



Urban Challenge

Video Demonstration Guidelines

March 30, 2007

Document Change Summary

Section	Description	Date
2	Submission guidelines revised to include the Video Demonstration Information Sheet	January 16, 2007
4	Evaluation Factors: Item 11 revised	January 25, 2007
2	The guideline paragraph for the course and its figure revised.	January 30, 2007
2	VDIS requirement removed for teams uploading videos directly at https://www.tfims.darpa.mil/urbanchallenge .	February 20, 2007
6	Copyright notice clarification	March 30, 2007

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Urban Challenge

Video Demonstration Guidelines

1. Introduction

The Urban Challenge Video Demonstration is a mandatory part of the qualification process for Track B teams competing in the DARPA Urban Challenge. DARPA will use the video to assess the state of preparation and capability of the autonomous vehicle, and determine the Track B teams to receive site visits. A site visit is a prerequisite for a team to be considered for the National Qualification Event. Track B teams that fail to submit a demonstration video will be ineligible for any further participation in the Urban Challenge, including site visits.

This document provides submission guidelines, a list of required video elements, and the evaluation factors to be used in assessing a team's Video Demonstration.

2. Guidelines

Submission. Videos must be received by DARPA by 5:00 pm ET on April 13, 2007. The preferred method for submitting the video is uploading at <https://www.tfims.darpa.mil/urbanchallenge>. Alternatively, teams may mail videos to DARPA. Teams submitting by mail must also complete the Video Demonstration Information Sheet (VDIS), available at www.darpa.mil/grandchallenge, and send it with the video to:

DARPA
3701 N. Fairfax Drive
Arlington, VA 22203
Attn: DARPA Urban Challenge

Teams will receive an email acknowledging receipt. Teams that do not receive an acknowledgement email within two business days after submitting their video, or have technical questions regarding video upload, should contact grandchallenge@darpa.mil. Videos should be uploaded well in advance of the deadline to ensure proper receipt and acknowledgement.

Format. The video total run-time must not exceed 5 minutes. Videos must be in .wmv file format and 100 MB or less in size. The audio track should be used to describe the on-screen activities. Videos submitted by mail must be on a PC-formatted CD. The CD will become the property of DARPA and will not be returned. The team reference number and team name should be marked on the CD case and the CD label.

