

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



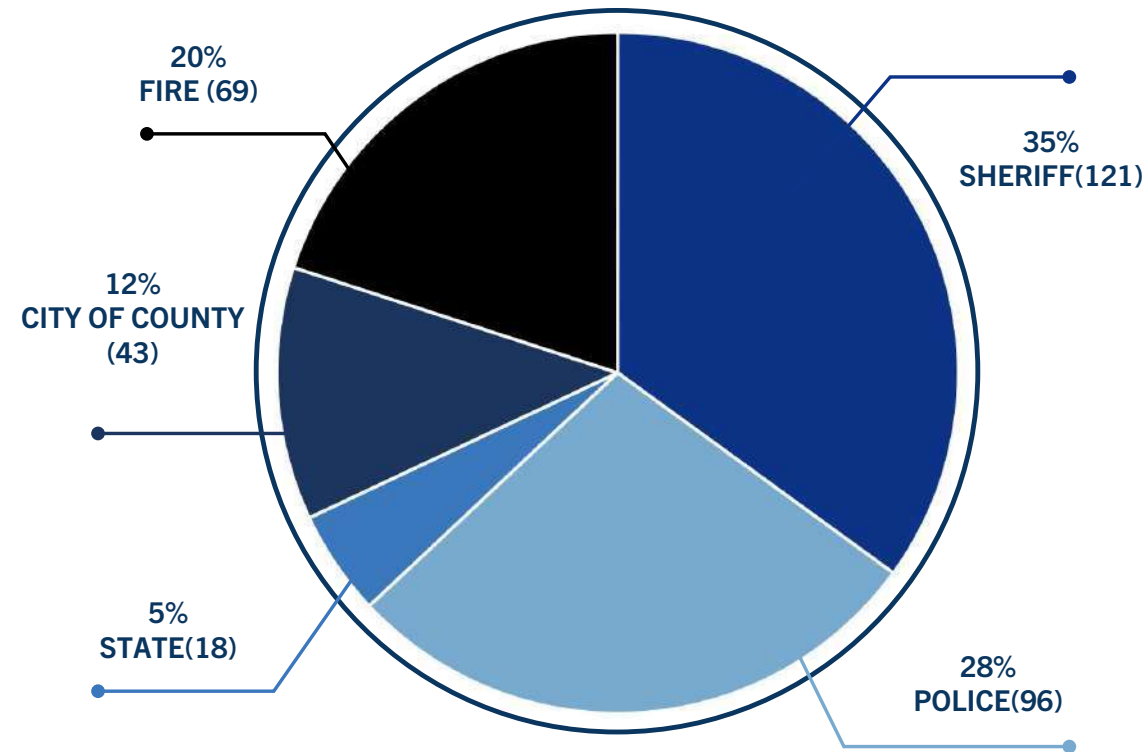
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U.S. AGENCIES USING DRONES

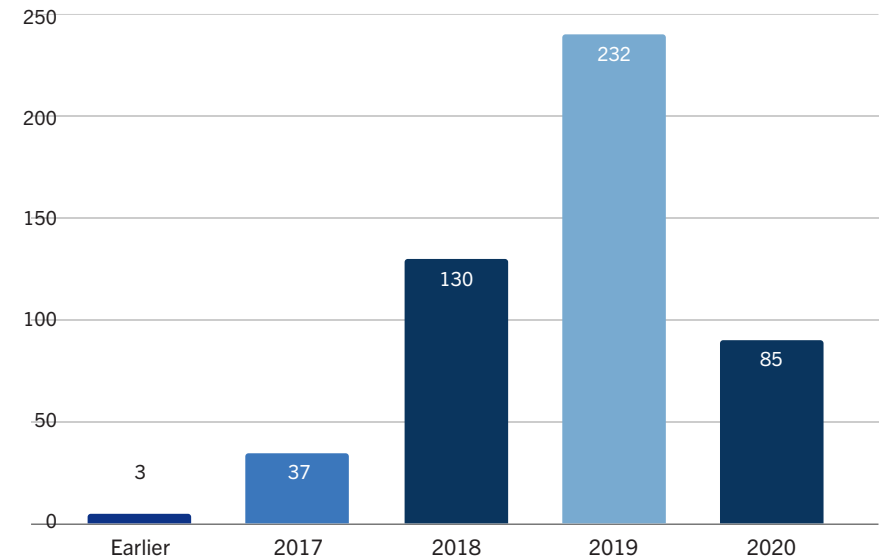


518%

GROWTH IN POLICE DRONE USE IN 5 YEARS

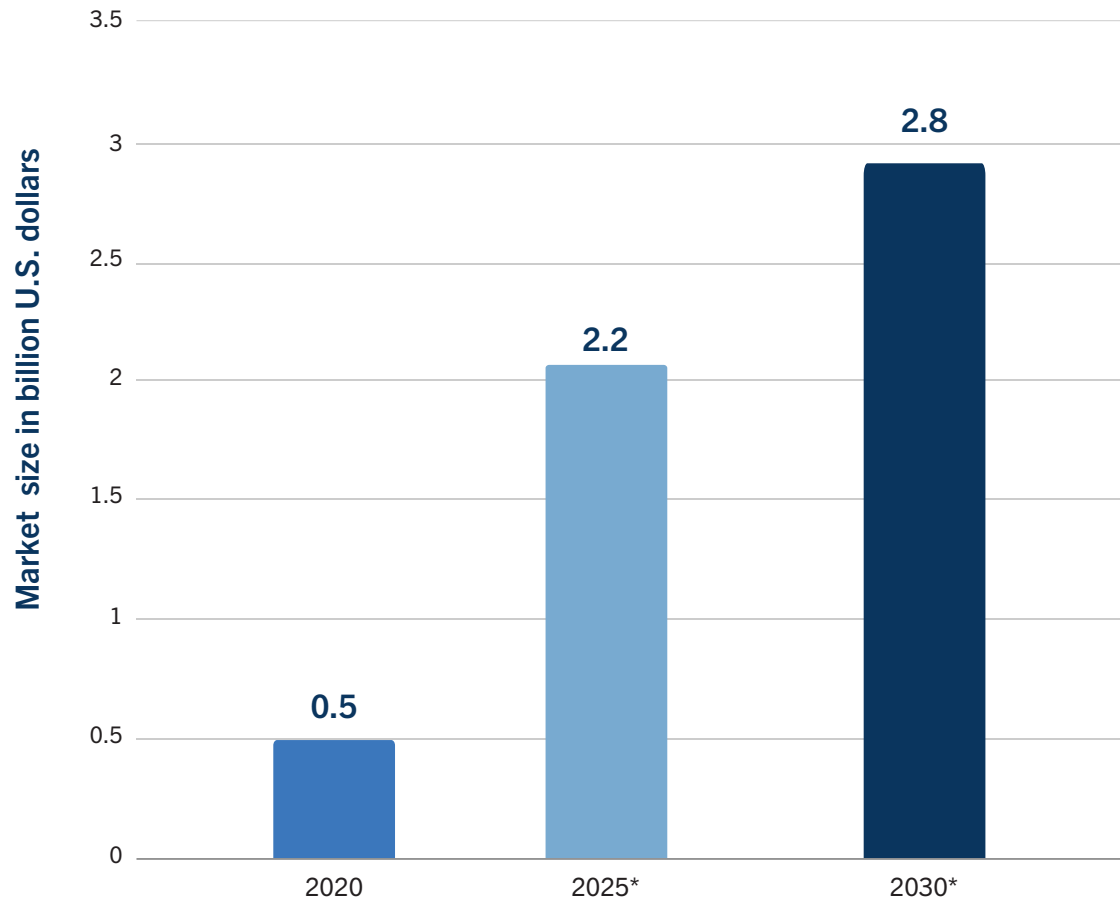


Number of departments





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.

