

Curiosity on Mars: Autonav

Hi, I'm Mark Maimone, rover planner and mobility engineer on the Mars Science Laboratory mission.

I'm here with the Curiosity engineering model at JPL's Mars yard and this is your Curiosity rover report.

Out here in the Mars yard is where we developed the software that Curiosity will use to drive autonomously.

We can test all kinds of situations out here. We can put rocks in its way and big holes and watch what happens and see how it responds to different terrain situations.

For the past year, Curiosity has been driving on Mars following instructions from human rover planners. But now, we have a new capability that's coming on line something that will let Curiosity drive herself on Mars. This is called "Autonomous navigation.

Humans are still in the loop. We're going to tell her where to go. Curiosity is going to decide how to get there.

Curiosity takes pictures from the navigation cameras, with the hazard cameras, and it's able to combine that information, put it all together to define a safe way to get to where we ask her to go.

And that capability is going to let us drive much farther than before,

This is an animation showing Curiosity's first autonomous drive on Mars. The drive lasted about 10 meters and you can see in the animation that she turned her camera this way and that to look at what's ahead of her.

And you can also see, she didn't just go in a straight line. She actually curved a little bit to the right to avoid some of the small rocks that were directly in front of her.

Another part of the autonomous navigation capability is using visual odometry. Visual odometry uses images from the mast cameras to look at the terrain before and after a small drive step.

Curiosity will see a few hundred features and see how they move across the step. And by tracking those features she can know exactly how far she moved, whether she slipped or twisted a little bit during the drive.

And with that knowledge, the knowledge of where Curiosity is and the knowledge of what the terrain looks like, we get really strong information to drive safely into areas no human has seen before at enough resolution to know that it's safe.

And now you can see the actual speed that Curiosity moves on Mars. It's only about 2 inches per second. Kind of slow but it gets where it's going and have enough power to climb over any obstacles in its way.

And this is a look at a real autonomous drive in JPL's Mars yard. We don't need to do this kind of testing everyday, but we still come out here as we're writing new software.

So for the next few months we're looking forward to putting the pedal to the metal and heading toward Mount Sharp; maybe stopping a few times along the way for some science observations.

This has been your curiosity rover update. Please come back for more reports