endurance of the Mavic were not sufficient for his needs.

GOOD DAYS

- Playing video games
- Shopping the latest 3C products
- Arresting suspects

BAD DAYS

- Using force in law enforcement
- Insomnia due to stress
- Seeking emergency waivers from the FAA to bend the rules

"A big safety thing for us is being able to use that drone to put it in places where we don't necessarily want an officer to put his face."

PERSONALITY



ATTITUDE TOWARDS POLICE DRONES

- Flying the drone is pretty user-friendly.
- The cameras pretty much jack the price up on the drones.
- The drone is used on a case-by-case basis and it is not used for random surveillance.
- I would like to see the department purchase more specialist drones that have better performance and more payload capability.





can create jobs. Reduce the use of public health resources. Our product can reduce the insurance company's loss ratio. Our products can improve the health of the country.



ONE-PIECE

STREAMLINED













FIERCE

20













EZIO POLICE DRONE

THE NEW GENERATION OF POLICE DRONE















The unique two-way communication with an on-board microphone and integrated speaker that allows officers to talk to suspects.



TTTTTTTTTTTT



POLICE

First Response

cenario

With a maximum speed of 140mph, the EZIO can reach the car accidents faster than ground troops and provide officers with information about the accident, which can greatly improve the speed with which officers can deal with the accident and retain video as evidence.

A POLICE

First Aid

The EZIO can also help emergency centres with urgent tasks, such as transporting emergency blood or organs to hospitals for people injured in accidents.

ospital

RENDERING | Night Scenario

Aerial Policing

-

The EZIO is equipped with advanced thermal sensors and zoom cameras to quickly locate fleeing criminals at night to help officers make arrests

Air tracking

EZIO can help state sheriffs stop vehicles on the highway from the air. Even at night thermal sensors and spotlight help EZIO to track the target vehicle very quickly.



TO PROTECT & SERVE

9

EZIO Launchpad

The launchpad is mounted on the truck bed of the police car F150. The Launchpad is used to store and charge the drone. Two huge solar panels on the outside of the launch pad convert solar energy into electricity and store it in the vehicle's battery. The launchpad uses wireless charging to automatically recharge the drone when it lands.

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TO PROTECT & SERVE

BILL RESPONSE

REDROCTRESS

NºA ST

POLICE OUT







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1. I like the propellers and how you're able to fly horizontally and vertically I think that's a really good feature, because you need to be able to extend your flight time and flying horizontally versus only vertical increases flight time.

- 2. The door on the back, I think it's a cool feature.
- 3. It has removable batteries.
- 4. Nice design aesthetic.
- 5. EZIO is a drone that can fly continuously in the air for over an hour, it flies high enough and fast enough to catch up with even cars and helicopters.
- 6. It looks good and EZIO can see the area before the police arrive.
- 7. I give the original prototype a score of 90.



1. I am expecting to have some more cameras to help with anti-collision

2. I understand the reason for retracting the camera is to reduce air drag. However, cameras going in and out can lead to disconnected cables or motor failure, so this is a problem.

OLD USER JOURNEY MAP



NEW USER JOURNEY MAP

MAPS

Changed parts

Anthony is a 35-year-old police pilot in Gerorgia. He is responsible for operating police drones when emergencies occur.

COMPARISON OF

OLD AND NEW

USER JOURNEY

SCENARIO

Anthony is using a new generation police drone to search for a fugitive criminal in the darkness of the night.

GOAL & EXPECTATIONS

Anthony expects to operate new generation police drones to help his colleagues with various tasks.

STAGE	Receive mission instructions	Pre-flight check	Flying into the incident area	>	Searc	Finish the mission and fly back				
Sub stages	Sub stages Confirm mission information Complete pre-flight check		Drones take off from launchpad	Start an extensive search	Start searching the location of the criminal vehicle	Locating the criminal and his vehicle	Arresting the criminal	Complete the mission		
User goals	Get information about the mission as soon as possible	Complete pre-flight check	Fly to the target area as soon as possible	Identify the approximate location of the criminal	Identify the exact location of the criminal and his car	Conducting aerial surveillance of the criminal and his vehicle	Cooperating with the police or the ground to catch criminals	Operating the drone back to the launchpad		
Behavior description	Receive mission information in Goundb Control Station	Detect automatically the drone's condition by the Launchpad	The pilot only needs to press the start button to launch the drone	Turn on the XT thermal camera and spotlight	Start video recording and convey the information to the police on the ground	Reporting continually the vehicle location information to ground forces	Record the arrest process	Writing reports, submitt The drone will automati checks and recharge in	Writing reports, submitting video files. The drone will automatically complete post-flight checks and recharge in Launchpad	
Behavioral thinking	I am very calm	We don't need to spend extra time for checking	I only need to observe the gound control screen	Hook forward to finding the criminal	I focus on operating the drone	I focus on operating the drone	I am happy and relaxed	Failure to arrest	Successful arrest	
Experience		~		•	?		2	•		
User reflections	The GCS Transceiver helps pilots to handle all kinds of geographic information	Electronic detection system detect more accurate	Launchpad is a good solution for pre-flight inspection and quick launch of drones	Thermal sensors and spotlights can help pilots find the criminal in the dark	Flight Controls can automatically locate the criminal and his vehicles	The new generation police drones can conduct aerial surveillance for more than 15 minutes	Drones hovering at low altitudes can generate a lot of poise	The drone's endurance and the controller's signal distance limitations lead	Drones help police catch fugitives quickly and safely	
Pain points/problems	GCS transceiver is difficult to avoid collisions		The Launchpad increases the weight and wind resistance of police vehicles which wastes more petrol	Thermal sensors and spotlights consume a lot of power	Flight Controls may identify incorrectly	The new generation police drones are bigger and noisier	The Noise of rotors will affect civilians's rest	to mission failure Commercial drones cannot meet police needs	-	
Design opportunity	Improve flight control system to help pilots automatically plan the best flight path	-	The Launchpad must be designed more aerodynamic and made of lighter materials	Increase battery capacity	Adding image matching function in the flight control system	Use lightweight materials and silent blades to reduce flight noise	Using silent blades to reduce flight noise	Design a new generation police drones for the officers	-	
Priority evaluation	Urgent		3 4 6 (® Important	5 Ø	Persona e e e e e e e e e e e e e e e e e e e	G	Not Urgent		



EZIO POLICE DRONE

THANK YOU