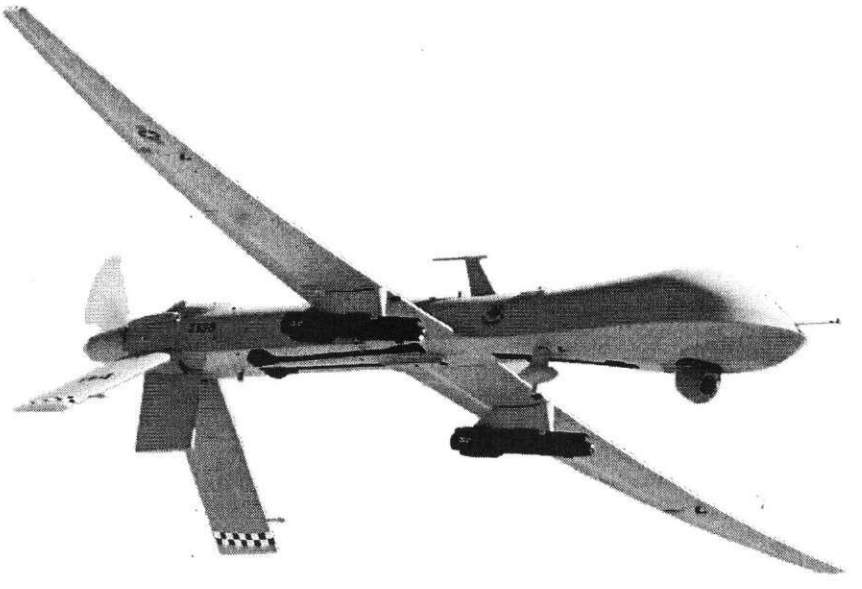
การสัมมนาหัวข้อ

เทคโนโลยีอากาศยานไร้คนขับในประเทศไทย

Technology of UAV and Drone in Thailand



15 พฤษภาคม 2557

เวลา 13.00-16.30 น. ณ ห้องประชุม 212

ศูนย์นิทรรศการและการประชุมไบเทค บางนา กรุงเทพฯ

MTEC
a member of NSTDA

จัดโดย

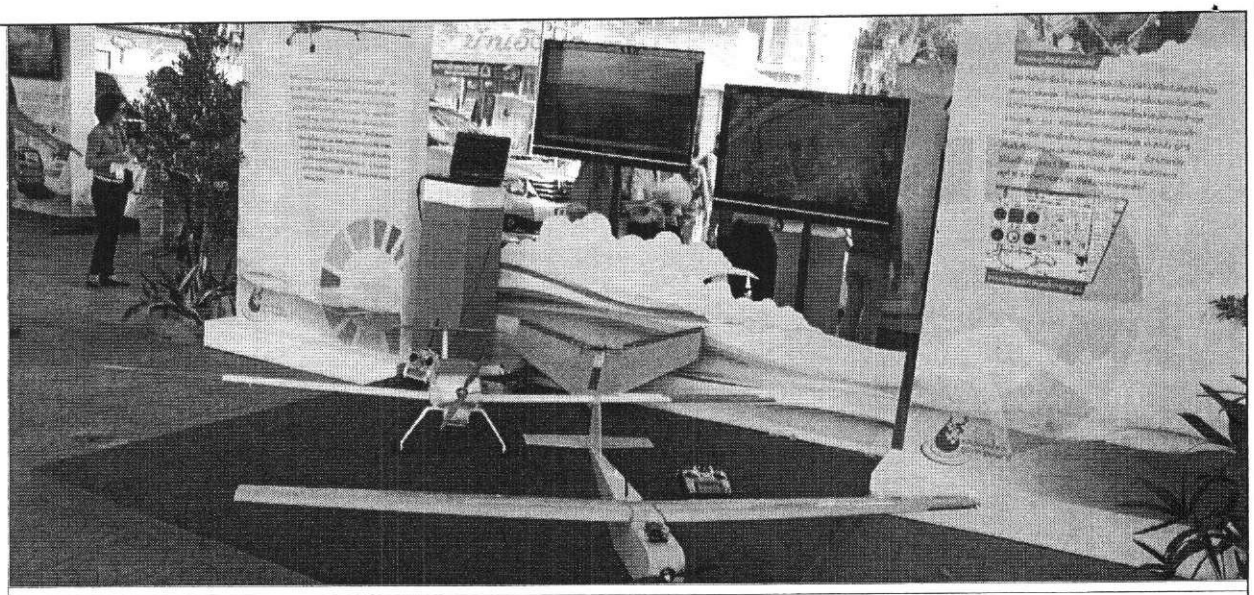
ศูนย์เทคโนโลยีโลหะและวัสดุแห่งชาติ (เอ็มเทค)
สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ
กระทรวงวิทยาศาสตร์และเทคโนโลยี

