I looked at corner cases (i.e “difficult” test cases) for the AVP project with a mix of autonomous and man-driven vehicles.

Let’s assume that we define and quantify a “difficult” test case as the result of the ratio between the number of correct/critical transitions divided by the total number of transitions. The more difficult the test case, the closer to 1 the ratio.

Please refer to the Powerpoint document enclosed: AVP gridworld.pptx

FYI- I made state 29 a failure tolerant state and updated the system dynamics, also attached.

1. No human driven cars - Corner case #1: slaloms – Slide 1

One example of a corner case only with autonomous vehicles and pedestrians could be: Static obstacles are placed on the grid forcing the system to take the right transitions at every step.

Now here is a list of corner cases involving autonomous cars, pedestrians and man-driven vehicles. Since human can exhibit uncertain behaviors, I looked at what are the different off-nominal behaviors a human could transition to driving his vehicle and on its way by foot towards the exit.

1. Human driven cars - Corner case #1: U-turn - Slides 2->7

One man-driven car (H) performs a U-turn and drives in the opposite direction. An autonomous car (A) facing H stops to avoid a collision.

1. Human driven cars - Corner case #2: bad parking - Slides 8->14

One H1 is parked but is not pulled forward enough, and another H2 is parked but takes 2 parking slots. One A avoids collision with H1 and H2.

1. Human driven cars - Corner case #3: pedestrians - Slides 15->20

A pedestrian walks away from his car in order to exit the parking structure and drops a bag on the way, blocking the other cars. One A avoids collision with the pedestrian and the bag.

1. Human driven cars - Corner case #4: unhealthy car - Slides 21->27

One H fails down and the driver steps down from the car, blocking the other cars. One A avoids collision with the pedestrian and with H.

1. Human driven cars - Corner case #5: a human car overtakes an autonomous vehicle - Slides 28->32

One H overtakes an A, blocking its way. A avoids collision with H.

1. Human driven cars - Corner case #6: backup strategy – Slides 33->38

One H goes faster than the other cars. Located ahead of H, one A initiates a lane change to get around an obstacle, but the H overtakes A. A avoids collision with obstacle and H.