BVLOS

BVLOS

VLOS

EVLOS

Border/ Coast Patrol

Long Linear
Infrastructures

BVLOS flight

Surveying of a
Construction sites

Mapping of
Agriculture terrain

Hobby/Spots

Real Estate

Movie Production

Asset inspection

First Responders

Drone Delivery

Remote Asset
Inspection

Search and Rescue

EVLOS flight

Beyond visual line of
sight of the pilot

Visual Line of sight
of the pilot

Extended visual line of
sight of the pilot

Drone Pilot

Visual Observer





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



Landing gear /
Secondary coil

Landing gear /
Secondary coil

Landing gear /
Secondary coil

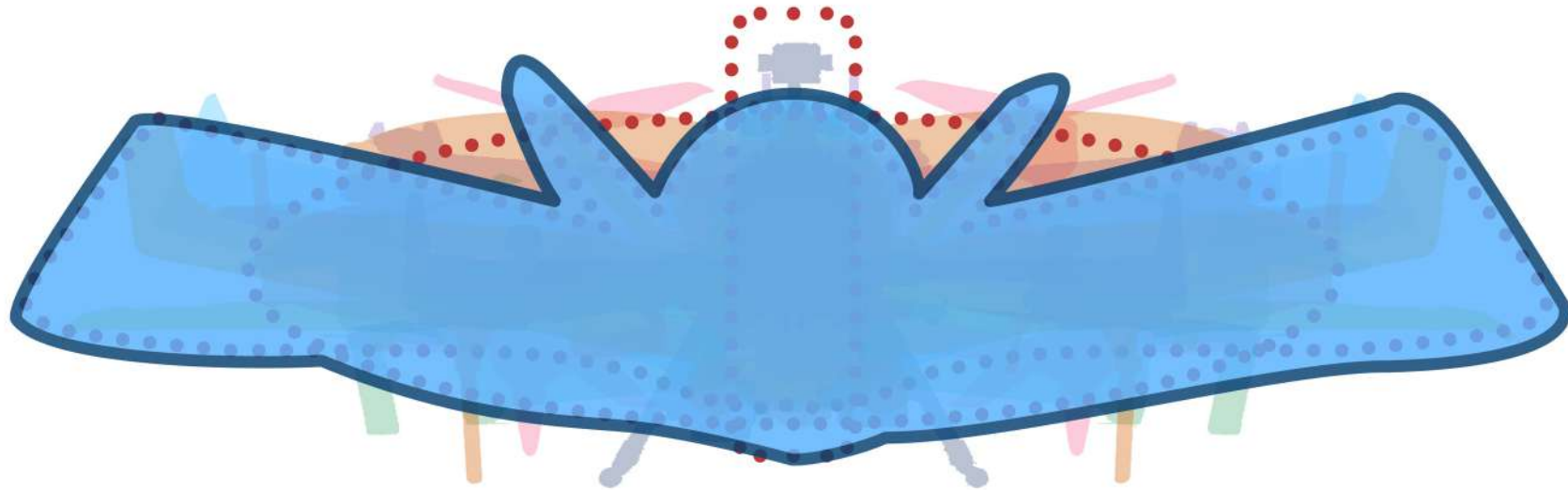
Drone

Payload

Power source

Ground pad

Primary coil



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

6

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

5

EDUCATORS

Pramod Varshney
Distinguished Professor
Syracuse University
Syracuse, NY

Billy Reiter, 38
3D Modeling Instructor
Orlando, FL

Dr. Emad Bector
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

7

RETAIL

Paul Pan, 42
DJI product Manager
DJI

Mark Taylor
CEO Of Arizona
based Extreme Aerial
Productions.

Romeo Durscher
Director of Public
Safety Integration at
DJI

Spencer Gore
Impossible Aerospace

Mike Dziok , 38
Assistant Manager
at Microdrones
Houston,
TX

Earl Dudley, 35
Alabama
Surveyors
Raleigh,
NC

20

POLICES

Darren Deex
Essex Police
Chief Inspector

Tom Shainberg
Senior Drone Pilot of Devon & Cornwall Police

Terence Monahan
Emergency Management
Specialist UniNYPD Chief
of Department

3

6

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 Director,
Ideology Productions
Ada, MI

David Vanderveen
Chief Operating Officer
New Age Beverage Company
Laguna Beach, CA

Corey Tumey
Owner of C. Tumey Law
Group
Houston TX

Rossel Kluwe, 27
Illustrator
Savannah, GA

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 Manager,
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](#) 

What is your gender?

- ☐ Male
- ☐ Female

How old are you?

- ☐ Under 18 years old
- ☐ 18-25 years old
- ☐ 25-40 years old
- ☐ Over 40 years old

What is your occupation?

- ☐ Students
- ☐ Professional and technical staff
- ☐ Technology / Internet / Computers
- ☐ Corporate Management
- ☐ Drone engineers
- ☐ Drone retailers
- ☐ Law Enforcement
- ☐ 其他: _____

Have you ever seen a drone?

- ☐ Yes
- ☐ No

Have you ever operated a drone?

- ☐ Yes
- ☐ No

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?

- ☐ Search and rescue
- ☐ Traffic collision reconstruction
- ☐ Investigations of active shooter incidents
- ☐ Crime scene analysis
- ☐ Surveillance
- ☐ Crowd monitoring
- ☐ Emergency transportation
- ☐ 其他: _____

What are your concerns about police drones?

- ☐ Image quality
- ☐ Operability, 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?

