



# Challenge Overview



- **UAS Challenge to consist of single 15 minute scenario with increasing difficulty**
- **Score consists of total time that target appears in camera view minus a penalty for human operator interaction**
- **Each team allowed to attempt scenario 3 times with best score used**
- **Participants to use single small UAV <200lbs GTOW with gimbaled camera**



# Scoring Details



- **Total scenario length is 15 min with increasing difficulty (uncluttered to cluttered to urban)**
- **A point is awarded for every second that the target is in view and properly annotated by the system.**  
**Max score: 900**
- **Judge starts stopwatch when system marks proper target and suspends timing when target is out of field of view or not annotated**
- **User interaction is allowed without penalty only twice: initializing tracker on target, initializing tracker at 10min mark to follow new target**



# Scoring Details



- **20 point penalty is assessed for every human intervention to the system. E.g. if the tracker has lost lock and operator re-cues the system to the target, the penalty will apply**
- **Run score = # seconds in view – 20 \* # of human interventions**
- **Final score is max score of 3 runs**



# Scenario Details



- **Test consists of three phases:**
  - Clutter-free vehicle tracking
  - Urban vehicle tracking
  - Urban personnel tracking
- **Each phase lasts approximately 5 minutes with fluid transition between phases**
- **UAV altitude to be set at 1000ft AGL (or if using fixed field of view, at fixed altitude below 2000 ft)**
- **Run starts with stationary target and begins when system operator marks target for first time**



# Scenario Timeline: Phase 1



- **Stationary pickup truck on runway, UAV operator initiates tracking, trail run begins**
- **Pickup truck moves in straight line at approximately 20 mph**
- **When reaching end of runway, truck performs slow U-turn and proceeds back along runway**
- **After 3 minutes, truck begins numerous stop-and-go maneuvers with speeds up to 30 mph**
- **Phase 1 complete at 5 minute mark**



# Scenario Timeline: Phase 1







# Scenario Timeline: Phase 2



- **Truck proceeds to urban-like area (Police training area, near burned out cars, along tree-lined sides of runway)**
- **Truck frequently makes 90 degree turns**
- **Truck will linger in shadows**
- **Truck will operate between 0 and 25 mph**
- **At various intersections, confuser vehicle will pass by (i.e. side-by-side at traffic light, passing in opposite directions)**
- **Phase 2 ends at 10 minute mark**



# Scenario Timeline: Phase 1







# Scenario Timeline: Phase 3



- **Truck stops near urban area (tent/canopy setup)**
- **Driver and 2 passengers exit vehicle, one of which carries a box**
- **UAV operator initiates track on person carrying the box**
- **Person walks at normal pace around tents**
- **At 13 min mark, person crouches in shadow then proceeds in evasive manner (running, waiting)**
- **At 15 min mark, person enters building and test is complete**



# Scenario Timeline: Phase 1





# Other Details



- **Vehicle and person are carrying GPS units and coordinates are broadcast and collected**
- **AFRL will allow access to the use of a test vehicle to teams unable to field a complete system. Full specifications of the vehicle and sensor capabilities are provided on the challenge website.**
  - **Full heading control and camera pointing is allowed when using AFRL asset**
  - **If a team does not want to control camera or motion of UAV (ie video analytics only), the default flight control is a loiter above the calculated target position with camera in “sensor point of interest” mode aimed at the calculated target loc**



# “Blue-Force Tracking” Sub-Challenge



- For teams interested only in keeping cooperative targets in camera field of view (i.e. a blue-force tracking problem), trial runs will be allowed and scored but will not be eligible for full challenge award
- In this scenario, full GPS information of the target is available to the control algorithm which chooses the flight path and camera motion to keep target in view as much as possible (1 point for every 1 second in view)



# Questions?

