FLY-BY-WIRE: A FOUNDATION FOR THE FUTURE

Chris Cawelti

Chief Engineer Bell 525

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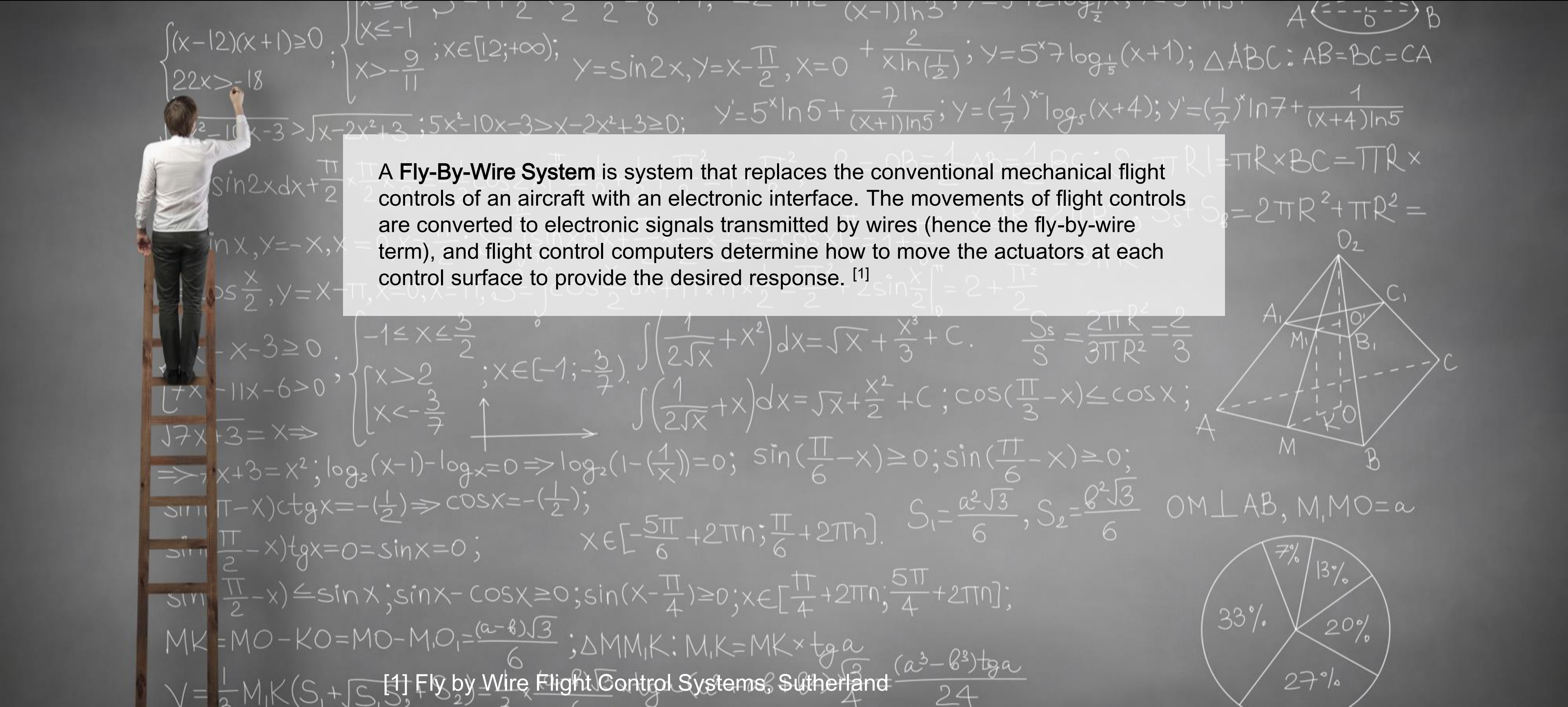
COMPLEXITY FOR COMPLEXITY SAKE?



A **Fly-By-Wire System** is system that replaces the conventional mechanical flight controls of an aircraft with an electronic interface. The movements of flight controls are converted to electronic signals transmitted by wires (hence the fly-by-wire term), and flight control computers determine how to move the actuators at each control surface to provide the desired response. [1]

[1] Fly by Wire Flight Control Systems, Sutherland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CHANGING THE STATUS QUO

CHANGING THE STATUS QUO

Fly-By-Wire Improved Safety Margin

- High-bandwidth Triplex Systems each fully capable of flying the aircraft.
- Triplex Power generation plus dedicated flight control backup generators.
- Maximum System Separation for zonal threats.
- Elimination of complex mechanical linkages and associated maintenance/rigging.
- Ergonomic Cockpit Control configurations

