



# TECHNOLOGIES FOR UAS/UAM

**HONEYWELL AEROSPACE**

**Honeywell**

# DETECT AND AVOID (DAA) SYSTEM

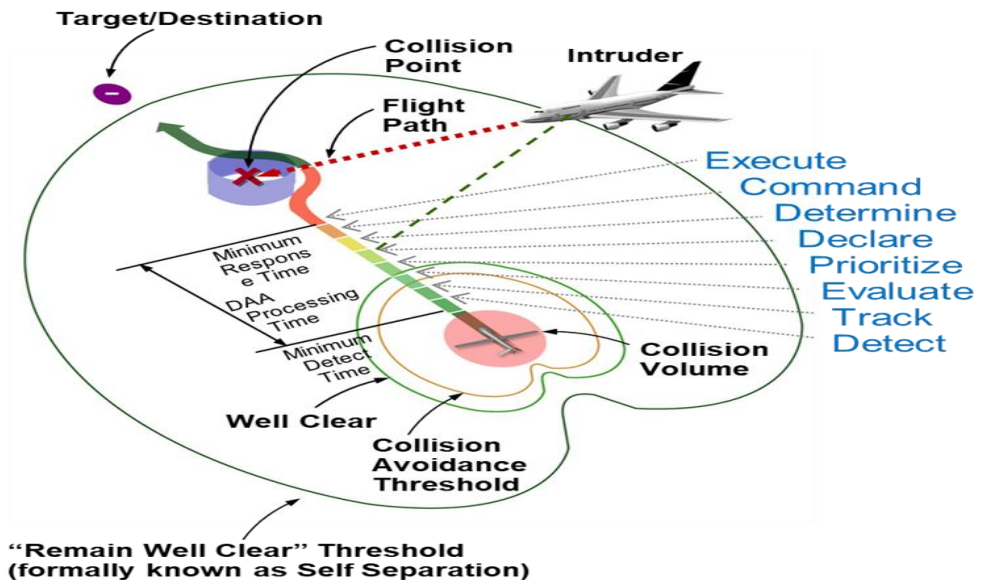
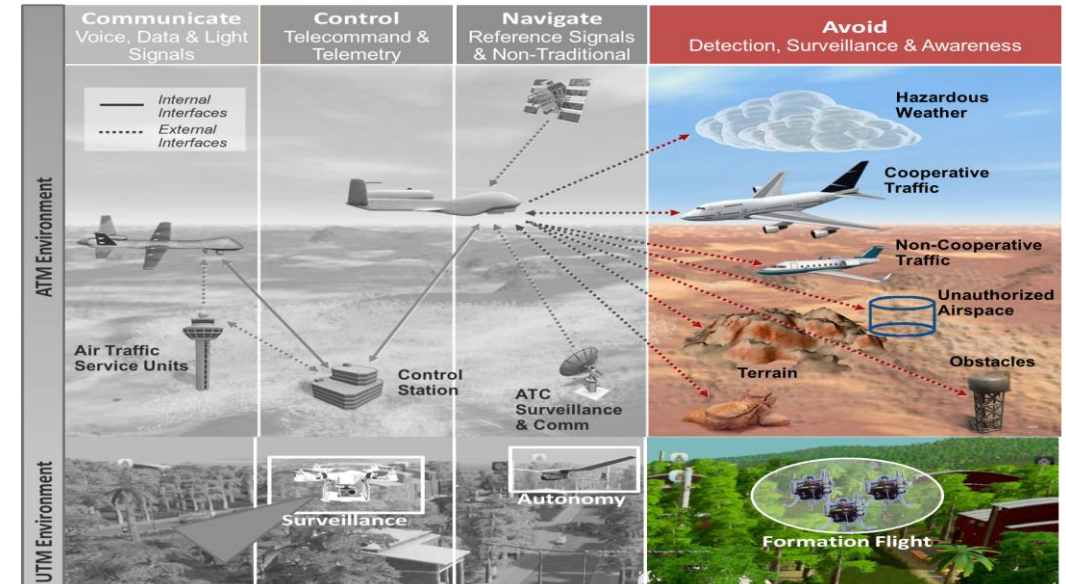
## Need

- 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

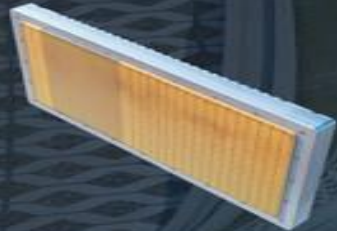
***DAA is a key enabler for Automatic Operations by reducing pilot workload or replacing pilot cognitive functions with avionics***



# INTUVUE RDR-84K BAND RADAR SYSTEM

## INTUVUE™ RDR-84K RADAR SYSTEM

Delivering 360 Degree Awareness via Multiple, Compact, Light Weight, Software-based Phased Array Sensors



### SOFTWARE-BASED RADAR SYSTEM & SENSING TECHNOLOGY FOR SMALLER AIRCRAFT

- Helicopters
- Urban Air Mobility Services
- Unmanned Aerial Vehicles
- Autonomous Military Ground Vehicles

