Benefits and Dangers of Civilian Drone Use in Germany

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Introduction

- Term Definitions
- Types of Drones
- Legal Framework
- Benefits from Civilian Drone Use
- Dangers of Civilian Drone Use
- References

Term Definition (1)

unbemanntes Flugsystem:
Im Unterschied [zu den Flugmodellen und unbemannten Ballonen] verfügt ein „unbemanntes Luftfahrtsystem“ über eine hochentwickelte Elektronik an Bord und ist in der Lage, selbständig Flugmanöver auszuführen. Entscheidendes Abgrenzungskriterium ist jedoch der Zweck der Verwendung. Flugmodelle werden ausschließlich zum Zweck der Freizeitgestaltung oder des Sports eingesetzt; erfolgt der Einsatz des Geräts zu sonstigen – insbesondere gewerblichen – Verwendungszwecken, handelt es sich bei dem Gerät um ein „unbemanntes Luftfahrtsystem“ im Sinne des § 1 Absatz 2 Satz 2.

- Entwurf eines Vierzehnten Gesetzes zur Änderung des Luftverkehrsgesetzes, 08.12.2011

Term Definition (2)

drone:
- also: Unmanned Aerial Vehicle/System

- a partly autonomoulsy acting aerial vehicle
- equipped with high-tech controllers
- definition extension:
  for any use it is called drone

Types of Drones (1)

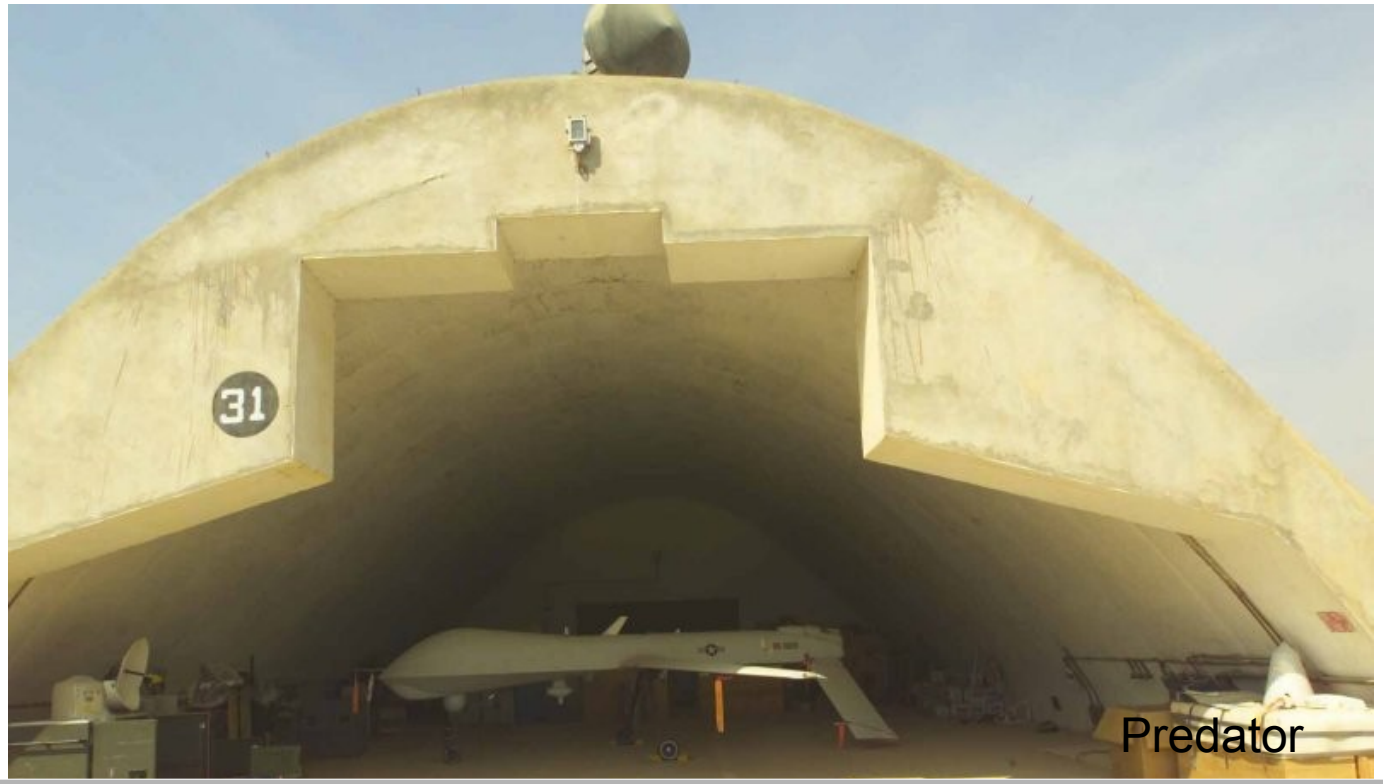
- HALE – High Altitude Long Endurance
- MALE – Medium Altitude Long Endurance
- TUAV – Tactical Unmanned Areal Vehicle
- MUAV – Mini Unmanned Aerial Vehicle
- MAV – Micro Unmanned Aerial Vehicle