ร่วมกับ

สำนักงานปลัดกระทรวงวิทยาศาสตร์และเทคโนโลยี
กระทรวงวิทยาศาสตร์และเทคโนโลยี

UAV AND DRONE TECHNOLOGY IN THAILAND

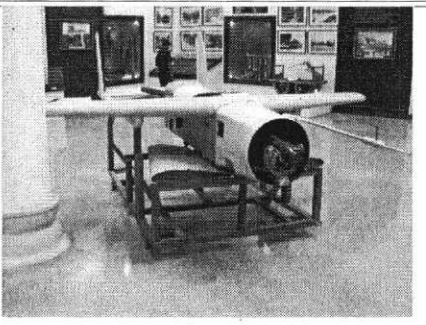
Peter Srivaree-Ratana @InterMach



Introduction

The First Thai UAV Systems

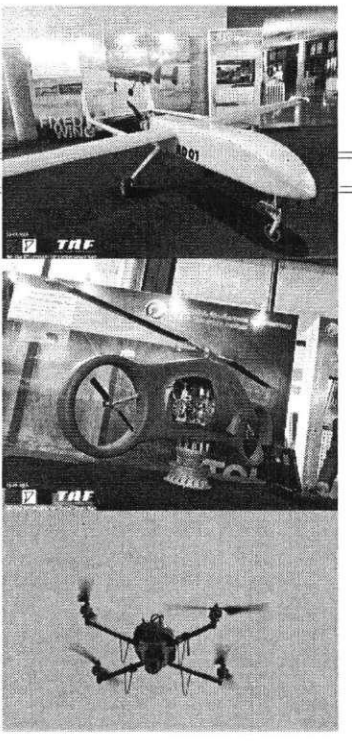
- SkyEye R4D from BAe Systems circa 1988
- IAI Searcher Mk.I & II



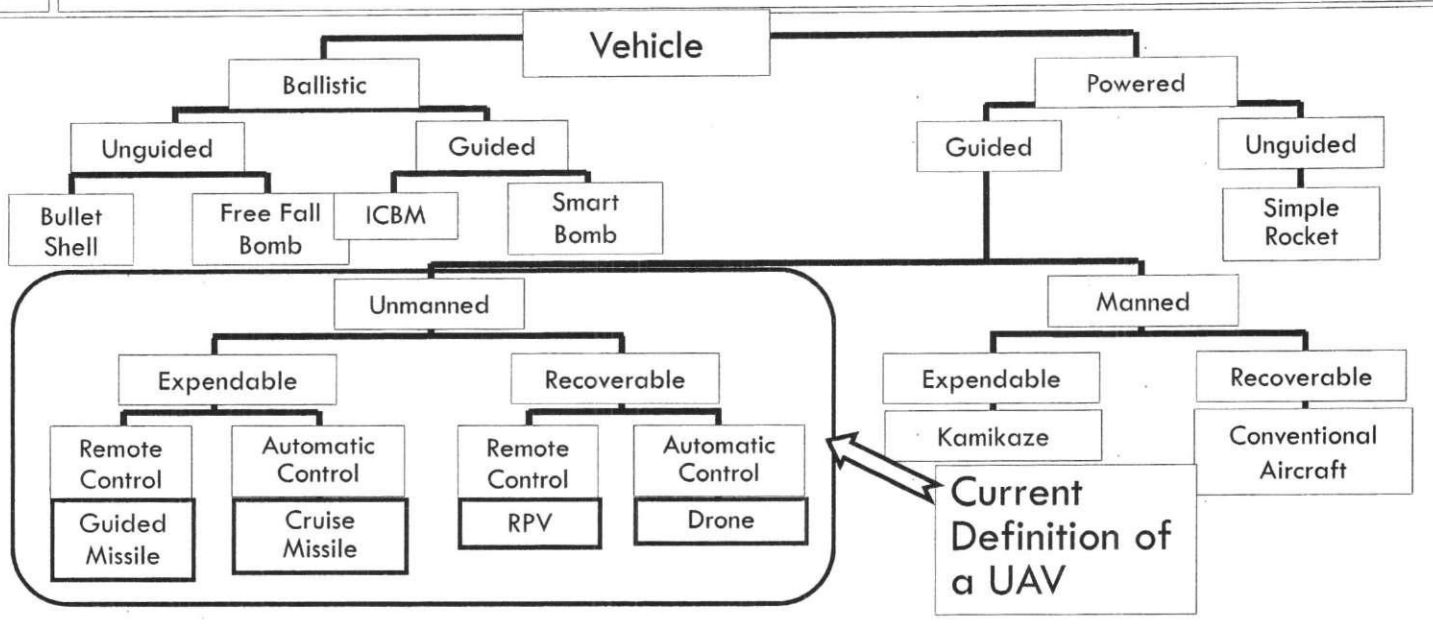
Indigenous UAVs

- Paksin UAV aka DTI UAV
- Siam UAVs
- KSM RTN
- RTN Narai, Ongkot, Pipake
- And many more

*Pictures from the Internet (thaiarmedforce.com)

