



UAS Challenge Scenarios: Focus on Automated Tracking

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Dr. Derek Kingston
Control Science Center of Excellence
Air Vehicles Directorate
Air Force Research Laboratory

Integrity ★ Service ★ Excellence



Challenge Overview



- **UAS Challenge to consist of three difficulty levels**
 - Student
 - Moderate
 - Difficult
- **Participants to use small UAVs <100lbs GTOW**
 - Fixed camera and gimbaled camera allowed
- **Scenes can include urban or rural setting**
- **Date to be decided during Oct meeting**



Student Challenge



- **Automated endurance tracking of vehicle (e.g. pickup truck) in clutter-free environment, start track on human operator input**
- **Metric: Duration of accurate vehicle track with no gaps greater than 3 seconds**
- **Method: Vehicle driving on clear runways at speeds varying from 0 to 30 mph, frequent straight maneuvers**
- **UAV Altitude: ideally greater than 1k ft, expected 500 ft, min 300 ft**
- **Expected that UAV will utilize gimbaled camera, bonus points for avoiding nadir view**



Moderate Challenge



- **Automated endurance tracking of vehicle in urban setting, start track on human operator input**
- **Metric: Duration of accurate vehicle track with no gaps greater than 3 seconds**
- **Method: Vehicle driving through urban setting with frequent abrupt turns. Slow and stopping motion possible in cluttered areas. Tree lined roads if possible.**
- **UAV Altitude: ideally greater than 1k ft, expected 500 ft, min 300 ft**
- **Expected that UAV will utilize gimbaled camera, bonus points for avoiding nadir view**
- **Cooperative teams allowed**



Difficult Challenge



- **Automated multiple human-sized object tracking in urban terrain**
- **Metric: duration and accuracy of each track**
- **Method: 4-5 people exit building as group. UAV acquires group in view and begins surveillance. Event scatters group, each human runs in different direction eventually entering buildings**
- **UAV Altitude: ideally greater than 1k ft, expected 500 ft, min 300 ft**
- **Bonus: identify how many carry packages**



Gradual Build-Up Challenge



- **Vehicle carrying multiple passengers nominated for tracking**
- **UAV tracks vehicle and passengers through incrementally harder environments:**
 - **Straight, clear, constant speed movement of vehicle with few obstructions in rural setting**
 - **Vehicle enters urban setting and frequently turns and changes speed unexpectedly**
 - **Vehicle often occluded by shadows, buildings, trees in urban environment**
 - **Passengers exit the vehicles some carrying tools and packages and scatter to different locations**



Gradual Build-Up Challenge



- **Human operator allowed to reset tracker, but system is penalized for every instance of human involvement needed.**
- **Metric: percent completion of challenge with valid tracks minus penalty for operator input**
- **Metric: locations of passengers and which objects they were carrying**
- **UAV Altitude: ideally greater than 1k ft, expected 500 ft, min 300 ft**
- **Cooperative teams of UAVs allowed**



Questions?

