

## Zurich team's beach robot draws art in the sand

January 9 2015, by Nancy Owano



Disney Research Zurich and ETH Zurich have come up with a robot artist capable of drawing giant sketches on the beach. Thanks to a team of mechanical and electrical engineers and industrial designers, the BeachBot was created with the goal to perform sand art on a large scale on public beaches. As such, onlookers would see an entertaining drawing process as well as finished image. Wait, how long would an image last on



the beach if it is only sand? That is the point.

Paul Beardsley, principal research scientist, Disney Research Zurich, said in *IEEE Spectrum* that he wanted to build a <u>robot</u> that could keep creating new artwork. He wanted a less permanent medium. "Sand drawing is perfect because it's an infinitely reuseable canvas," he said in the report. *New Scientist* said each drawing takes about 10 minutes. The pictures are carved into sand with a rake. The rake has movable elements actuated by servo motors attached at the tail of the robot. A variety of line widths is possible. The BeachBot is 60 cm in length and 40 cm in both width and height, with a three-wheel arrangement—differential drive back wheels and steered wheel in the front.

No sand can get into the BeachBot because of its aluminum shell and sealing lips. As part of their preparations toward the final technical concept, the team turned to a mini test beach with three cubic meters of sand.

Sandrine Ceurstemont in *New Scientist* <u>commented</u> on the design and drawing process: Since the robot moves on three wheels, said Ceurstemont, it is better at creating smooth curves rather than sharp corners. For a right angle in the sand, it draws a line then lifts the rake before using a <u>laser scanner</u> and inertial sensor to reposition itself so that it can trace the intersecting line.





"Robot sand art is basically a path planning problem in robotics," Beardsley said in *IEEE Spectrum*. "Based on the lines of a drawing, the robot computes a trajectory that most closely approximates them," wrote Evan Ackerman in *IEEE Spectrum*. "For big art pieces, the trajectory still has to be adjusted manually. But the group hopes to completely automate the process," Ackerman added.

His report had design details: The BeachBot carries a computer with Wi-Fi, inertial measurement unit; a laser scanner mounted on the robot detects four poles placed on the beach for canvas boundaries. The robot uses the laser data and the IMU to <u>locate itself</u> and navigate with accuracy.



Looking ahead, the team plans to equip the robot with tools so that it can imprint various textures or erase previous markings, said *New Scientist*, also taking inspiration from the Nazca Lines – ancient motifs produced in the Nazca desert in Peru. Beardsley said they would like to make huge sand art that "amazes people."

## More information: <a href="mailto:beachbot.ch/">beachbot.ch/</a>

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