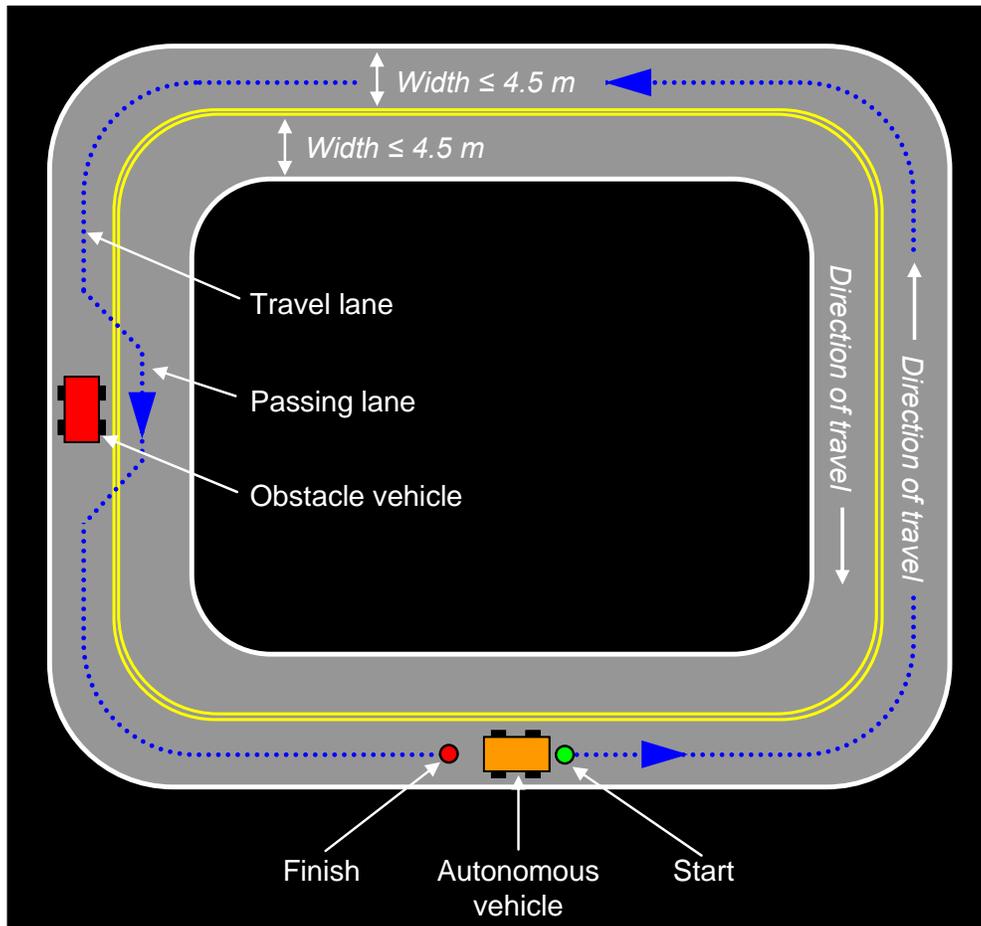
Vehicle. The vehicle shown in the video must be the vehicle that will be demonstrated at the site visit. Vehicle eligibility issues, such as the submission of safety record documentation, must be resolved by March 31, 2007.

Location. There are no limitations on the filming location of the Video Demonstration, although if the location is part of a public road system or traverses private land, the team is responsible for obtaining all necessary permitting and access rights.

Safety. The primary responsibility for safety resides with each team and team leader. Teams are encouraged to develop a safety plan to ensure the safety of persons and valuable property during the filming process. The team must comply with Federal, state, and local regulations and all environmental and permitting requirements applicable at the demonstration site.

Content. The video should provide a clear and convincing demonstration of autonomous vehicle capabilities. The team is required to demonstrate the vehicle capabilities without a rider on board. The video must include all required elements. The video will be evaluated solely on the basis of the specified evaluation factors.

Course. The team shall create a two-lane course as shown in the figure below. The outside (travel) lane must be 240 to 400 meters in total length and the width of each lane shall be 4.5 meters or less. Lane boundaries shall be clearly visible on the video through marker cones, lines, or by other means. The course must be closed-loop, although the shape is not specified. The team shall place an obstacle vehicle in the travel lane as shown.



Video Demonstration Course for Autonomous Run

3. Required Elements

The vehicle shown in the video must be the vehicle the team intends to use for the site visit. The vehicle platform must conform to the Urban Challenge Rules, and must be based on a full-size stock chassis or full-size chassis with documented safety record that has been accepted in writing by DARPA.

- a. *Vehicle Tour.* The video must give an overview tour of the stationary vehicle, including a description of sensors, actuation, navigation, processing, accommodations for Government E-stop, and any significant variations from the vehicle specifications submitted with the Application, Part 1.
- b. *E-stop test.* The video must show a demonstration of the team-supplied E-stop's ability to stop the vehicle. The vehicle must accelerate to approximately 10 mph and then come to a complete, controlled stop with the actuation of the E-stop. The E-stop control commands should be called out or otherwise indicated in the video. The vehicle must resume travel when the E-stop RUN mode is reactivated without intervention by the team. If the vehicle is equipped with a wireless remote control capability, the E-stop must be a separate, independent system.
- c. *Course Tour.* The video must give an overview tour of the course. Lane markings, obstacle placement and the start/stop locations shall be identified. The total course length shall be indicated.
- d. *Autonomous Run.* The video must show the vehicle autonomously navigating the course with a target average speed range of 5 to 15 mph and returning to the start location. Autonomous navigation, waypoint-following, lane-keeping, and obstacle avoidance are required as part of this element. The autonomous vehicle must be able to detect the obstacle vehicle, steer into the passing lane to avoid it, and then return safely to the travel lane to complete the maneuver. For this element, the autonomous vehicle may be filmed from a control vehicle following the autonomous vehicle around the course.