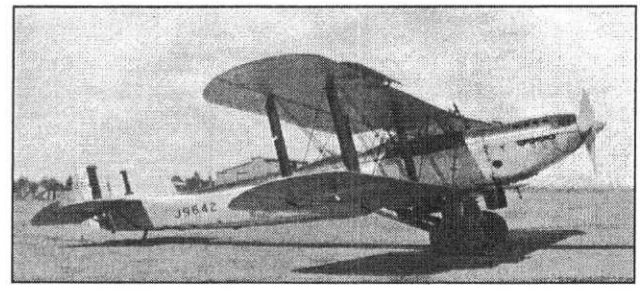


UAV or Drone



The Beginning

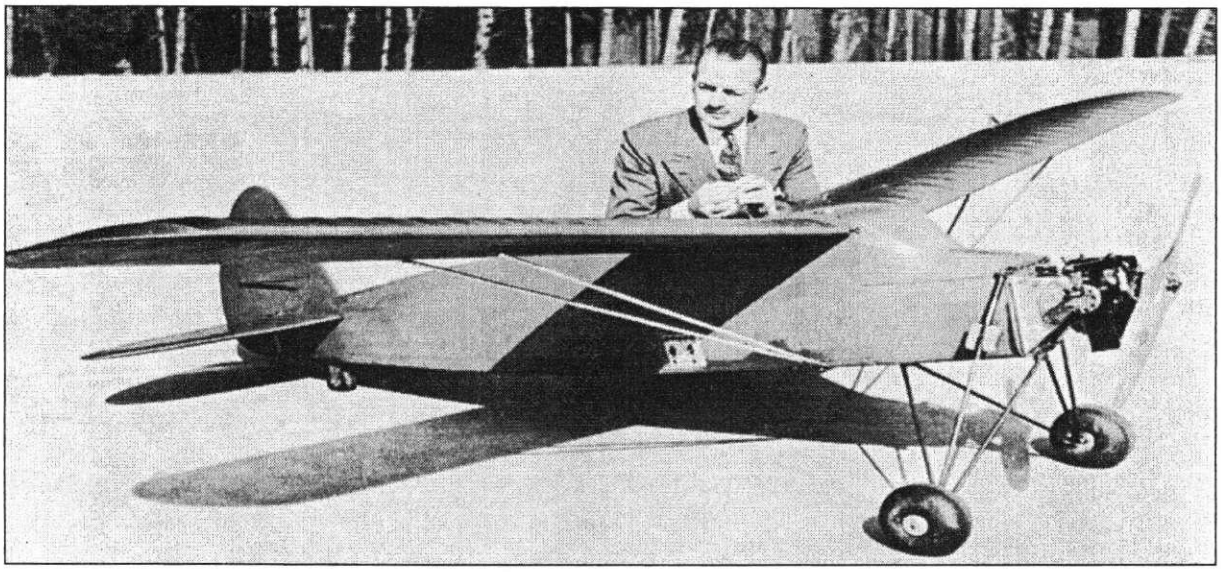
- 1917: French artillery officer, Rene`Lorin proposed flying bombs using gyroscopic and barometric stabilization and control.
- 1918: Germany halts development of guided weapons.
- 1918: Charles Kettering (USA) flies Liberty Eagle "Kettering Bug" and Army Air Corps orders 75 copies.
- 1920: Elmer Sperry perfects the gyroscope and the first enabling technology makes flight control feasible
- 1932: RAE "Fairey Queen" crashes, technology is still in its infancy.