### ENHANCES SAFETY

- Advanced object discrimination amplifies onboard sense and avoid capabilities
- Multiple scans pull in many things at once and "focus" on everything ahead
- Bringing safer, more efficient operations and broader range of capabilities to connected or virtual operations
- Widest range detection parameters available today – detects objects from 1 meter to 5 kilometers
- Open software platform for innovation
- Fewer sensors required enabling streamlined system integration



THE  
FUTURE  
IS  
WHAT  
WE  
MAKE IT

**Honeywell**

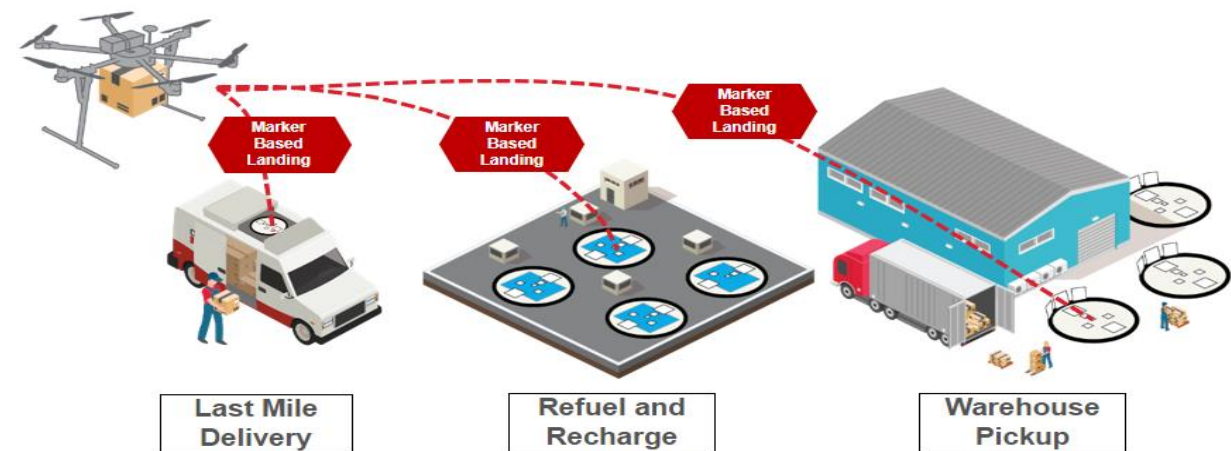
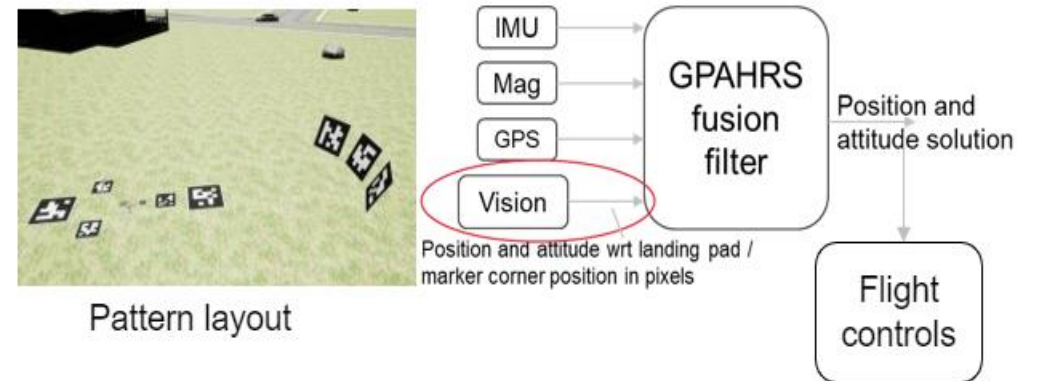
# MARKER BASED LANDING (MBL)

## 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.

## 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



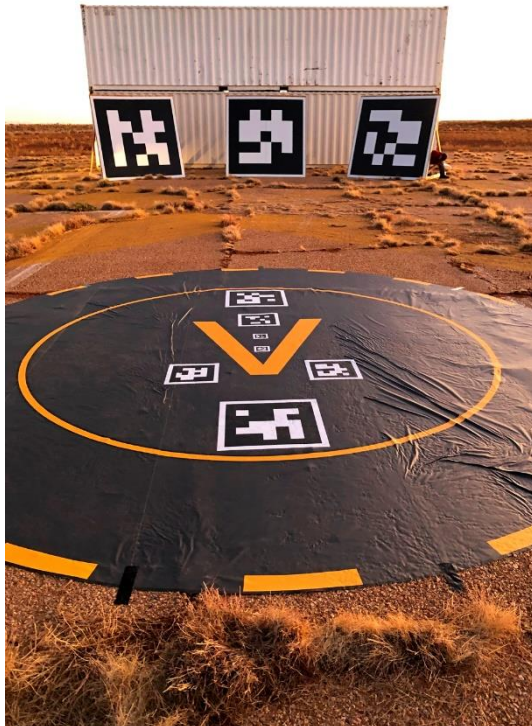
*Different scenarios of MBL use*

# 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**

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