Teams may not place a rider in the autonomous vehicle during the E-stop test or Autonomous Run.

4. Evaluation Factors

DARPA will score each team's Video Demonstration using the following equally-weighted evaluation factors:

1. Vehicle has at least 4 wheels and front and rear bumpers. Vehicle is equipped with externally-actuated manual E-stop capability, with at least one actuator easily accessible and labeled on each side of the vehicle. Platform has no apparent design elements that could harm other vehicles or drivers.

2. Navigation systems (GPS, IMU, etc) have been integrated on the vehicle. Vehicle is equipped with integrated sensor systems (cameras, lidars, radars, etc.) that provide forward, aft, and side-sensing capabilities.
3. Vehicle has been equipped with audible and visible warning devices. Vehicle actuates audible and visible warning devices when in RUN mode. Vehicle displays rear brake lights when the brakes are applied in autonomous mode.
4. Vehicle has been outfitted with a wireless E-stop system for use at the site visit. Video shows actuation of the wireless E-stop controller and requisite stop and restart of the vehicle.
5. Upon E-stop activation, vehicle stop is smooth and controlled – no skidding, swerving or excessive delay.
6. Autonomous Run course conforms to DARPA’s ‘Video Demonstration Guidelines’.
7. Vehicle exhibits required 5-second pause after entering RUN mode and before moving.
8. Vehicle navigates all course waypoints autonomously.
9. Vehicle is able to stay within travel lane, with wheels of vehicle remaining completely within marked boundaries at all times while traversing the course.
10. Vehicle completes course at an average speed within the 5-15 mph target speed range. Vehicle progresses smoothly during straight sections of the course and controls speed by slowing during turns, if necessary.
11. Vehicle detects obstacle vehicle at a safe distance and comes to a full stop.
12. Vehicle pulls completely into adjacent passing lane, and maintains safe distance from obstacle during maneuver.
13. Vehicle returns safely to travel lane a safe distance from obstacle and continues without leaving travel lane for the remainder of the course.

5. Results Notification

DARPA will notify teams of their selection or non-selection for a site visit via e-mail on or before May 11, 2007. Teams that do not receive this email should notify DARPA promptly at grandchallenge@darpa.mil.

6. Data Rights

By submitting the video, teams represent that they either own the copyright to the video and agree, or have obtained permission from the copyright owner who agrees, that the U.S. Government may use the video for noncommercial purposes in conformity with the Data Rights provisions of these Guidelines; such use may include, where necessary, copying and distributing one or more copies within the Government.

If a video is submitted on a CD, the physical media becomes the property of DARPA, on behalf of the U.S. Government and the physical packaging should prominently be marked with the

above information, as well as the following statement: “This CD is the property of the U.S. Government.”

All videos submitted will be used for Urban Challenge evaluation and selection purposes. DARPA may also use the video for training purposes or for other DARPA program-related purposes within the Government.

By submitting the video in any medium, the team grants DARPA permission to release a copy of the video to the Smithsonian Institution for archival and noncommercial public display and public performance purposes.

All videos must be marked prominently in the onscreen material to reflect the appropriate copyright notice and the existence of the Government license, citing specifically the terms of the DARPA 2006 Urban Challenge Video Demonstration Guidelines.

The following satisfies this requirement:

“Copyright 2007 by Team Yourname. Team Yourname has granted DARPA a license for use of this video in accordance with the Urban Challenge Video Demonstration Guidelines.”