- ☐ Yes
- ☐ No

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

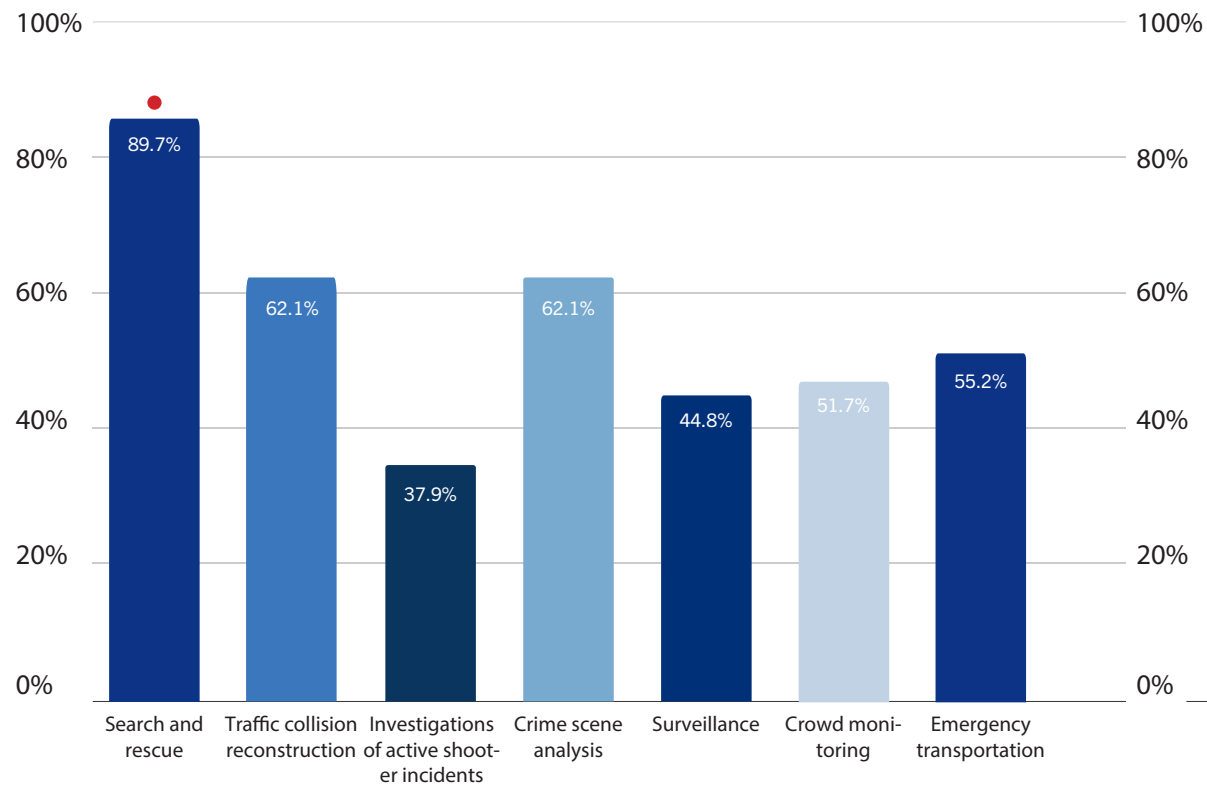
- ☐ Yes
- ☐ No

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

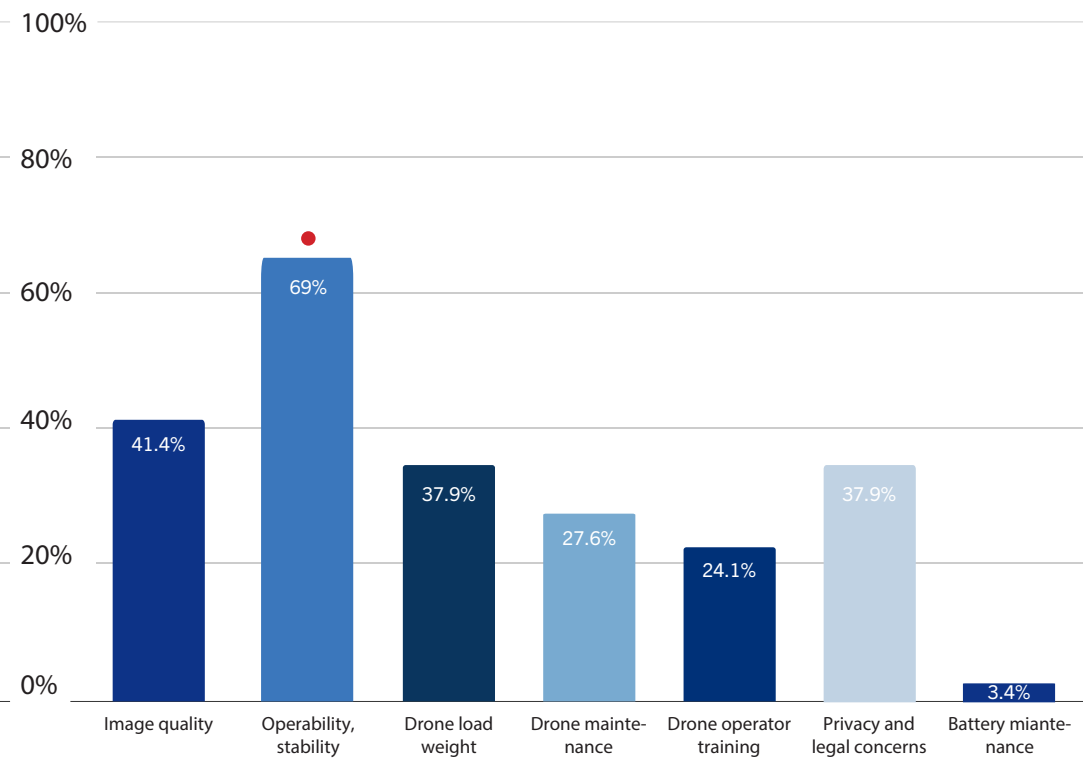
您的回答 _____

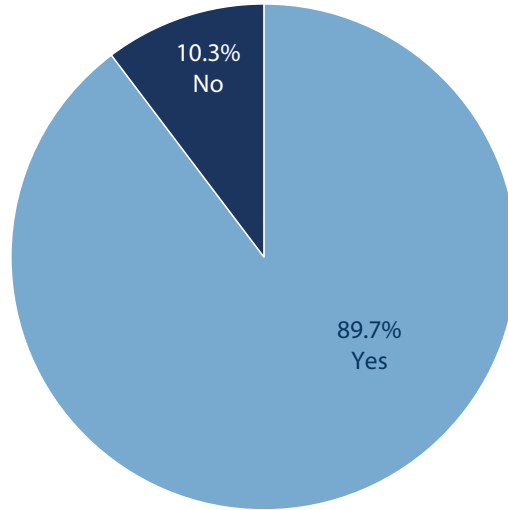


What do you think is the purpose of police drones and what are their main applications?

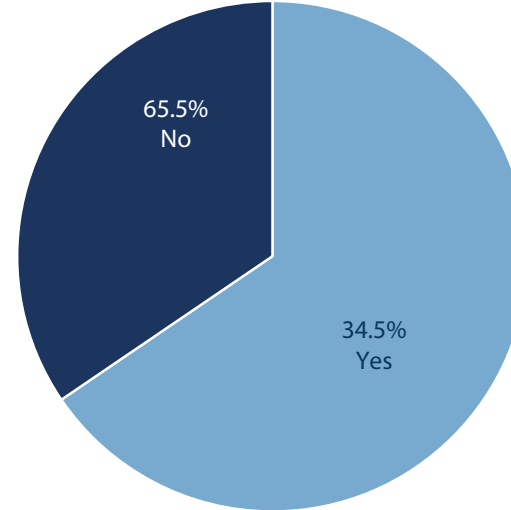


What are your concerns about police drones?

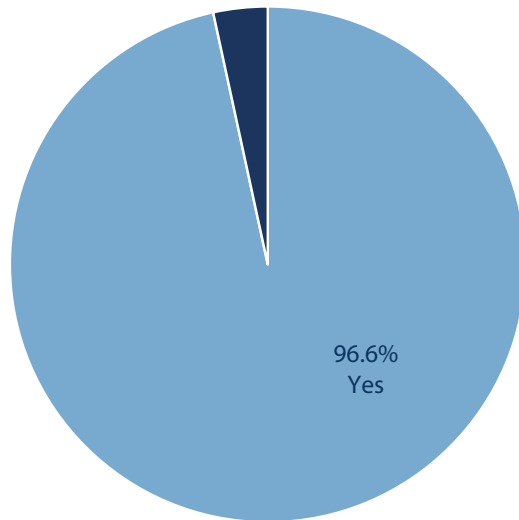




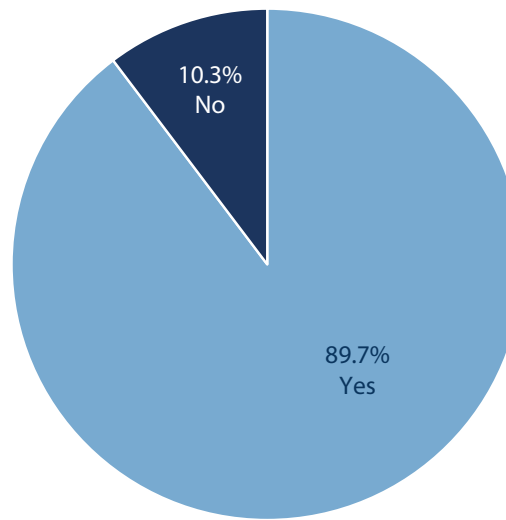
Have you ever seen a drone?



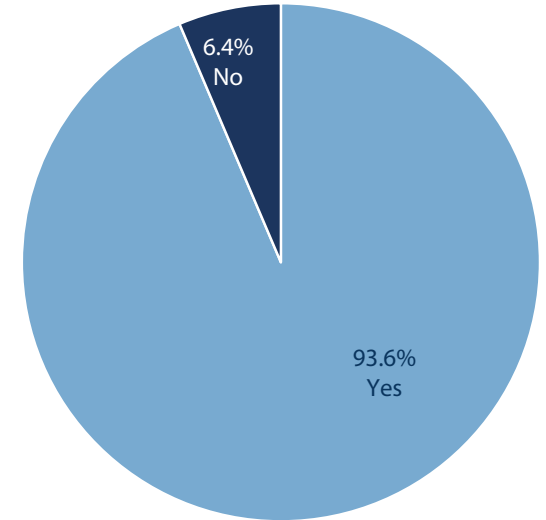
Have you ever operated a drone?



Do you think drones should be used in the law enforcement



Do you think the work of police officers is dangerous?



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



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....)



3





8 KEY INSIGHTS

BE SILENT

The sound of the drone can irritate suspects. Drones have the potential to inadvertently capture residents' privacy and trigger a backlash from them

HELICOPTERS WILL BE REPLACED

Drones are becoming more popular because they have faster response speed and are less costly and less expensive to maintain than helicopters.

HIGHER PERFORMANCE REQUIREMENTS

We believe that police drones will have longer flight times, be more capable, and equip more thermal or infrared sensors in the future.

POLICE IS A DANGEROUS JOB

Officers protect civilians' property and rights. Their job is very dangerous, which is 4.1 times than ordinary work.

DRONES REGULATIONS

FAA's regulations protect the privacy and safety of the public. FAA requires only pilots who have a license can operate drones.

LAUNCHPAD IS A GOOD IDEA

That is a good idea if you design a cargo container that attaches to the top of a police vehicle to store a drone.

