

LANTRONIX®

INDUSTRY:

Robotics

Moxie Named Among TIME's
Best Inventions of 2020



Success Highlights:

- Contributed to creation of Moxie, a companion robot for children
- Delivered exceptional privacy, security and camera technologies
- Helped support creation of a market-ready prototype
- Provided services that helped contain development costs
- Helped facilitate Moxie's quick entry to market

Case Study Overview:

Created by vets of the Mister Rogers' Neighborhood TV show, Pixar, Jim Henson Productions and experts in education and child development, Embodied's Moxie is a revolutionary new companion robot. Created for children ages five to ten, Moxie was designed to help boost their social and emotional skills through play-based learning. To make Moxie safe for at-home use by children, advanced IoT technologies were needed.

Embodied's designers turned to Lantronix engineers to support the development of a secure operating system with advanced privacy, security and camera technologies.

Bringing Moxie to Life

Embodied Inc. was founded with the goal of elevating robotic technology to a more impactful level for society.

Embodied assembled a world-class team of experts in child development, engineering, technology, game design and entertainment to create Moxie, a robot that helps promote social, emotional, and cognitive learning for children through play-based activities.



Product:

Lantronix Engineering Services

Lantronix Engineering Services offers a full range of production-ready Edge AI computing solutions, including multi-disciplinary engineering services. Its experienced engineering team provides IoT product development that delivers unparalleled expertise and proven product development best practices to help its customers meet their technical goals and quickly get products to prototype and market.

Lantronix's flexible engineering offerings range from fixed-cost turnkey product development to augmenting design teams in complex areas of product development, including:

- Camera development and tuning
- Voice control
- Machine learning
- Mechanical and RF design
- Thermal and power optimization

<https://www.lantronix.com/professional-services/>

“Lantronix's solutions contributed greatly to giving Moxie the security, privacy and interactivity features needed for in-home use by children.”

– Paolo Pirjanian, CEO and Founder, Embodied

Challenge: Create a Secure AI-Based Robot for Children

Privacy and security are top requirements for mobile and robotic products. Security is a particularly fundamental consideration in robotics, especially those designed for use by children.

- **Security & Privacy Requirements:**

- Secure over-the-air operating system updates
- Secure Boot
- Android-Verified Boot
- Secure external interfaces
- Avoidance of backdoor intrusion

- **Camera Requirements:**

- Advanced camera performance optimization
- Ability to adjust to scene changes
- Adjustable to varied lighting environments



Solution: Lantronix Engineering Services

Embodied's designers chose the Lantronix Engineering Services team to support the development of a secure operating system with advanced privacy, security and camera technologies to ensure that Moxie would be safe for use by children.

In addition, the Lantronix team helped deliver the most appropriate options for camera exposure control to ensure image quality in challenging imaging environments. Implementing advanced camera technology enables Moxie to interact while adaptively adjusting to scene changes, such as dim lighting conditions.

Results: Secure Robot Helps Children Develop Meaningful Skills

With the support of Lantronix's Engineering Services, the Embodied team created Moxie, the first-ever animate companion robot for children. With Lantronix's Engineering Services delivering advanced privacy, security and interactivity features, Embodied was able to quickly develop a market-ready prototype.

In addition, Lantronix's contributions supported and freed up resources for the Embodied team, enabling them to spend their time and efforts on creating Moxie's interactive and educational capabilities. Lantronix's contributions helped Embodied bring Moxie to market faster, more affordably and with built-in security updates and patches that can be remotely updated.

Security & Privacy Deliverables:

- Secure Boot, ensuring that the only initial software that can be run on the device is authorized, ensuring a secure boot sequence/chain.
- Android Verified Boot, verifying the Android kernel and filesystems are authenticated cryptographically
- Secure external interfaces, ensuring no ports are susceptible to backdoor intrusion
- Secure device software updates, enabling application of security patches and future features

Advanced Camera Deliverables:

- Auto-exposure library, providing the ability to adaptively adjust to scene changes with varied lighting environments, particularly in dim lighting conditions.

Lantronix Advanced Robotic & AI Engineering Services

Experts in advanced robotic technologies, Lantronix's Engineering Services team has proven experience working with a variety of companies to help support robotic and AI product development from conception to prototype and to market.

Whether it participates in the full development cycle or just a segment, the Lantronix engineering team takes on complex technical projects, freeing up product developers to focus on their best-use deliverables.

The Lantronix team works closely with a variety of silicon vendors to recommend and incorporate the most appropriate choices to ensure high levels of security and capabilities.

About Lantronix

Lantronix, Inc. is a global provider of software as a service (SaaS), engineering services and hardware for Edge Computing, the Internet of Things (IoT) and Remote Environment Management (REM). Lantronix's solutions are deployed inside millions of machines at data centers, offices and remote sites serving a wide range of industries, including energy, agriculture, medical, security, manufacturing, distribution, transportation, retail, financial, environmental, infrastructure and government.

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