



Manufacturing Love

3D Printing Helps GROOVE X Make Robots That Foster Love

The Need for Quick Solutions

If you think robots have to be impersonal and mechanical, Japanese robot venture GROOVE X wants you to think again. They created “Lovot,” a cuddly family robot. With more than 50 embedded sensors, it can analyze external stimuli, exhibit a variety of cute behaviors and human-like expressions, and nurture the users’ ability to love.

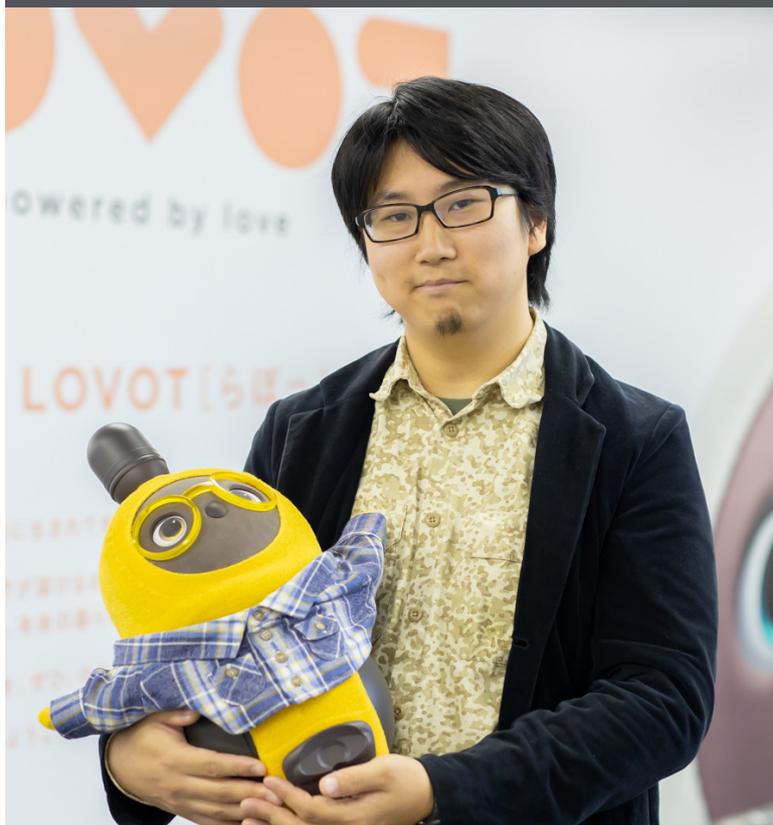
However, its appearance and intricate mechanism must be in perfect unity for it to work at its best, so the prototype development process for Lovot is particularly complicated. GROOVE X couldn’t outsource prototyping because designs change quickly and contractors would always be working with outdated data. “We needed a prototype system that enables quick review of designs that evolve on a daily basis,” said Kaname Hayashi, the CEO and founder of GROOVE X.

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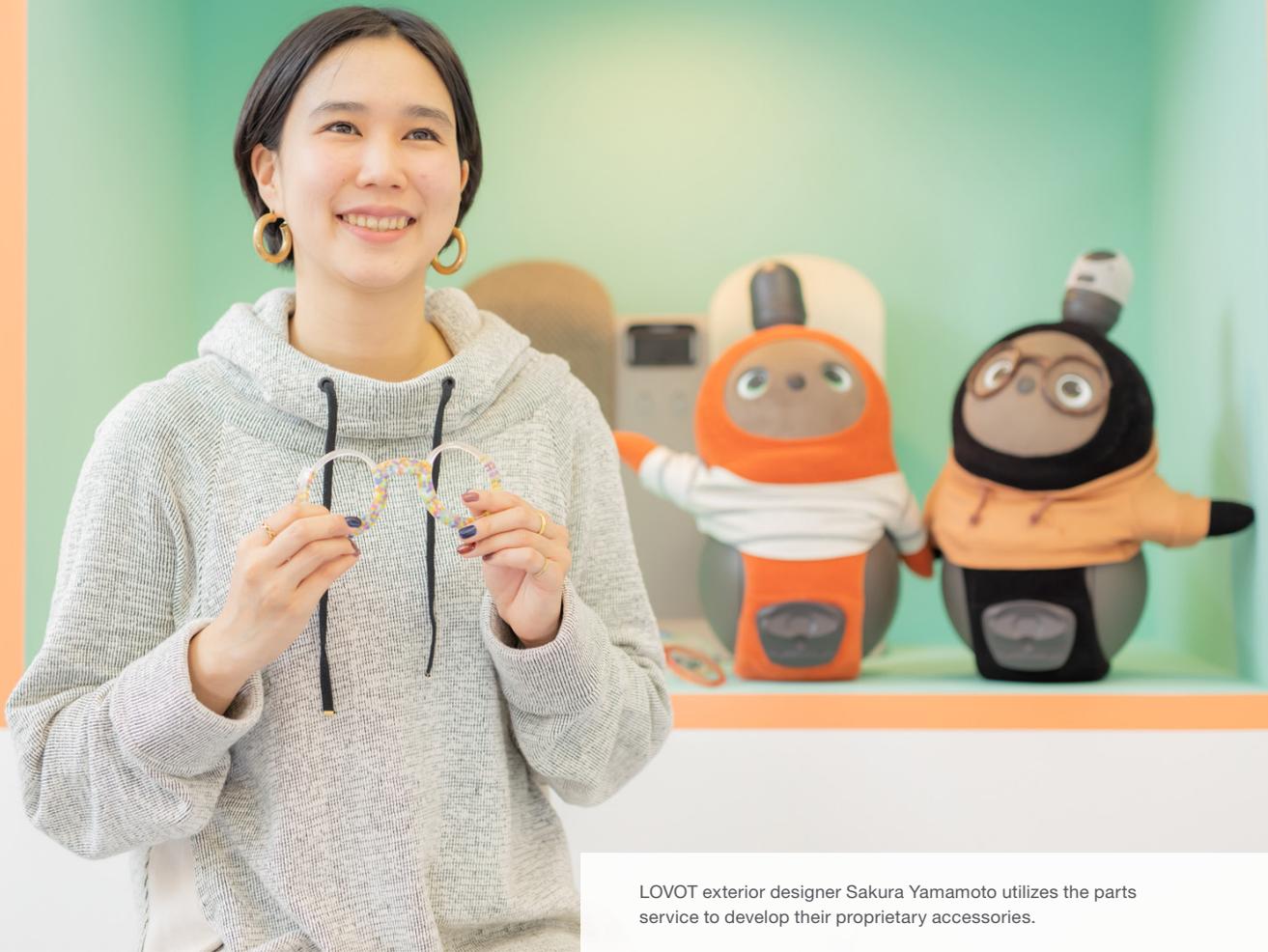
Takamitsu Ikoma

