TECHNOLOGIES FOR UAS/UAM

HONEYWELL AEROSPACE

Honeywell
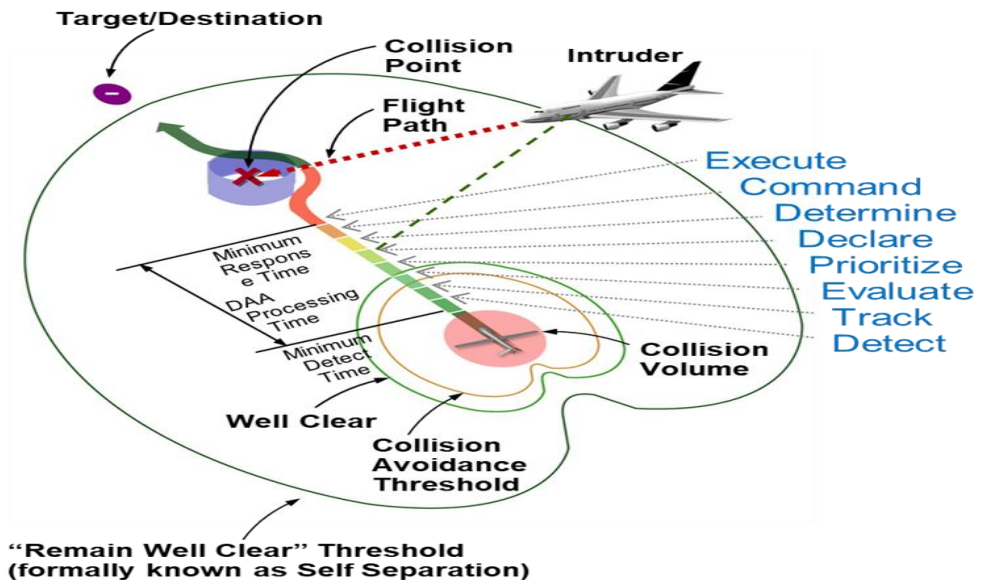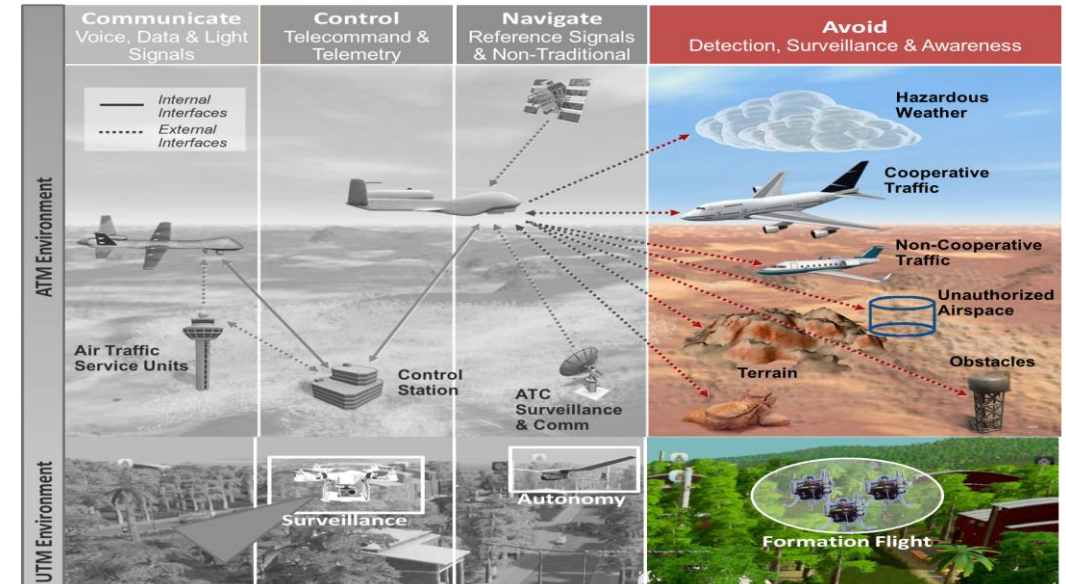
DETECT AND AVOID (DAA) SYSTEM

Need

- Ability for unmanned and manned Systems to fly within airspace with ability to sense and avoid obstacles either fixed (terrains, buildings) or dynamic (other aircrafts and birds) which poses a threat to the safety of aerial vehicle and sometimes to obstacles (if the obstacle is other aircraft or a building).

What is DAA

- Detect and Avoid (DAA) is defined as
  - "the capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action" [ICAO Annex 2]
  - This capability aims to ensure a safe flight and to enable full integration in all airspace classes with all airspace users.
- DAA Regulatory Priority is on Traffic Avoidance
  - Some operations emphasize Collision Avoidance
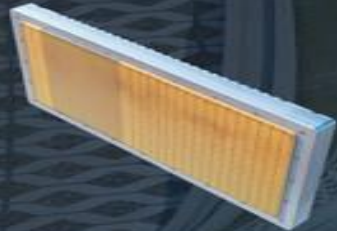 - Some operations emphasize Remain Well Clear functionality

DAA is a key enabler for Automatic Operations by reducing pilot workload or replacing pilot cognitive functions with avionics

INTUVUE RDR-84K BAND RADAR SYSTEM

MARKER BASED LANDING (MBL)

Need

- Precise estimation of the attitude of the vehicle (UAV/UAM), particularly the altitude of the vehicle w.r.t to the landing site for safe and precise landing and takeoff.