HALE

Global Hawk

HALE – High Altitude Long Endurance	
Altitude:	more than 15'000m
Endurance:	more than 24h
Weight:	10t
Purpose:	surveillance of large areas and areas with air defense systems

MALE



Predator

MALE – Medium Altitude Long Endurance	
Altitude:	5'000m to 15'000m
Endurance:	more than 24h
Weight:	0.5t - 2t
Purpose:	surveillance of large areas

TUAV

TUAV – Tactical Unmanned Aerial Vehicle	
Altitude:	1'000m to 5'000m
Endurance:	1h to 6h
Purpose:	reconnoiteringg flights

MUAV

MUAV – Mini Unmanned Aerial Vehicle	
Altitude:	up to 250m
Endurance:	up to 1h
Purpose:	reconnoiteringg flights

MAV

MFI – sponsored by DARPA

MAV – Micro Unmanned Aerial Vehicle	
Weight:	80g
Purpose:	surveillance of large areas

Legal Framework in Germany

- EU law is applied for drones <150kg:
  - HALE and MALE are prohibited
  - some of the TUAV are prohibited
- German law is applied for drones >150kg:
  - MUAV and MAV are allowed
  - some of the TUAV are allowed
- need for certification:
  - for private use: no
  - for other use: gadget and pilot

Benefits from Civilian Drone Use

- Catastrophe management
- Scientific use
- Experimental agriculture
- Media production
- Combatting criminal activities

Catastrophe Management

- Detection of gas leakages
  - fire brigade → estimate danger
- Area observation
  - during floods → gain overview
- Victim detection
  - after landslides/avalanches → detect victims

Scientific Use

- Of special importance for:
  - agriculture science
  - history
  - forestry
- task:
  - land surveying → create research-specific map
  - efficient recording of data
    → gather research-relevant values
    (e.g. crop growth)

Experimental Agriculture

- apply pesticides / fertilizer
- replace:
  - lifting plattforms (trees)
  - airplanes (e.g. tea in South America, Africa)

Media Production

- hobby:
  - plenty of drones available for free purchase
  - drones often equipped with extendable software
- professional:
  - several service operators available for private videos/photos
  - used in movies
  - good for paparazzi

Combatting Criminal Activities

- Police
  - observation of demonstrants
  - programm started 2008, up to now officially in experimental state
- Frontex (European Border Control)
  - fighting illegal immigration

Dangers of Civilian Drone Use

- Defects in software
- Cyber attacks
- Violation of Privacy
- Dual use

Defects in Software

- Impossibility of proving correctness of a drone's software
- Share same airspace → puts other aerial vehicles in danger
- no proper landing → puts anybody on ground in danger

Cyber Attacks

- Drones rely on signals from environment
  - GPS signal
  - radio controll signal
- Signals can be faked

Violation of Privacy

- gather data → some belong to privacy?
  - pictures of house
  - photos of persons (in action/bad situation)
- Kate Middleton's privacy hurt by a drone?
- surveillance of innocent citizens by police → Orwellian state?

Dual Use

- Hardware – body and sensors
- Search&Rescue ~ Search&Destroy
- autonomous agents
  - DARPA competition

Conclusion

- Drones are just about to emerge
- Many fields of application
- Need for good legislation
  - protect privacy
  - set high security standards
  - protect developers of drones from involuntarily supporting the armaments industry

References

- http://www.globalsecurity.org
- http://robotics.eecs.berkeley.edu
- http://www.heise.de/tp/artikel/32/32105/1.html
- http://www.asdnews.com
- Elaboration