GROOVE X Product Designer



Product Designer Takamitsu Ikoma takes advantage of the significant optimization in the prototype process for their development.





LOVOT exterior designer Sakura Yamamoto utilizes the parts service to develop their proprietary accessories.

Fast Adjustments Through 3D Printing

GROOVE X had the right idea — but the wrong equipment — when they decided to utilize hobbyist desktop 3D printers for prototyping. The printing was inconsistent and didn't meet the company's high standards. That's when they turned to the Stratasys F370™ 3D printer with FDM® printing technology. "Mold stability, speed, and ease of maintenance during molding of large parts for an extended period are important factors in the decision-making process," commented product designer Takamitsu Ikoma.

In contrast to the desktop 3D printers, in which printed molds sometimes deform due to temperature fluctuations, the F370 can print sturdy and complex shapes thinner than 1mm

so that the support material can be peeled off with ease. As a result, the removal of support materials takes only five minutes instead of 20. The GROOVE X team can also print mockups that are much larger than the standard mold. "Even large prototypes can be manufactured over the weekend, so that we can review them in the following week. Every one of us can now better focus on the design itself," notes Ikoma.

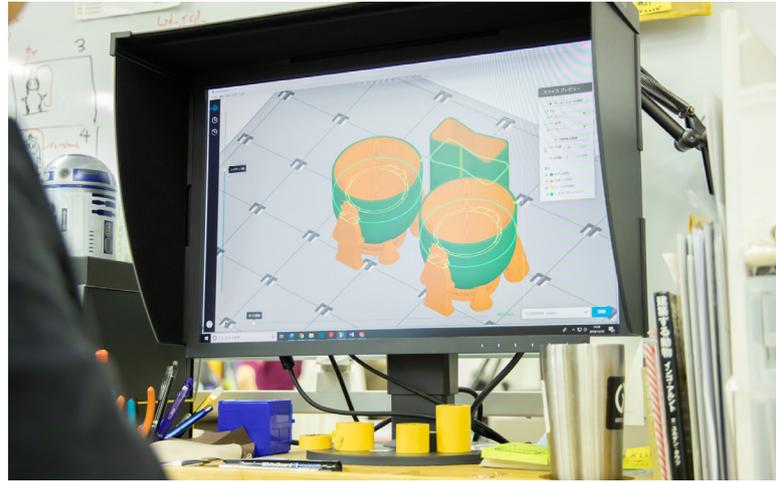
Ikoma is also very pleased with the simplicity of GrabCAD Print™ software, which allows the user to directly upload the raw CAD data from the computer. Using GrabCAD Print has shortened the pre-printing process from 15 minutes to just three minutes.

A Future to Smile About

The GROOVE X team had such success with the Stratasys F370, they also added an F170™ 3D printer to cater to expanded business and operational needs. Both printers are helping them explore options to help Lovot best connect with humans and relate with a human touch. They're using the printers to provide a wide variety of accessories, such as clothes, glasses, and horn/tail covers, so that Lovot users can customize the robots to their own preferences.

Exterior designer Sakura Yamamoto appreciates that Stratasys technology offers a colorful molding technique similar to pixel art that embeds a chip-like color bit inside the exterior of the transparent frame. Yamamoto can carefully monitor the color designs and expand the color variations without constraints. "It is fun to share our opinions to co-create various prototypes!"

The GROOVE X team now considers Stratasys 3D printing solutions to be integral to their development process. "With the 3D printers in our office, we can now review the designs and make adjustments in real time," commented Ikoma. He plans to manufacture maintenance parts in-house with the 3D printers to reduce inventory risks, and he predicts that 3D printers will play an increasingly important role in the household robot market for years to come.



GrabCAD Print enables data uploading right from the comfort of your own PC, and supports CAD data, which shortens the setup time from 5 minutes to 1 minute.



Not only LOVOT's main unit, but also its larger charger is prototyped by a 3D printer.



CEO Kaname Hayashi founded GROOVE X with the vision of creating an industry that supports the next-generations of Japan.

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