Fairey Queen IIIF Mark IIIB, 1932

The First UAV

1935 - Reginald Denny develops the RP-1 and launches the Radio Plane Company

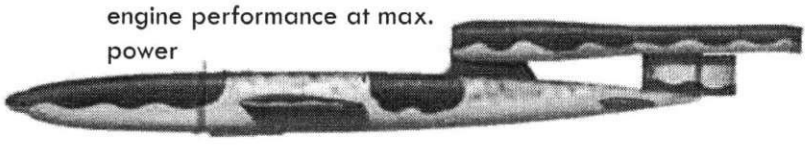


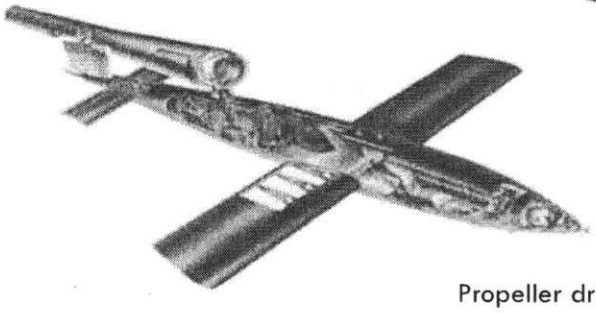
The First Jet-Powered UAV

1943 V-1

Azimuth Control by gyroscope governed by magnetic compass

Speed was determined by engine performance at max. power

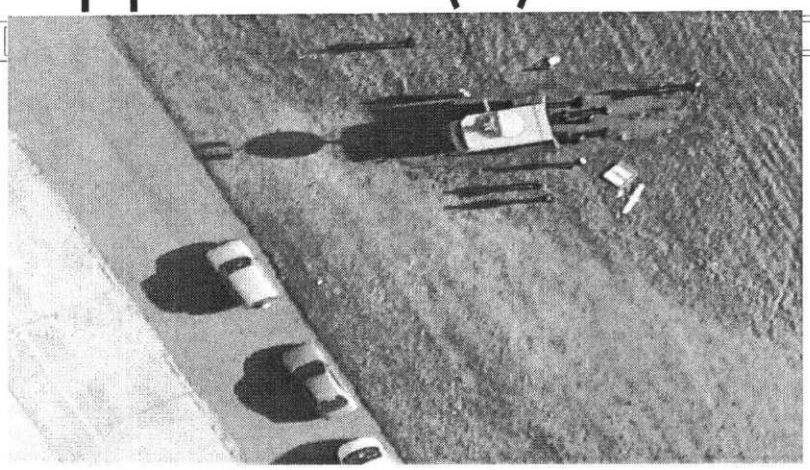




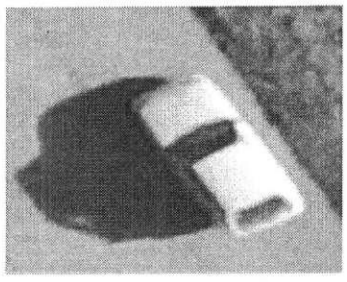
Aneroid barometer altitude control

Propeller driven "air-log" governed range

Application (1) Surveillance



- Altitude 500m

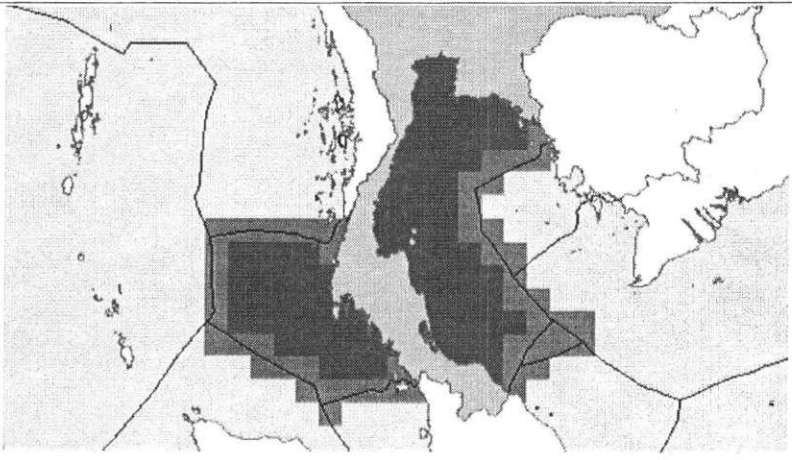


- Cars easily recognizable
- Humans are clearly visible
- Aircraft is not detectable from the ground!

*Pictures © Siam UAV Industries 2014

Application (2) Protect EEZ

- Protecting Economic Exclusion Zone by looking at who's in your waters is very important



Application (3) Disaster Monitoring

- UAVs are becoming important sensor to monitor the disaster as it goes
  - http://www.youtube.com/notepeter01 for flood-monitoring videos during the great Thailand flood

*Pictures © Siam UAV Industries 2014

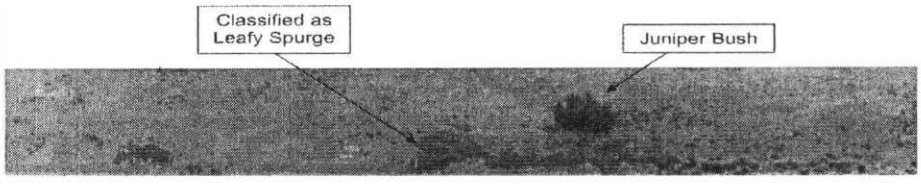
Application (4) Search and Rescue

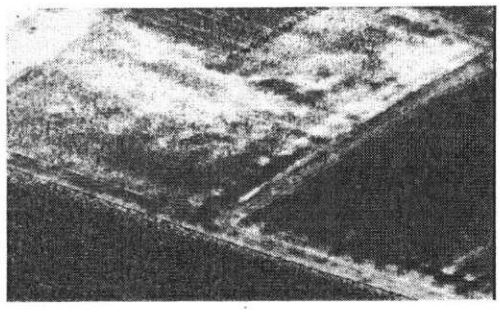
- SAR mission requires a number of planes and crews, # of UAVs can be increased easily

*Picture from the Internet

Application (5) Agriculture

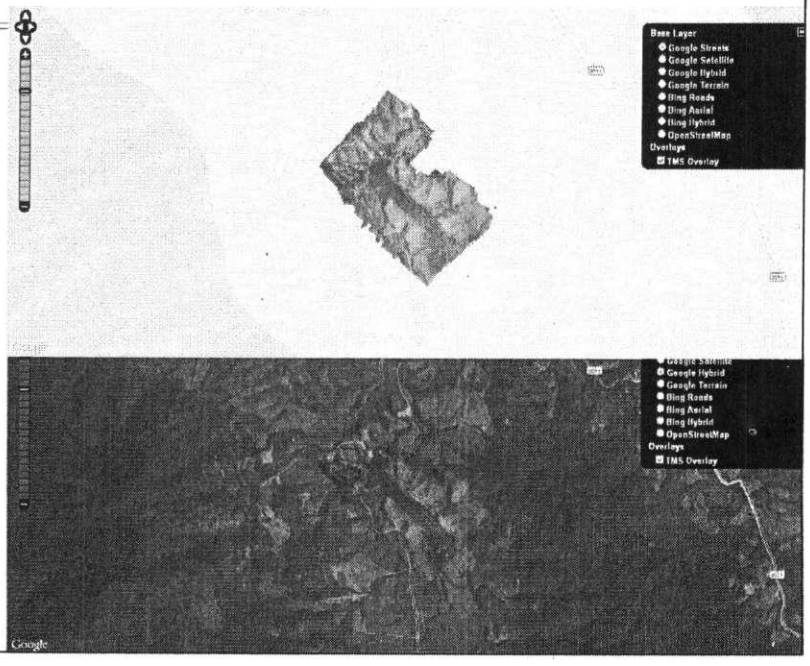
- Precision Agriculture
  - UAV gathers information (Remote sensing)
- Agriculture Use
  - Crop dusting, fertilization





