

Junior, the robotic car, learns to slide park (w/ Video)

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Stanford Racing Team's "Junior"

(PhysOrg.com) -- "Junior," an autonomous car developed by the Stanford Racing Team, has been taught how to park itself -- by putting itself into reverse, accelerating up to 25 miles per hour, and then suddenly braking while turning the wheel sharply, which starts it on a 180-degree spinning slide right into the parking spot.

Video of the robotic [car's parking](#) procedure was shown at the 2010 International Conference on Robotics and Automation (ICRA) in Anchorage, Alaska last week. The car can reliably and repeatedly park itself in this way.

Junior was introduced to the world in the Defense Advanced Research Projects Agency (DARPA) Urban Challenge in 2007, where the car

drove almost flawlessly and came second. Since then the team have been working on teaching Junior to do more complex maneuvers. In normal driving along a straight line the car's computer adjusts the car's brakes, steering and fuel systems with a closed-loop system using data from sensors built into the car, but the dynamics are much harder to predict and model in a complex maneuver such as spinning and sliding into a parking spot.

The team then tried an open-loop process in which they simply repeated the control inputs from the slide parking section of the demonstration to try to end up with the car in the same place each time. The problem with this method was there was no correction of errors when the car was traveling in a straight line, and this could change the car's final position.

To teach Junior the stunt the team then combined the two methods, using the closed-loop control while the car was approaching, and then smoothly switching to open-loop control for the spin and slide into position. The decision about when to switch between the two modes of operation was made by the car's software, based on observation, and the final result impressively and reliably places the car exactly where it is supposed to be.

The parking stunt has a serious side, since it aims to give the robotic car more flexibility in emergencies or unexpected situations. The annual [DARPA Urban Challenge](#) aims to help developers design autonomous vehicles for military uses. It features robotic vehicles executing various maneuvers in a simulated city environment.

More information: Stanford Racing Team page:
cs.stanford.edu/group/roadrunner

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