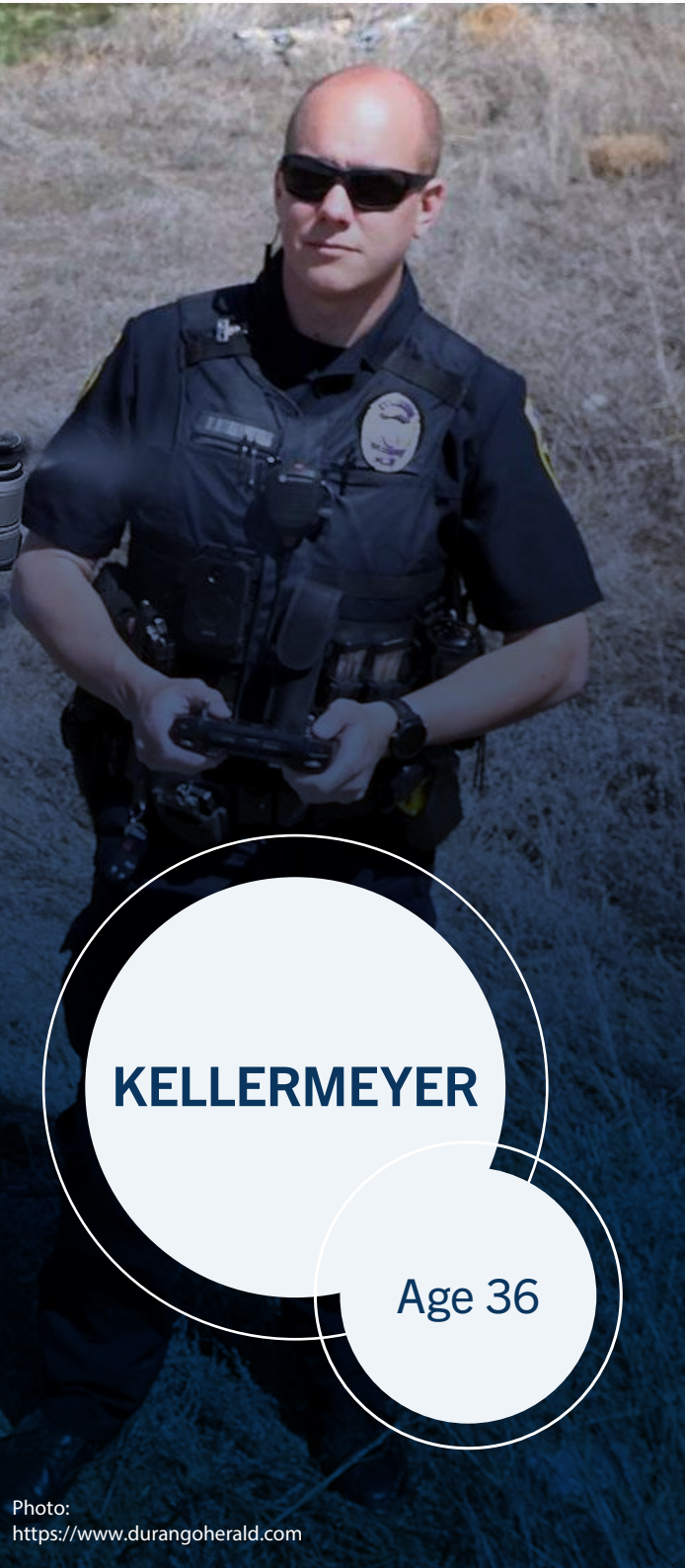
UNNECESSARY TECHNOLOGIES

FPV technology and weapons are not suitable for police drones. We should improve the Obstacle avoidance system and signal reception of drones to avoid crash.

ENDURANCE ENHANCEMENT

Police drones have a stronger endurance, carrying capacity, and camera capability. Commercial drones use a folding arm for portability, police drones do not need to consider portability, but should be adopted to the waterproof and windproof design.





KELLERMAYER

Age 36

THE POLICE PILOT

ABOUT OFFICER DAN KELLERMAYER

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 department. He thought that the wind resistance and endurance of the Mavic were not sufficient for his needs.

GOOD DAYS

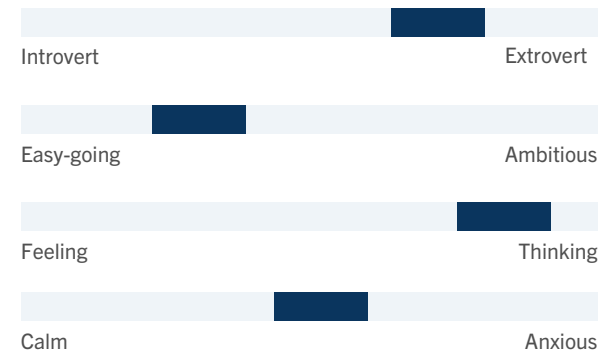
- Playing video games
- Shopping the latest 3C products
- Arresting suspects

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

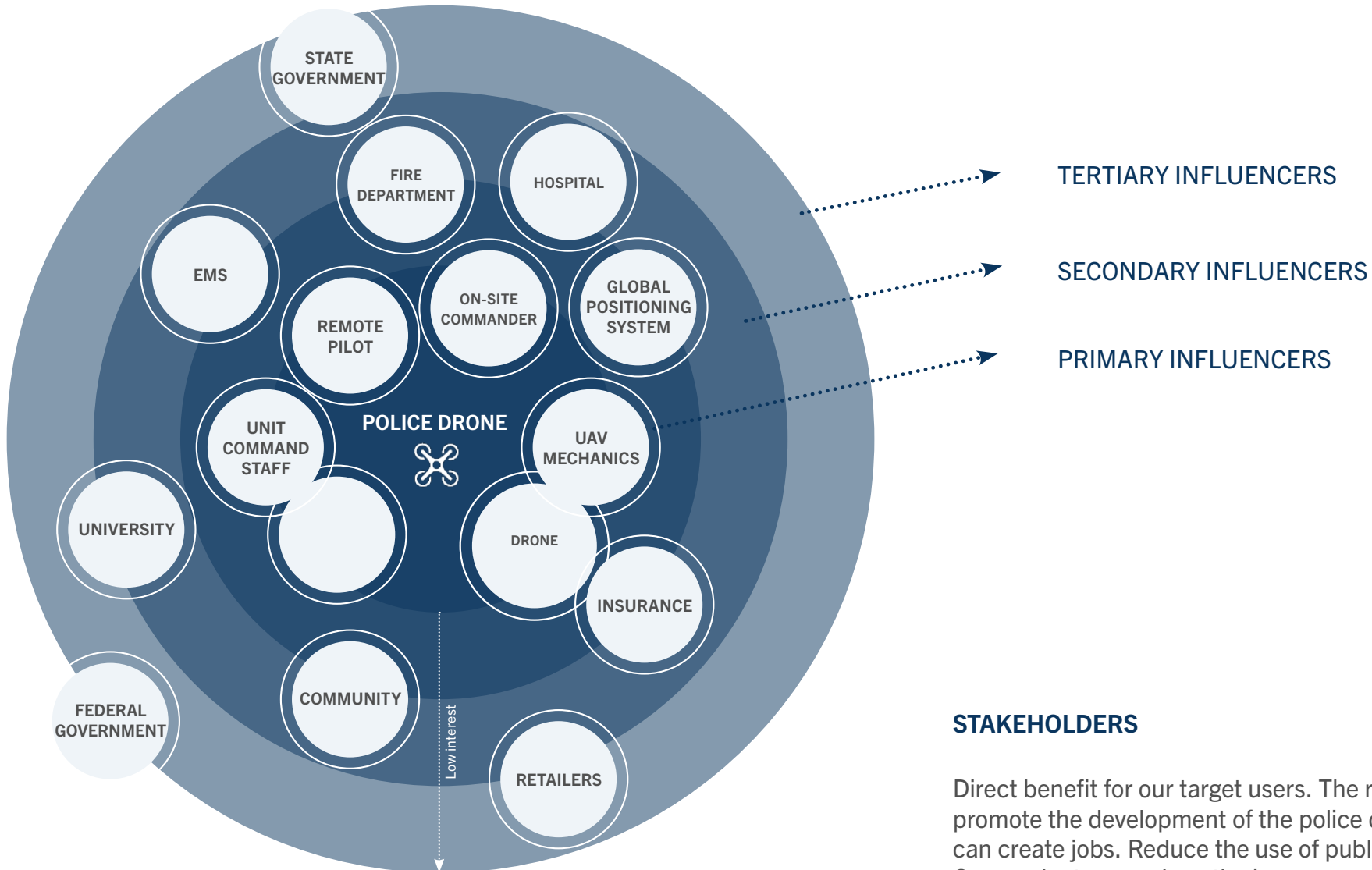


ATTITUDE TOWARDS POLICE DRONES

- 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.



STAKEHOLDERS MAP



STAKEHOLDERS

Direct benefit for our target users. The researcher can promote the development of the police drone industry. We 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.