Application (6) Mapping

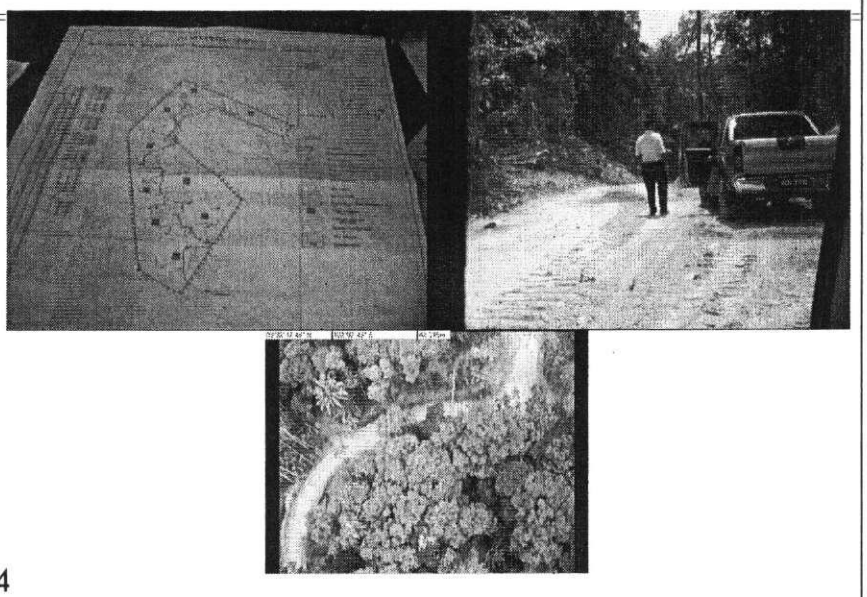
- UAV is a low-cost tool to capture images for Mapping missions



*Pictures © Siam UAV Industries 2014

Application (7) Forestry Protection

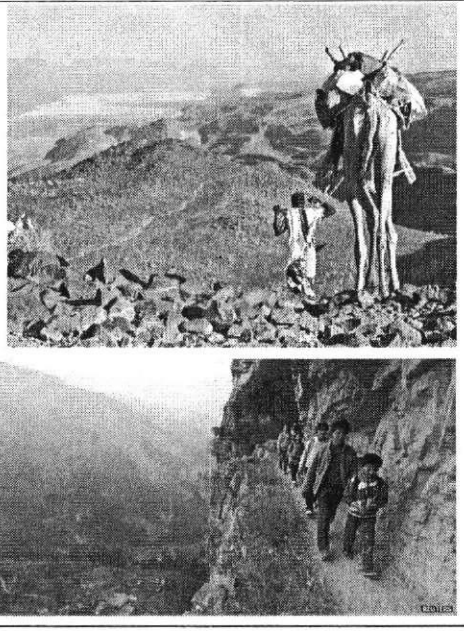
- Anti-poaching
- Anti illegal logging
- Natural resource preservation
- Carbon credit calculation

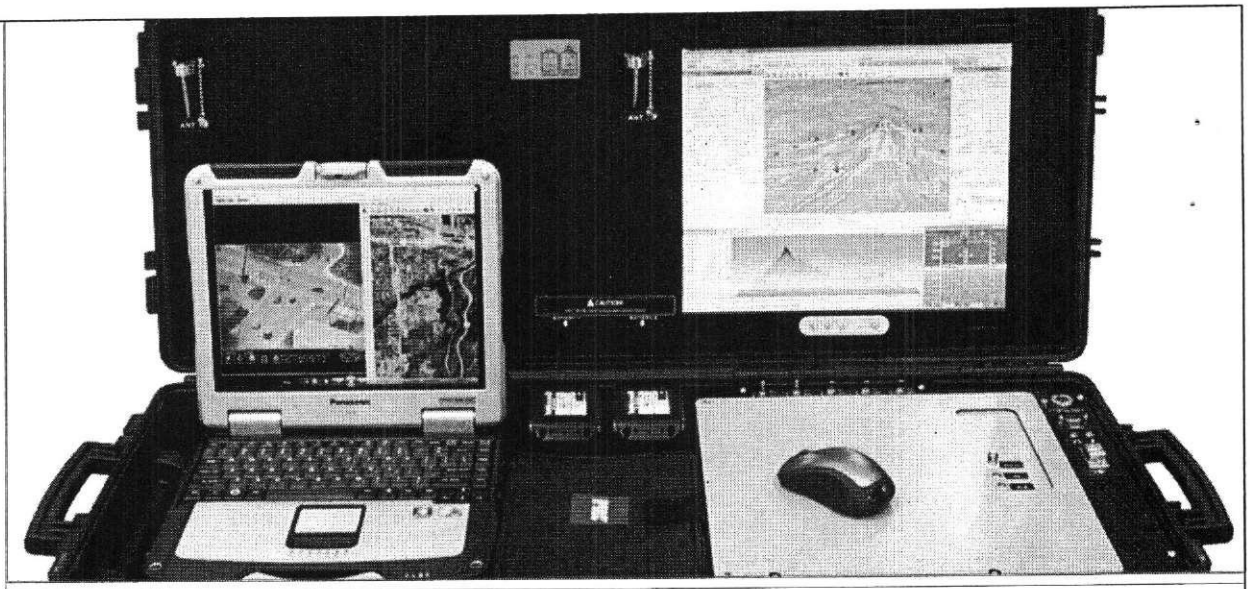


*Pictures © Siam UAV Industries 2014

Application (8) Package Delivery

- In poorest countries, important things like serums and medicine are hand delivered
- CSR for big corporations underway

