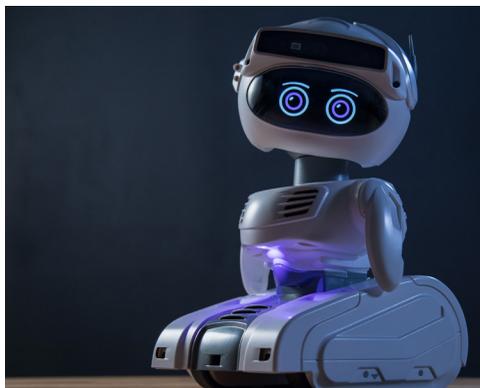


An Advanced, Purpose-built Platform Robot



Misty II

Case Study Highlights

- **Background:** Misty Robotics believes that in order for robots to become a part of our everyday lives, developers need an accessible robot platform to build upon – be that for business, in home or educational use.
- **Solution:** Misty Robotics, with the support of Intrinsic Technologies, created Misty II, an open platform robot for development and education. To give Misty the performance necessary for meaningful tasks and customization, Intrinsic helped incorporate a variety of hardware and software, including two System on Modules (SOMs) equipped with Qualcomm SoCs and a variety of cutting-edge software.
- **Results:** As a powerful robot designed for programmability and customization, Misty's full potential has yet to be seen. She is already being used for a variety of applications ranging from education to eldercare, with more exciting and innovative applications to follow.

Introduction: Opening the future to robots

Despite the advances in robotics technology, the creative visions of robots seen in the world of science fiction are still a fantasy. The challenges to date have been that it is costly to build a robot and requires a knowledge of robotics as well as robotics languages. This is coupled with the existing thinking that robots need to be purposed to a single use. Robots as a platform for businesses, home use and education simply haven't existed.

[Misty Robotics](#), a company aiming to bring robots to the mainstream, believes this is because the robotics industry is in the same position the computer and smartphone industries once were. These industries had the technology necessary to build computers and smartphones, but a lack of stable hardware platforms and closed source development held back their innovative potential. For both these industries to evolve into the fundamental components of everyday life they are now, developers needed accessible and open platforms to invent and share useful applications.

For the same advancement to take place with robots, the industry needs an easily customizable robot. This means that in addition to having the powerful technology needed for a useful robot, it must be easy to program and have expandable capabilities so developers from around the world can contribute to its growth.

Solution: A platform robot that invites everyone to contribute

Misty Robotics teamed up with [Intrinsic Technologies](#), a wholly owned subsidiary of Lantronix, Inc. As an innovator in product development services and edge computing modules, Intrinsic helped Misty Robotics work with solutions from Qualcomm Technologies, Inc. (QTI) to create Misty II, an open robotics development and learning platform based on Misty the robot.

Misty's design is industrial, yet very approachable. She has a fully articulating head with three degrees of freedom. She uses spatial awareness and mapping to move freely on her motor driven treads, and can even automatically travel to her recharging station when low on battery. Her screen face is capable of conveying an impressive array of expressions, lending her a convincing personality.

Misty's high-resolution camera and object detection capabilities let her detect people's faces and other visual information. Her far-field microphones and audio processing capabilities give her the ability to hear speech while filtering out background noise. She can record video and audio data and share it with other devices, or use her screen and speakers to stream data shared with her by other devices. She can even respond to touch.



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These are just some of Misty's built-in capabilities. But true potential lies in her customization. Both Misty's hardware and software can be modified with ease. Misty's arms, headpiece, and other appendages serve as attachment points where developers can build their own custom hardware attachments for Misty to use for unique tasks. She comes with software development kits that helps make it easy to program her without prior robotics training, and she can integrate with third-party APIs to combine their capabilities with hers. Developers can program a unique skill for Misty from scratch, or use an application template from the Misty development community to speed up the process. Finally, these hardware and software modifications can be shared with the community.

Limited by imagination, not by performance

Realizing a robot with so many capabilities and so much potential would require high performance hardware and software, Misty Robotics turned their attention to QTI's technology and sought assistance in tailoring it for their needs. Already familiar with products from QTI, Intrinsic used their expertise to help Misty Robotics incorporate QTI's hardware and software into Misty.

Misty's hardware includes two System on Modules (SOMs) from Intrinsic Technologies, both equipped with QTI SoCs. The Intrinsic [Open-Q™ 820Pro μSOM](#) is equipped with a [Qualcomm® APQ8096SG SoC](#) for visual and acoustic processing, while the Intrinsic [Open-Q™ 410 SOM](#) is equipped with a [Qualcomm® APQ8016E SoC](#) running Windows 10 IoT Core for UI/UX and programmability. Also included is the [WCD9335 Qualcomm Aqstic™ Audio Codec](#) for advanced audio processing purposes.

Misty's software includes the Qualcomm® Neural Processing SDK for object detection and machine learning, Qualcomm® Noise and Echo Cancellation, and Qualcomm® Voice Activation for which Intrinsic utilized Qualcomm® Hexagon™ DSP-based voice activation for APE-mode keyword detection for the "Hey Misty" custom keyword detection. Intrinsic also worked with QTI's audio team to facilitate advanced audio and keyword tuning. Advanced audio features for beam-forming and noise-reduction were a key feature to aid users interacting with Misty in noisy environments.

Intrinsic design services were optimized by Misty Robotics to develop many other software capabilities, including camera management, audio management, display panel support, audio topology support using multiple microphones and speaker output, inter-processor communication, battery charging, and tuning of noise suppression. Finally, Intrinsic helped with hardware design reviews and FCC certification testing support.





One Part Hardware, One Part Software, Packed with Technology

She may look cute and approachable from the outside, but on the inside, Misty is all business.

Results: A platform robot with untapped potential

Built for exceptional performance, Misty has an impressive array of capabilities and gives developers the opportunity to build the skills (robot applications) meaningful to them. With Misty, developers don't need to worry about building their own robot. They can devote their attention to implementing their ideas and sharing them with the world.

Misty can be used in education. Her straightforward software development kits and hardware customization can provide an incredibly engaging opportunity for students to learn programming, robotics, and more. Meanwhile her more sophisticated technology can assist with research and learning in universities.

Misty can be used in the growing eldercare industry to promote independence and quality of life. She can serve as a senior assistant by connecting to smart home appliances, monitoring falls, and providing medication reminders, all the while supplying companionship with her convincing personality.

Misty's capabilities are even being explored to help keep people safe from contagious illnesses like COVID-19. Current development projects include teaching her to move through a building to sanitize door knobs and other frequently touched surfaces, or having her question visitors for symptoms of illness and use her infrared cameras to check their temperatures for fevers, reducing the risk of exposure.

Dozens of other use cases are being explored and built, including greeter, receptionist, delivery agent, security monitor, and more. But Misty's most promising applications may have yet to be invented. She has the potential to tap into the imagination of millions of developers who aspire to work with robots, helping shape the future of the industry.

About Misty Robotics

- **Company Name:** Misty Robotics
- **Description:** Misty Robotics aims to have a robot in every business, home, and school. They grew out of Sphero, a leading STEM company that provides education-oriented robots.
- **Headquarters:** Boulder, Colorado
- **Website:** www.mistyrobotics.com

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About Lantronix

- **Company Name:** Lantronix
- **Description:** Lantronix is a global provider of hardware and software solutions for the Internet of Things (IoT) and Out of Band Management (OOBM).
- **Headquarters:** Irvine, California
- **Website:** www.lantronix.com

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