Simplified flying with Fly-By-Wire

- Single axis inputs through complete control axis decoupling
- Precise trim beeping
- Automatic hover hold
- Automatic transitioning between flight regimes
- Automatic bank angle holds
- Collective tactile queuing
- Ergonomic side stick controls with armrests

Fly-By-Wire Intelligent Pilot Assist

- Seamless/transient-free reconfiguration following failures
- Collective Tactile queuing and limit trimming
- Return to trim
- Automatic airspeed trim to AEO, OEI or AEI Vne
- Unusual attitude recovery
- Inadvertent descent detection and recovery
- Autorotation Entry Assist

525 Video

The Future with Fly-By-Wire

- **ADAPTABILITY!**
- Auto-Couple envelope protection
- Detect and avoid integration
- Auto-landing functions
- Optionally piloted vehicles
- Fully Autonomous Operations

FUTURE OF LOGISTICS
AUTONOMOUS POD TRANSPORT (APT)

Bell Unmanned Logistics Support

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Bell Autonomous Pod Transport (APT) Vehicle Family

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Cost-effective, innovative tail-sitter VTOL pod transport aircraft family

Low maintenance / high availability = Low operating cost

Low empty weight fraction = Long range, high speed, high payload

Easy load / unload design = Ground interface automation opportunity

APT Family of Vehicles

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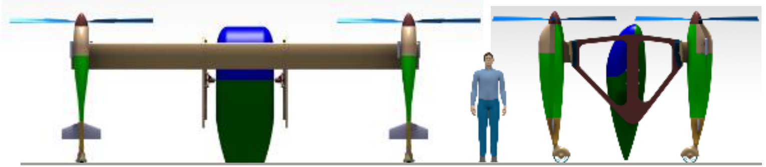
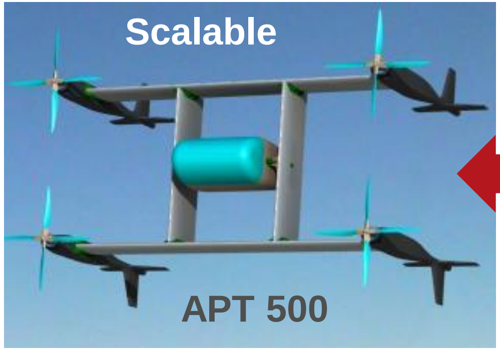
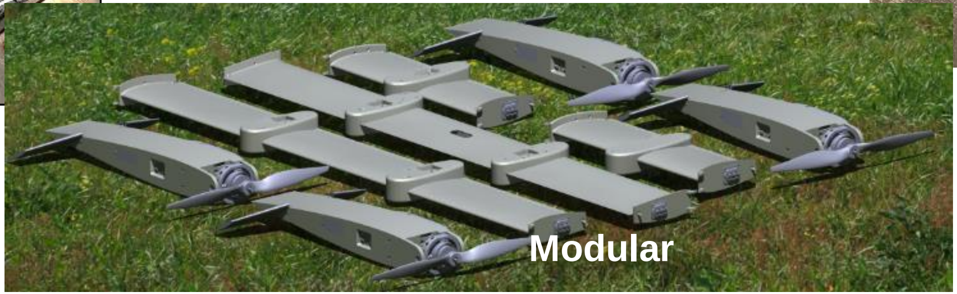
- **Scalable**
- **Portable**
- **Broad Commercial Application**