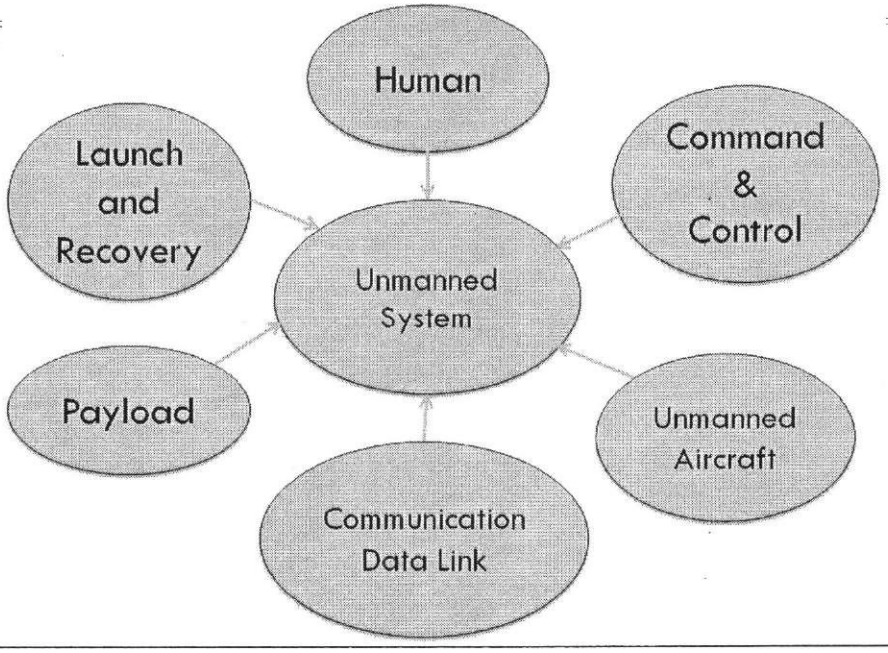




Technicality part of the UAV

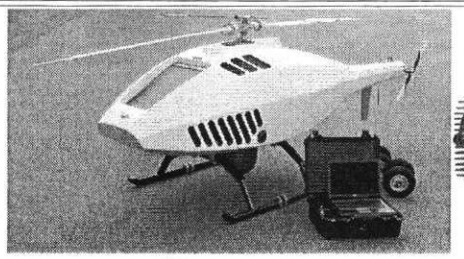
*Picture from the Internet (Cloudcap)