  - Precise estimate is important for generating precise controls during the descend phase for smooth landing as well as preventing the damage to landing gears.

  - For application related to autonomous pick and drop of the package (delivery service), it is important that drone is precisely oriented w.r.t to package pickup spot, also it should align precisely w.r.t to drop location for safe delivery of the package.

  - For Indore navigation in warehouse like scenarios, similar fiducials can be used for precise navigation and control to avoid hitting the nearby articles and racks for point-to-point navigating as well as precise pick and drop of the package from the designated spot.

Pattern layout

Position and attitude wrt landing pad / marker corner position in pixels

Solution

- Using the fiducial markers at the landing site (part of landing pad design) to precisely estimate the attitude of the vehicle at cm level accuracy especially during the final descend phase of the UAV/UAM
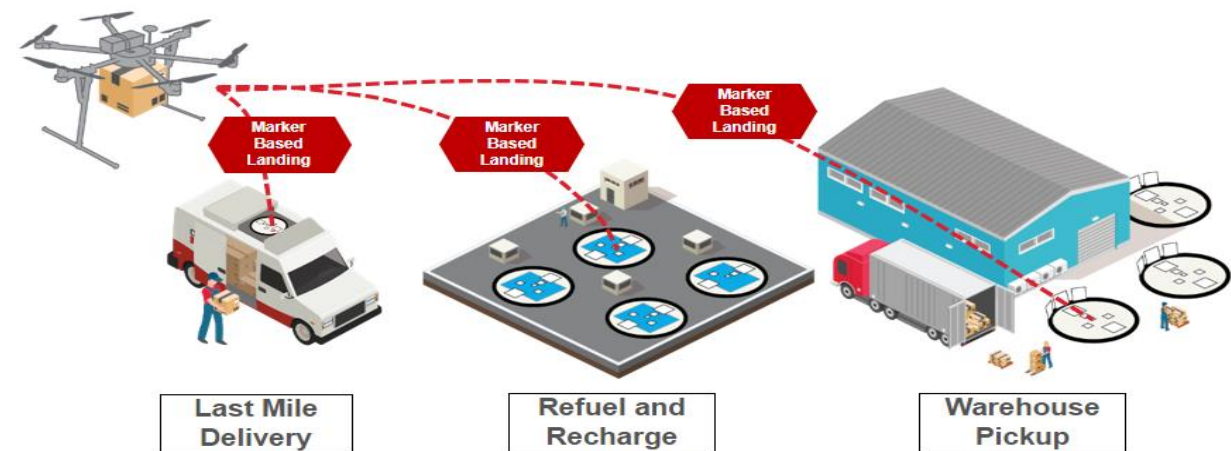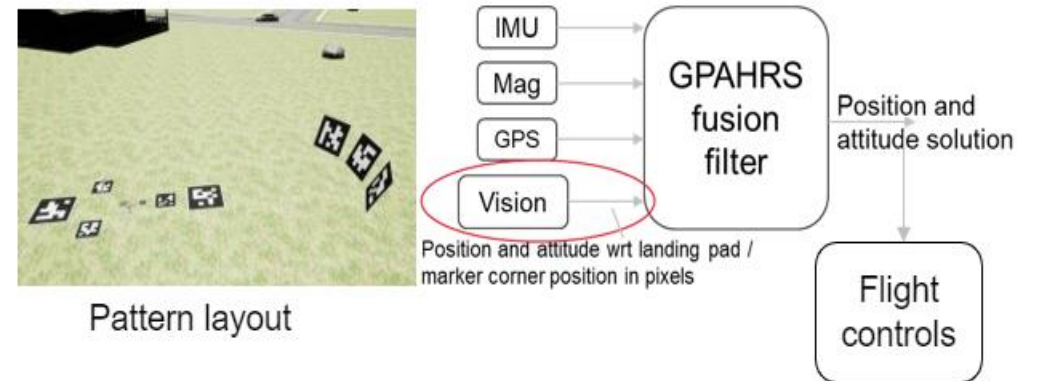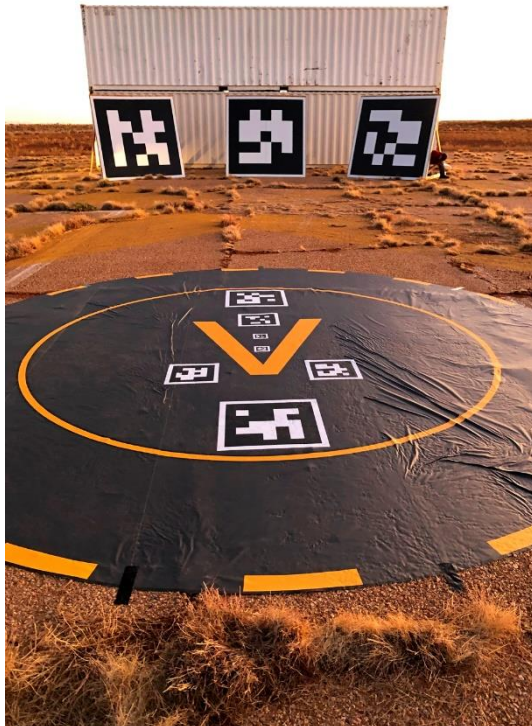

Different scenarios of MBL use

MARKER BASED LANDING

Marker Based Landing (MBL):

Starting at descent height above landing pad:

- MBL uses camera to determine alignment to center of landing pad
- MBL aids navigation and/or flight controls

THANK YOU

Honeywell