MOOD BOARD

ONE-PIECE



FIERCE



STREAMLINED



BIOMORPHIC

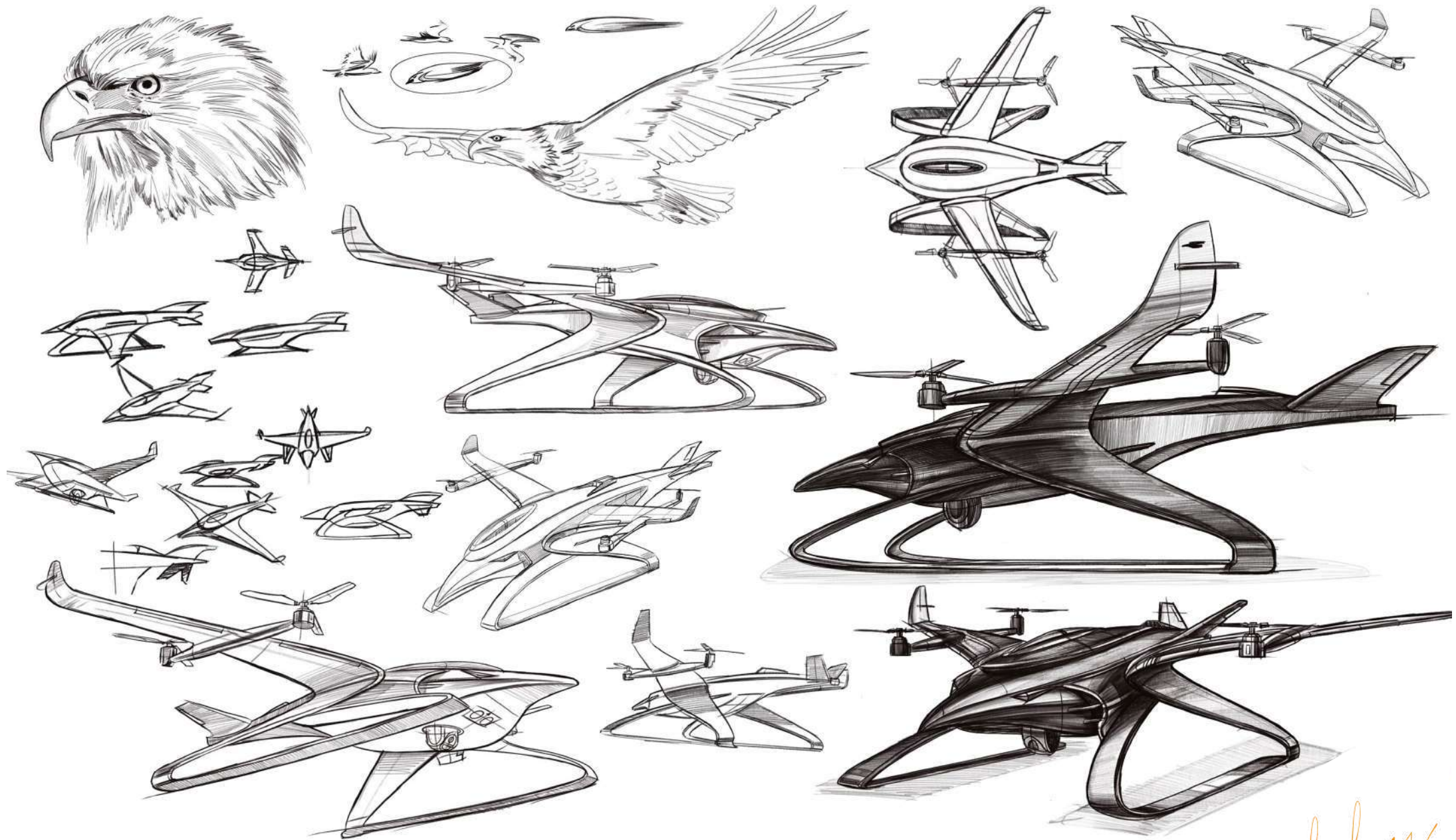


FUTURISTIC





IDEATION



Bobby

EZIO POLICE DRONE

THE NEW GENERATION OF POLICE DRONE





EZIO POLICE DRONE SIZE

TOP



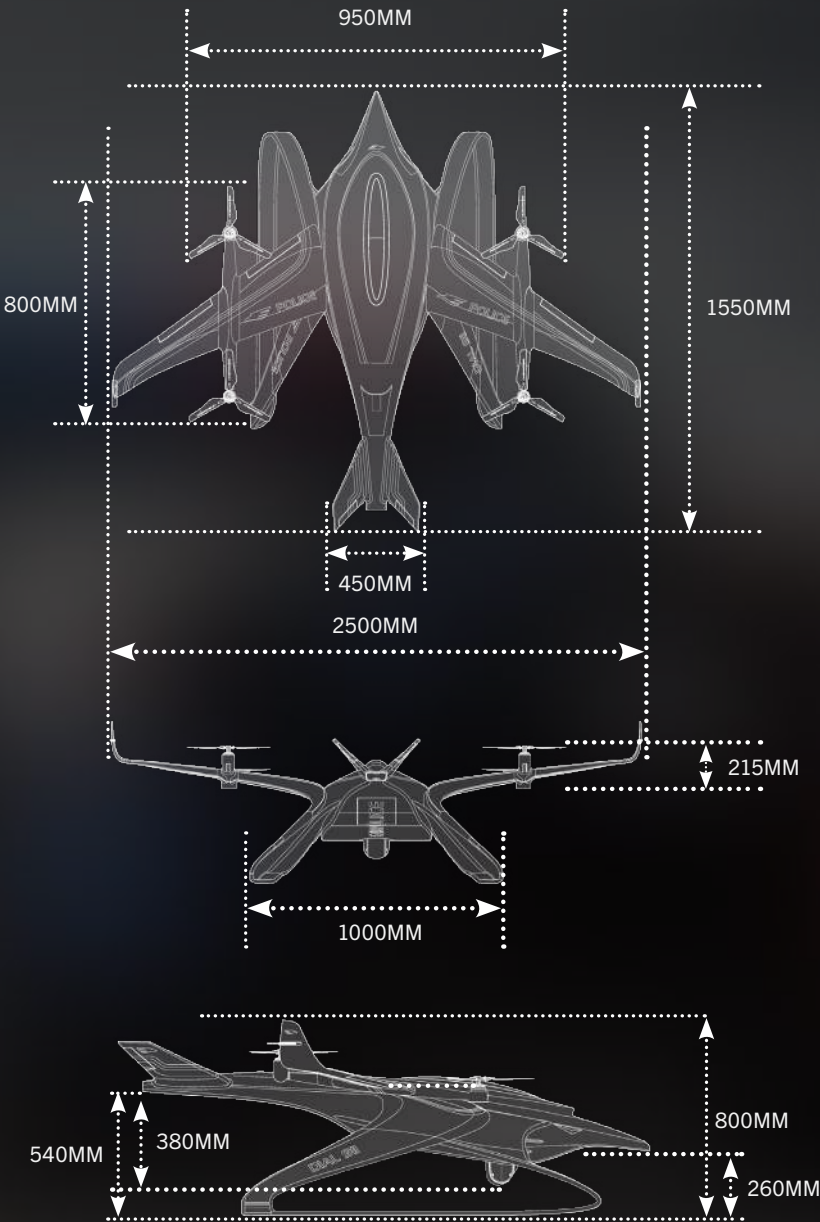
PERSPECTIVE



FRONT



RIGHT

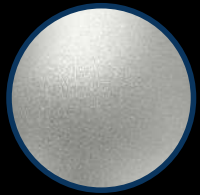




EXPLODED RENDERING



GLASS



ALUMINIUM



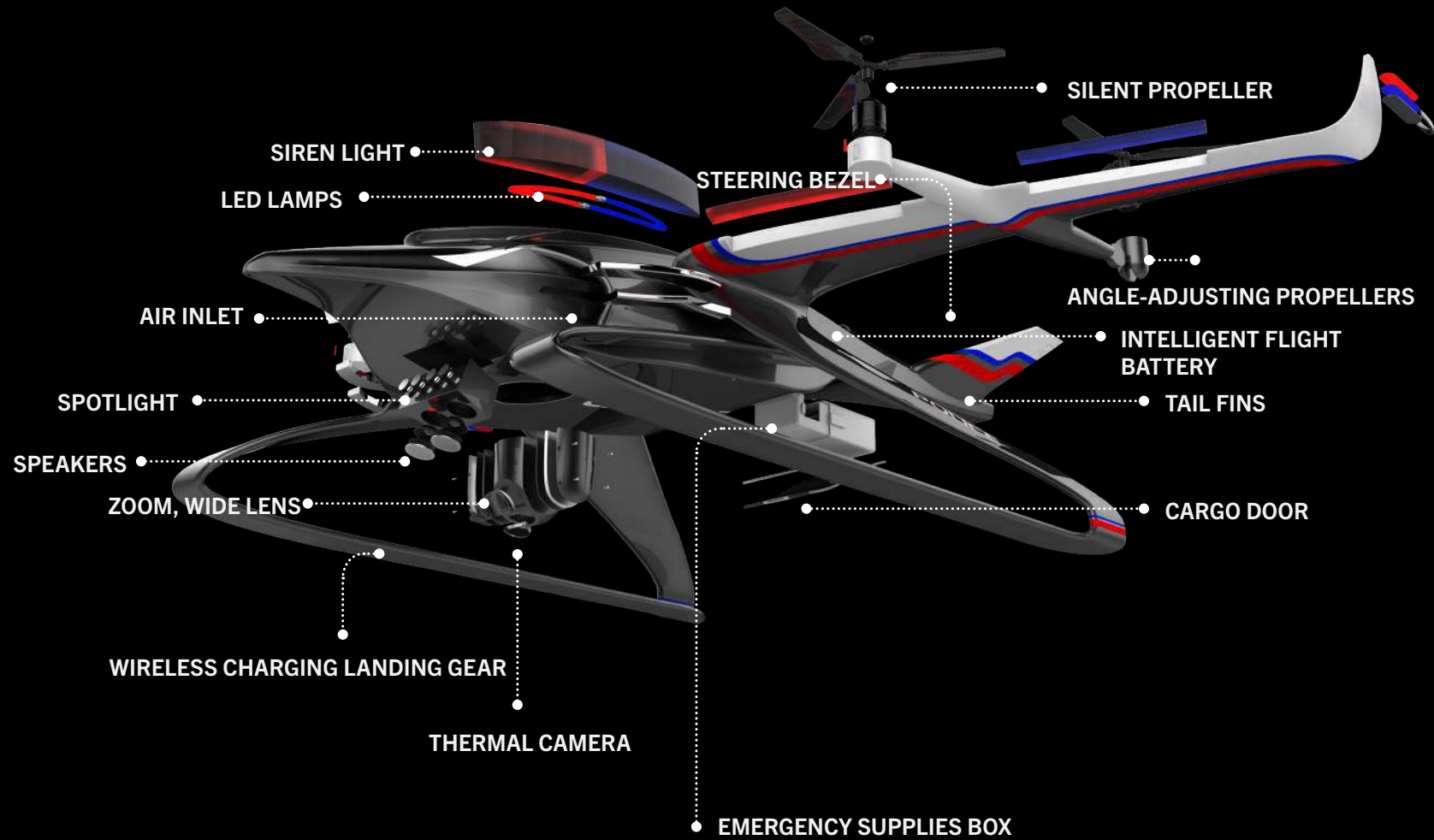