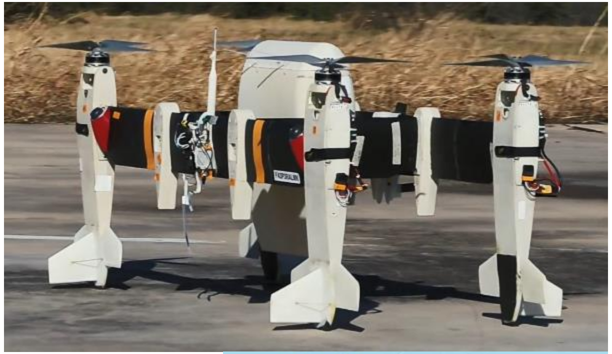


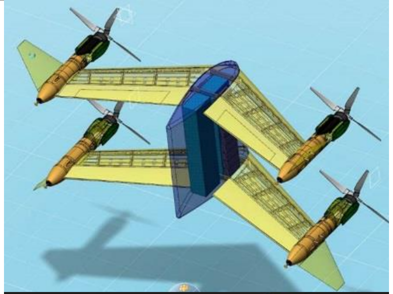
APT 500

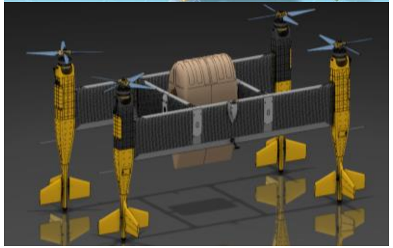




Technology Maturity & Availability



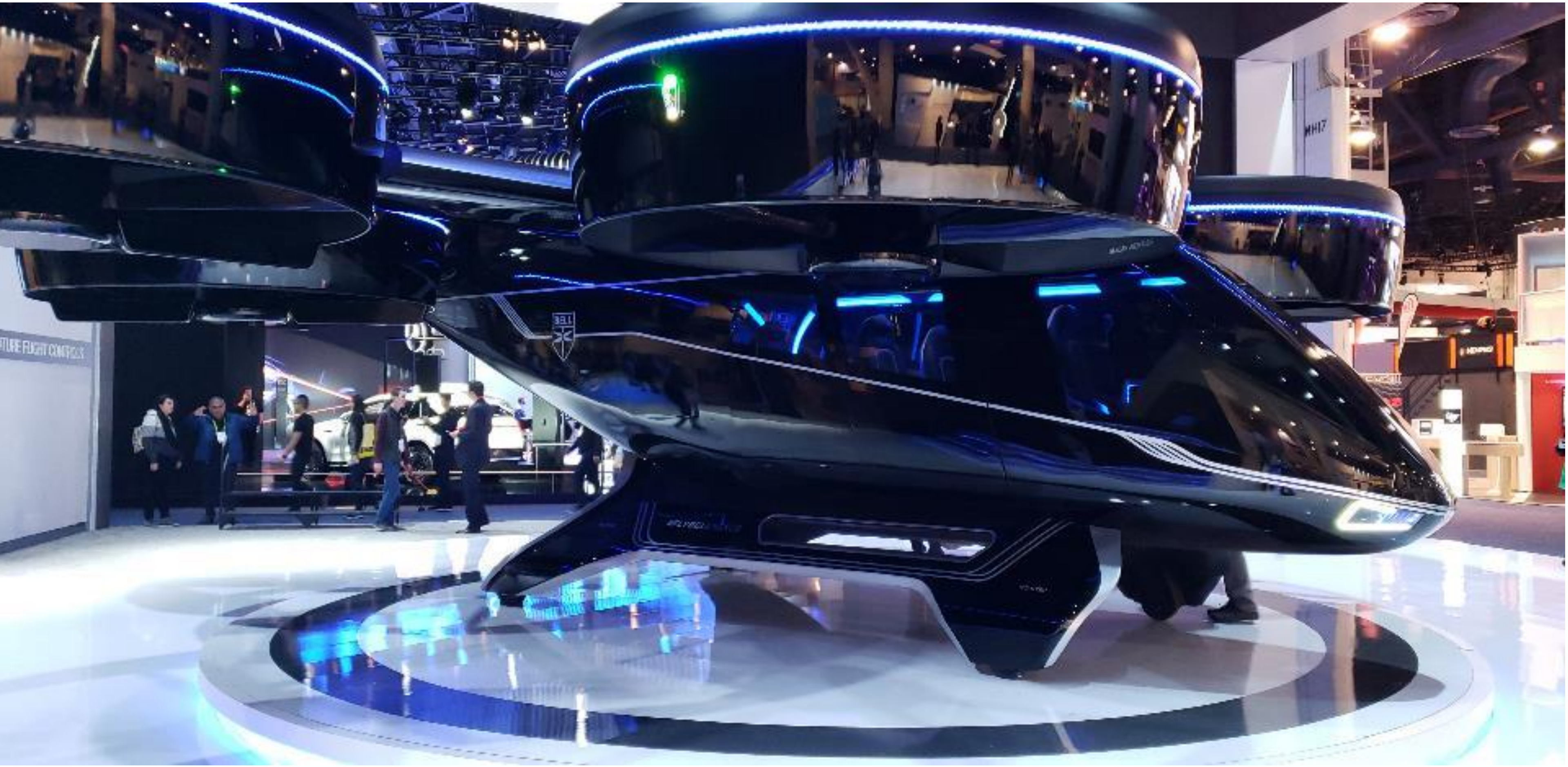




APT20 Currently flying fully autonomous missions:
https://vimeo.com/305842864

APT70 Currently in flight test
- Expected Fully Autonomous flights in June
- Yamato Autonomous Flight Demo in August 2019
- NASA SIO Urban Medical Transport Demo in July 2020

NEXUS – ON DEMAND MOBILITY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CES Media Buzz

THANK YOU!