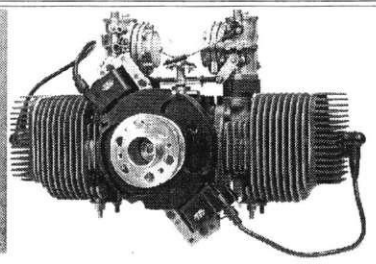
Unmanned Aerial System

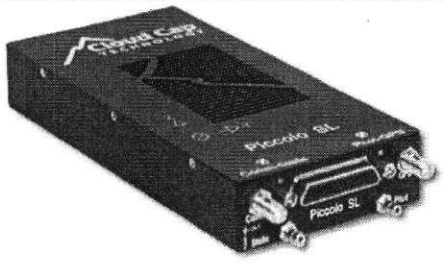


Unmanned Aircraft

- Aircraft
- Propulsion
- Autopilot







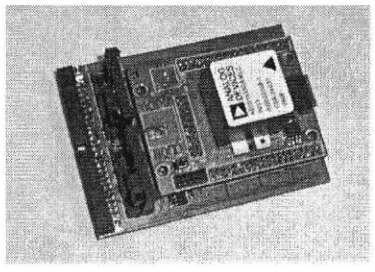
Autopilot

Hardware

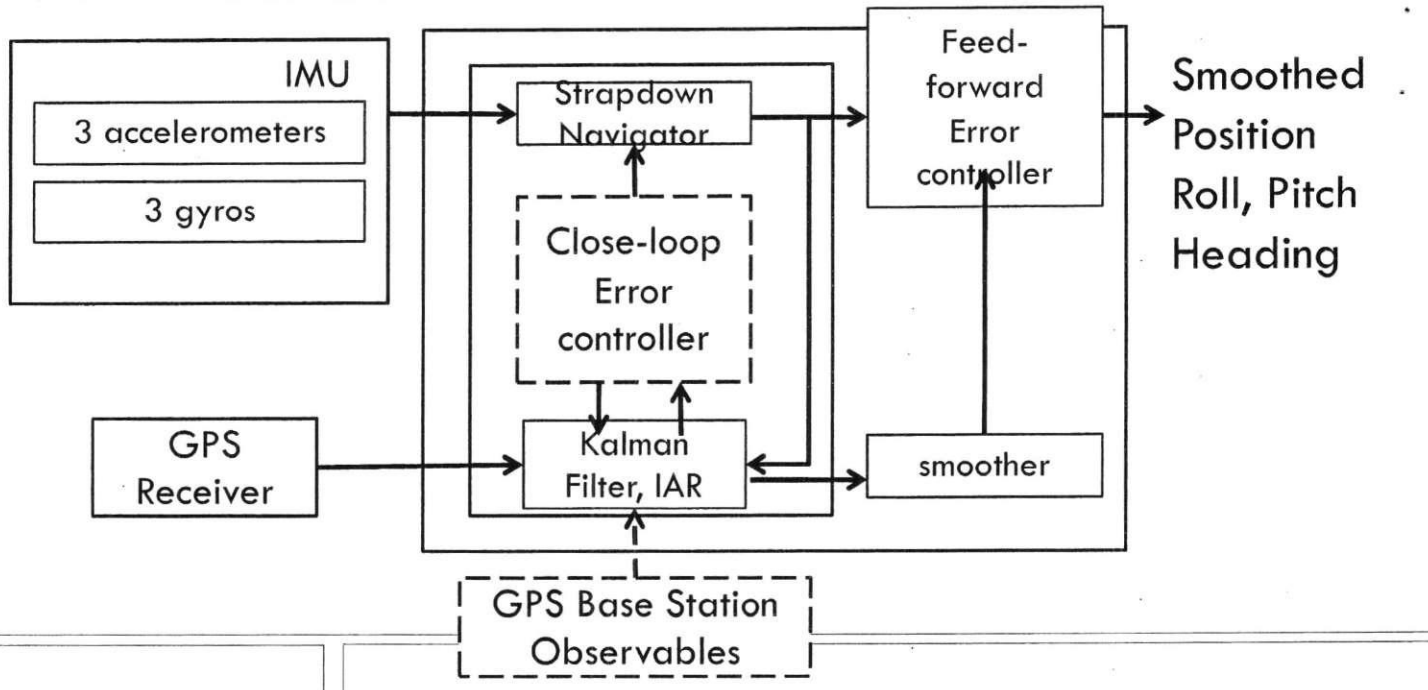
- Microcontrollers
- Set of flight sensors including but not limited to IMU and GPS

Software

- Flight Control Software



Basic schematic of INS/GPS ,DGPS system



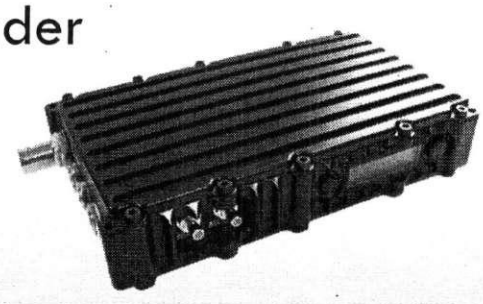
Communications Data Link

Data Link

- Real-time autopilot data sender

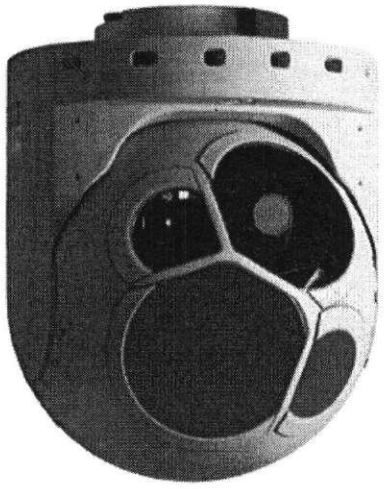
Video Link

- Real-time video sender



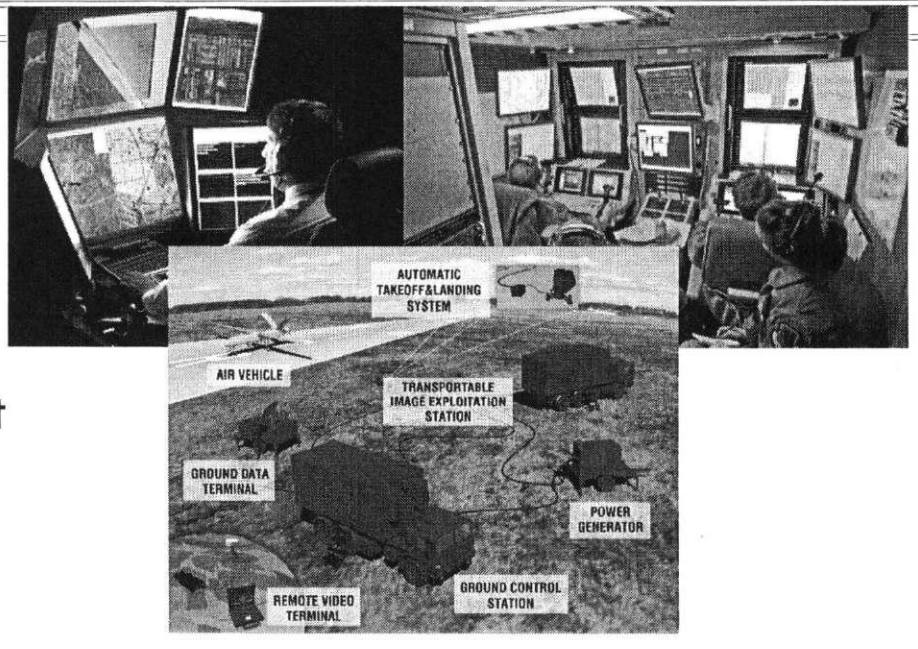
Payload

- Something you carry to do your work
  - Digital Camera
  - Hyperspectral Camera
  - Thermal Camera
  - Laser Designator
  - And more



Command and Control

- Computers
- Ground communications equipments
- Ground support equipments



Speaking about the Law

Definition

กรมการบินพลเรือน
Department of Civil Aviation (DCA)

- Remotely Piloted Aircraft (RPA) – An unmanned aircraft which is piloted from a remote pilot station.
- Remotely Piloted Aircraft System (RPAS) – An remote pilot aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design.