CARBON FIBER



PLA



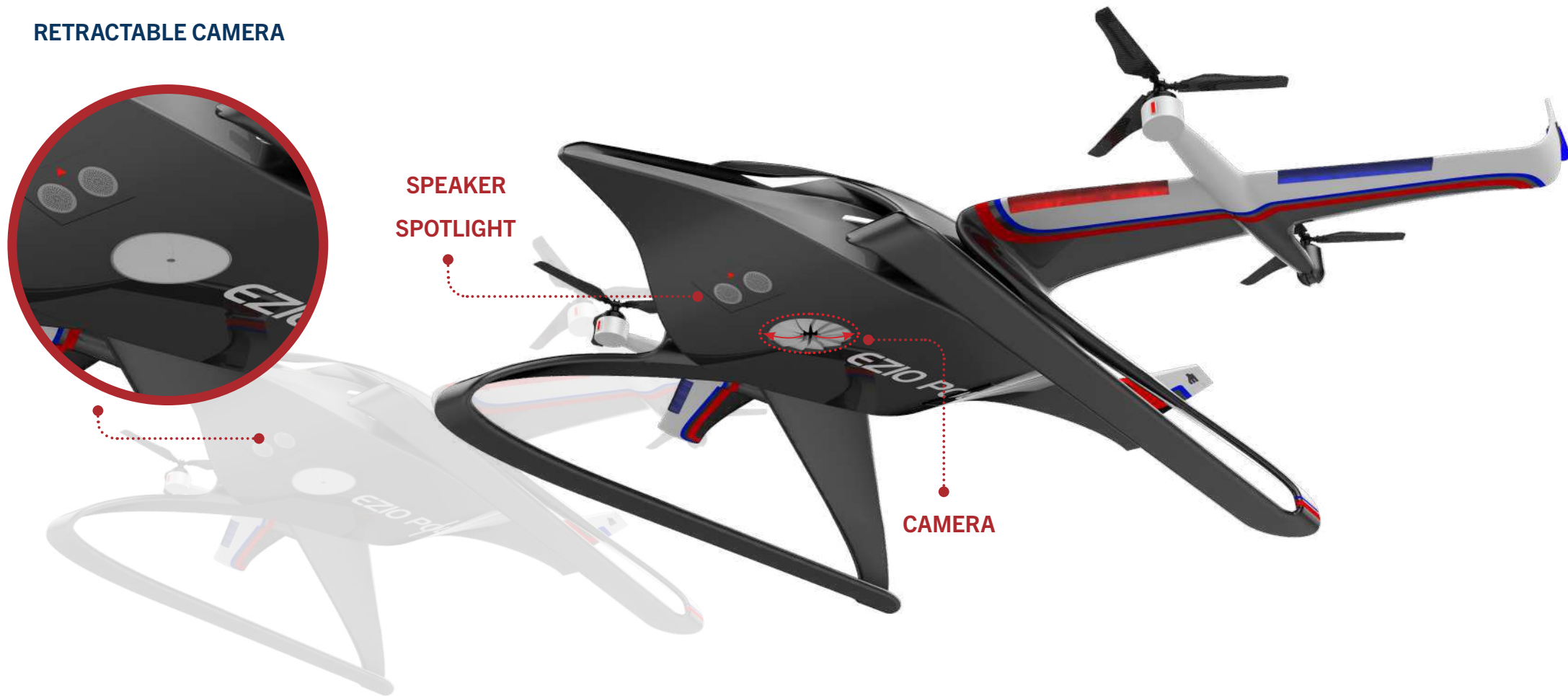
STROBING LIGHT





RETRACTABLE CAMERA AND HIDDEN SPOTLIGHT

RETRACTABLE CAMERA



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



RENDERING | Daytime Scenario





RENDERING | Daytime Scenario





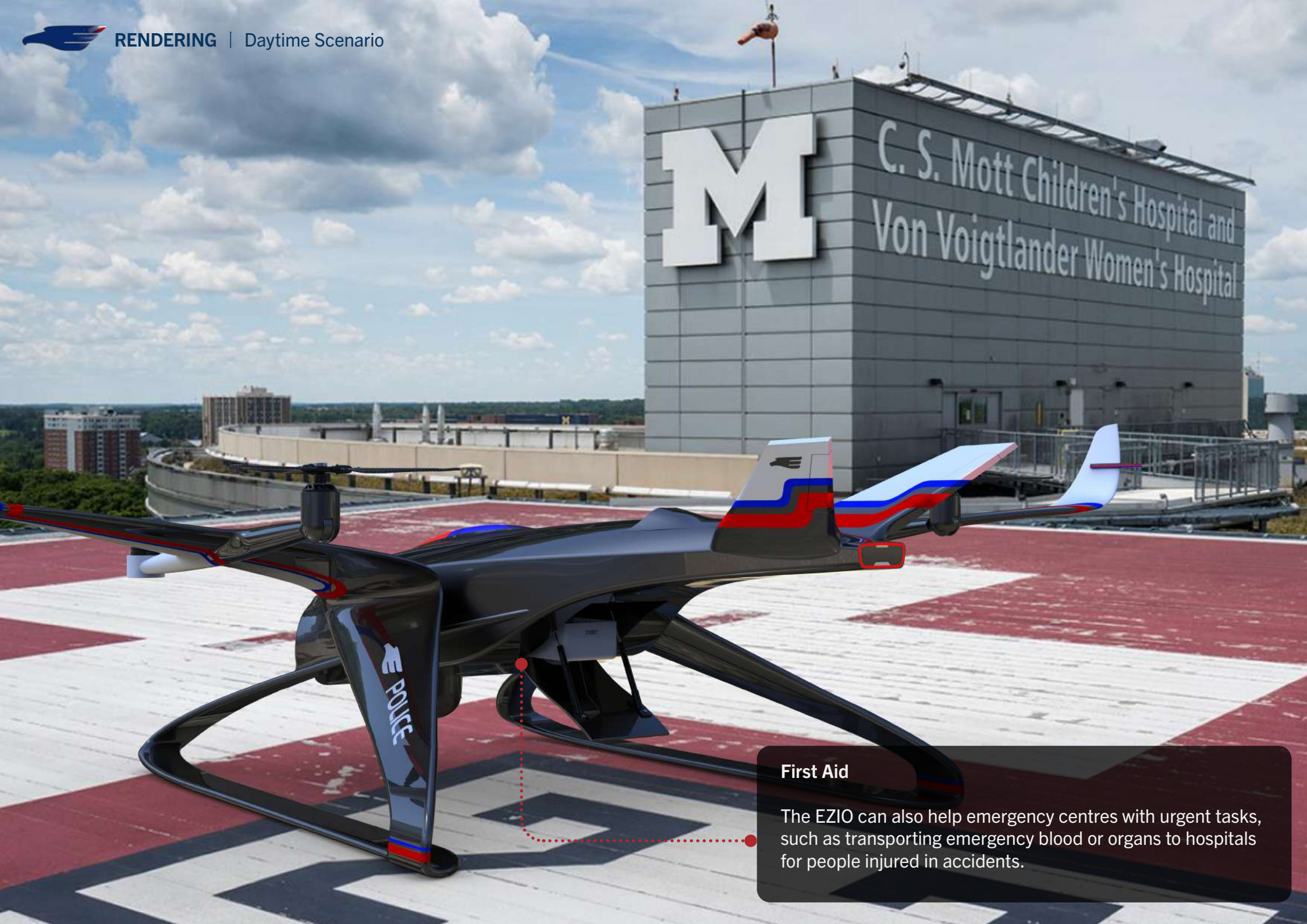
RENDERING | Daytime Scenario





First Response

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.



