

Autonomous grilling robot prepares sausages at a party

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Steffen Seibert, government spokesperson and head of the Press and Information Office, was interested in the function of the BratWurst Bot too. Credit: FZI

The BratWurst Bot was taking care of the guests by grilling sausages at the 53rd Stallwächter-Party of the Baden-Württemberg State Representation in Berlin. The autonomous service robot was continuously grilling German bratwursts on a regular gas grill all by itself.

The BratWurst Bot was developed for the Stallwächter-Party and is made of shelf robotic components such as the light-weight Universal Robots arm UR-10, a standard parallel gripper (Schunk PG-70) and standard grill tongs. A regular tablet with a ROS-based web frontend was used as an interface. The guests could easily order a sausage via this tablet. Then the ordered bratwurst appeared in a queue on the tablet with the name of the guest and the remaining preparation time. In addition to that, a tablet-based chef face behind the [robot](#) interacted with the guests.

The robot turned the sausages multiple times until they were ready to be directly served on a guest's plate. A ROS-based BratWurstManager was internally scheduling all tasks. This included putting new sausages on the grill, turning the sausages in time and serving them when they were ready. The BratWurstManager was continuously adding new sausages to the grill in order to reduce the waiting time for the guests. This dynamic scheduling of different tasks makes the system extremely flexible and robust. After receiving a new order, the manager assigned the next available bratwurst to the respective guest. While serving the bratwurst on the plate, the chef's moustache wiggled and the name of the order was shown, causing one or other hilarious moment. Furthermore, the robot also commented many of its actions with funny German sayings like 'heiss und fettig', which literally translated means "hot and greasy".



The BratWurst Bot was autonomously grilling delicious sausages for the guests at the Stallwächter-Party. Credit: FZI

Each bratwurst was localised with one of the two RGB cameras. A segmentation algorithm with background subtraction was used to localise the sausage on the grill. A special challenge was the changing color of the sausages. The robot used a mixture of previously taught trajectories and online planned trajectories. This ensured high velocity while keeping up the needed flexibility. On the whole, the BratWurst Bot successfully demonstrated the maturity of service robotics solutions at the FZI. The system was a combination of robust and reliable industrial robotic components and flexible, adaptive software components that also interact with humans. These hardware and software components can of course also be used for many other tasks like cooperative assembly or

difficult manipulation tasks.

The guests were fascinated by the grilling robot at the Stallwächter-Party. In total, more than 200 sausages were autonomously prepared by the BratWurst Bot. By the way, the sausages also tasted pretty good.



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Provided by FZI

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