Related Law

Aviation Law of B.E. 2497 (1954)

- Sec.24 – Prohibit the use of unmanned aircraft or balloon without authorization from the Minister of Transportation
- Sec.12 – 5. This Aviation law is not applicable to the Military, Police, and Customs use

Related Law (2)

กรมการบินพลเรือน
Department of Civil Aviation (DCA)

- New laws are work-in-progress to include RPAS
- Annex 2 to the Chicago convention – Rules of the air

The 10,000 ft. View of the RPAS Law

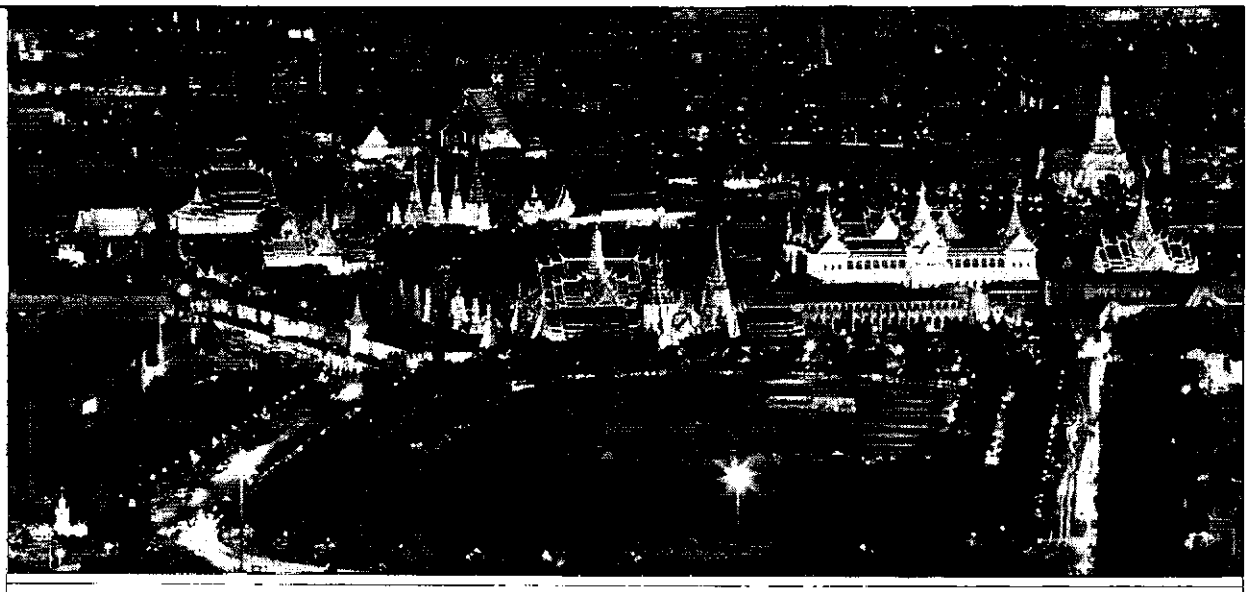
- RPAS shall be approved and have certificate of airworthiness
- Operator shall have an RPAS operator certificate
- Remote pilots shall be licensed
- Request for authorization shall be made to appropriate authorities

What We Can Do Now

- Operate the aircraft in visual line-of-sight (low altitude) and short distance from the operator
- Be careful when operate the aircrafts especially in Bangkok FIR
- Note:
  - Do not fly in restricted airspace (such as airspace near palaces, airports, military bases)
  - Do not fly above other people, buildings, and properties

What We Need

- Approval Policy
- Rules and Regulations for RPAS Operation
  - For VFR and IFR operation
  - Operation in each type of airspace(Class A,B,C,D,E,G)



Current Status of Thai Robotics

*Picture from the Internet (unknown photographer)

Thai Robotics Environment

- Education
  - Quite a few universities offer Robotics degree
- People
  - Professors, engineers, technicians
- Companies
  - Few companies focus on purely Robotics
- Thailand as a user country

Thai UAV Market

- Early adopter market, still
  - early majority phase is 5 years out at least
- UAV
  - Government-only market
- Small UAV
  - Hobbyist
    - Chinese models
    - Potential problem

Looking Forward

- UAV cost, reliability/maintenance, availability, and airspace access need to improve
- BUT: UAVs offer unique capabilities for important applications
- Commercial use of the UAV

Why Do We Need To Develop

- Own technology, own destiny
- Simple enough but very hard to make reliable
- Level playing field among companies, no clear competitive advantage from developed countries
- Adapt to various vehicles – ground, surface, air, underwater, …

Summary: My Ten-Year Journey

- Get to do what I love
- Live like a kid in a candy store
- Ups and downs, through bad times, still, the light at the end of the tunnel is growing stronger
- But – no money in the game, not just yet

Thank you for listening...

Any questions?