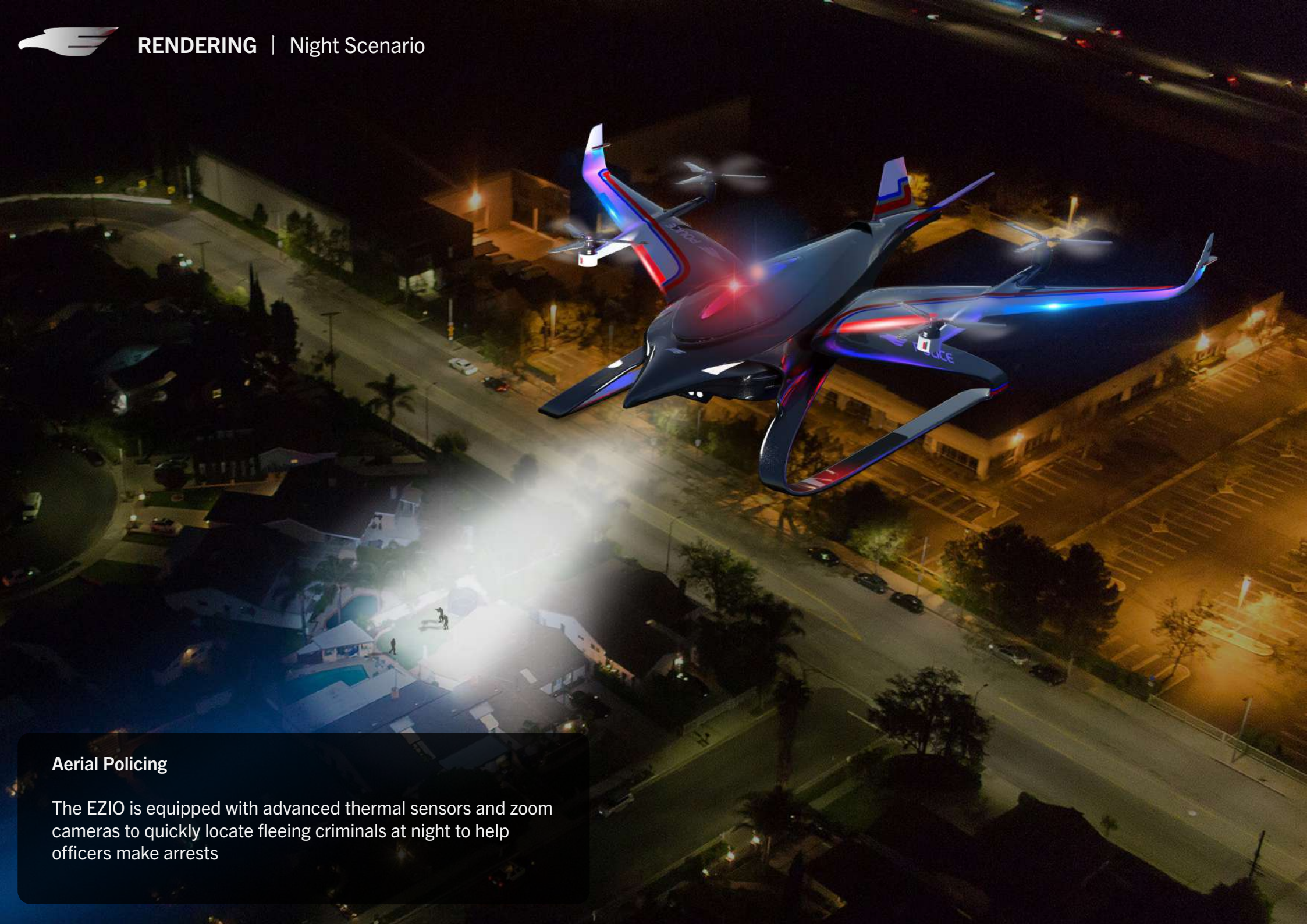
First Aid

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



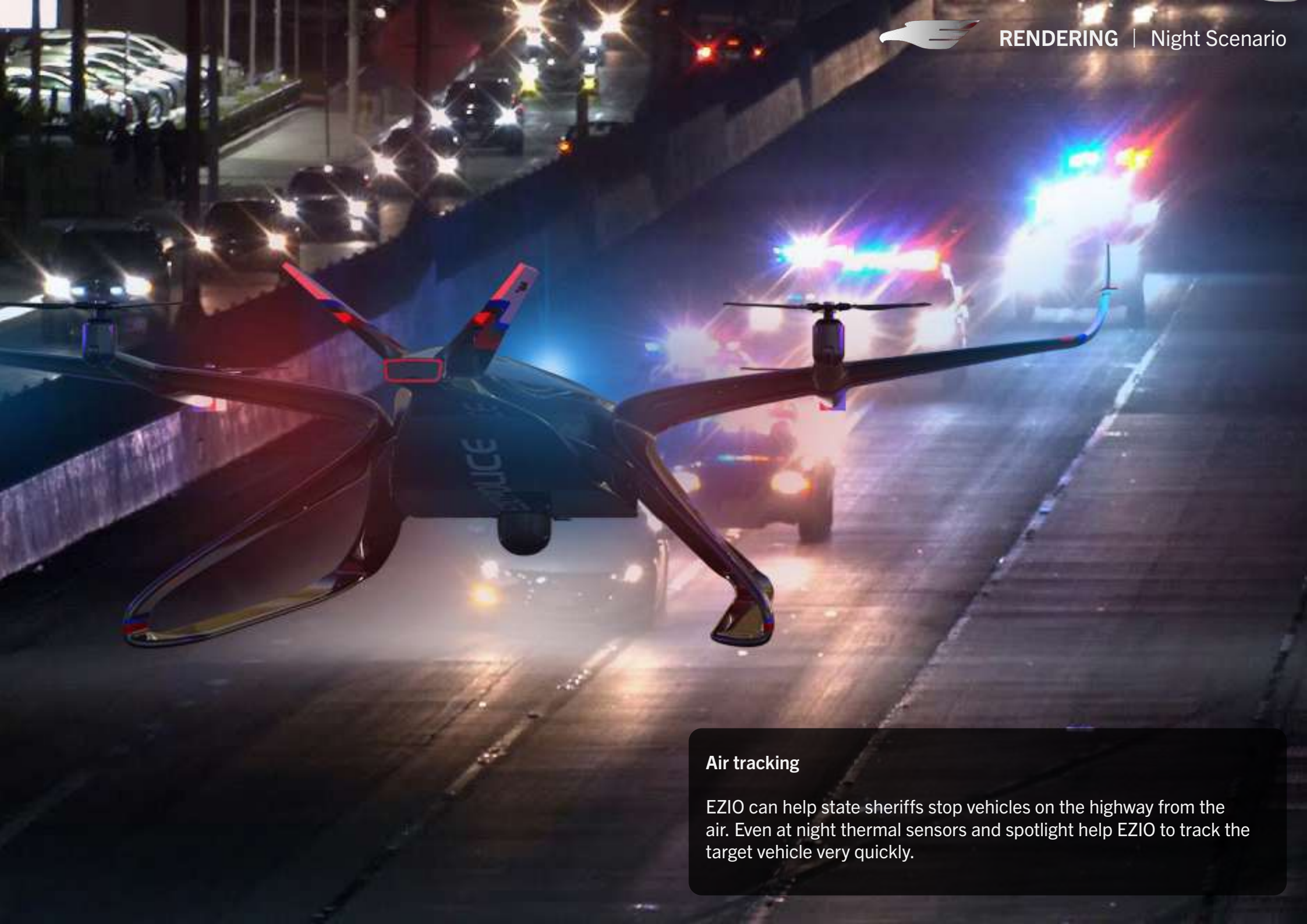
RENDERING | Night Scenario





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.



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.





RENDERING | Launchpad







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.

COMPARISON OF OLD AND NEW USER JOURNEY MAPS

OLD USER JOURNEY MAP



ANTHONY LAWRENCE

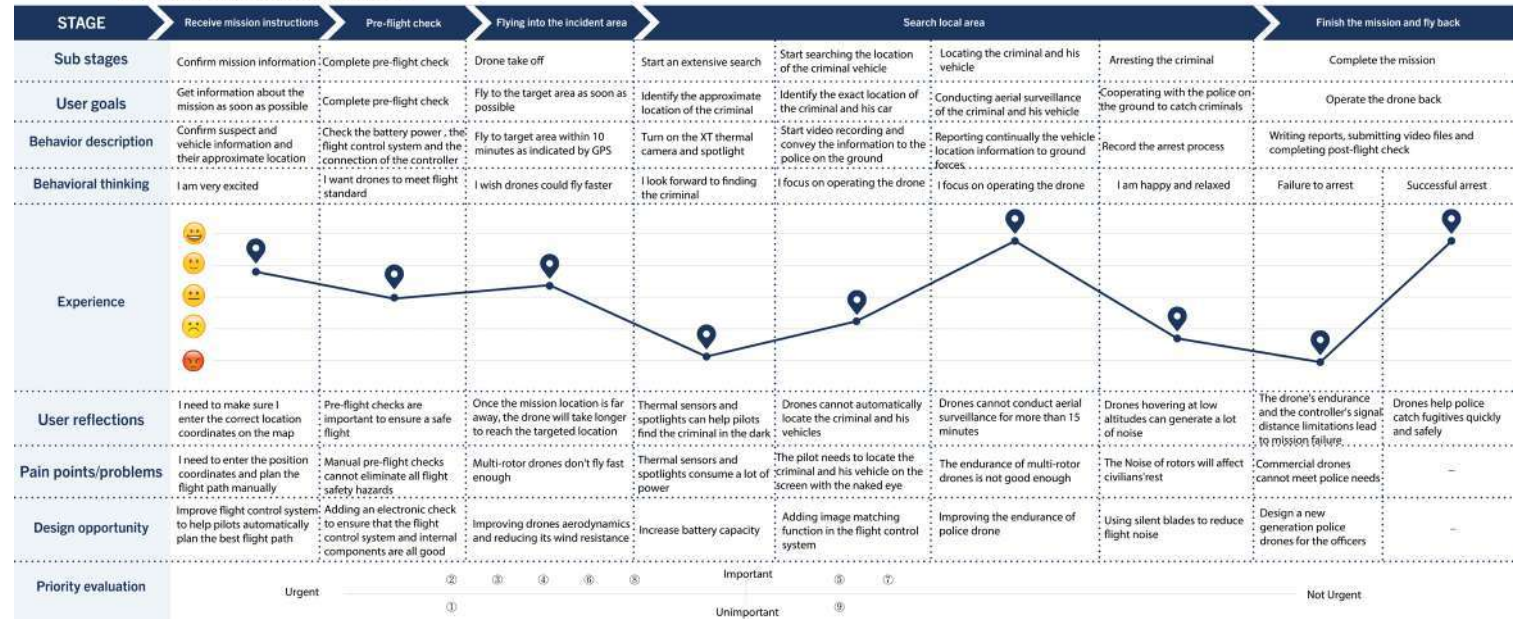
Anthony is a 35-year-old police pilot in Georgia. He is responsible for operating police drones when emergencies occur.

SCENARIO

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

GOAL & EXPECTATIONS

Anthony expects to be able to use drones to help his colleagues with various tasks.



NEW USER JOURNEY MAP



ANTHONY LAWRENCE

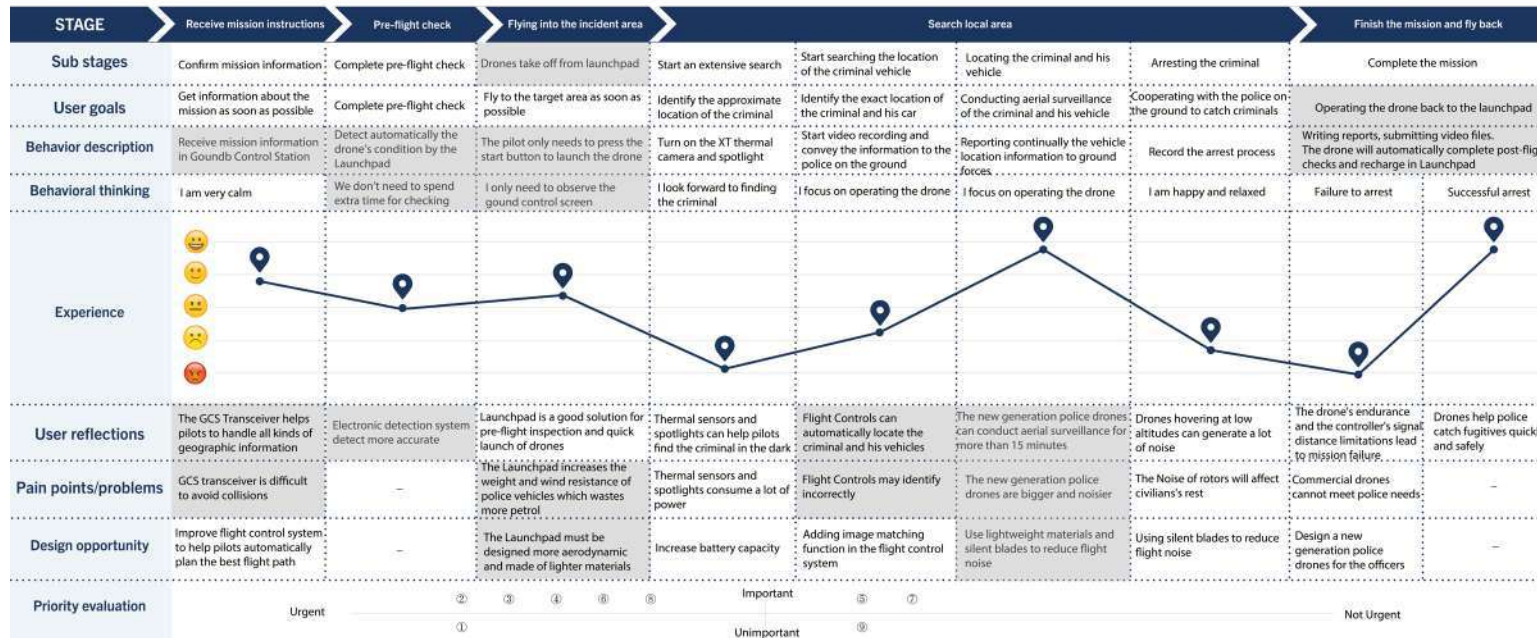
Anthony is a 35-year-old police pilot in Georgia. He is responsible for operating police drones when emergencies occur.

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.



EZIO POLICE DRONE

THANK YOU