

# Synopsys and JOYA Team

Advancing Augmented Reality Optics with CODE V and LightTools

*“The CODE V and LightTools complementary virtual prototyping tools are a must-have in any optical product design, especially for start-up companies with time and funding pressures. Using these tools can be a major leap over the “Death Valley” that so many optics-oriented start-ups face during their product development.”*

~Olga Resnik, Co-Founder, JOYA Team

## Business

JOYA Team offers optical systems development services. JOYA's goal is to help customers and partners design exclusive, tailor-made optical systems. They are experts in augmented and virtual reality (AR/VR) systems design and development.

## Augmented Reality Product for Brilliant Labs Designed in CODE V and LightTools

JOYA Team, working with Brilliant Labs, was tasked with designing a second generation of Brilliant's augmented reality product that was:

- Revolutionary in its simplicity
- Based on mature technology and highly manufacturable
- Open source for the application builders' community
- Pocket sized
- Scalable and oriented to mass adoption
- Affordable to consumers

JOYA used CODE V to perform the optical design, optimization, and tolerance sensitivity analysis. The CODE V Image Simulation feature was particularly helpful during product development. Image Simulation provided an accurate, realistic assessment of the AR optical system's visual image quality in the early design stages, including how the image changed with the various eye positions of the AR system user.

CODE V also helped JOYA define a complete set of product specifications to minimize design time, system complexity, and costs, and to assess the impact on image quality of relaxing tolerances to shorten production lead times.

JOYA then used LightTools to create a virtual prototype—or digital twin—of the product, including the effects of all materials, coatings, and surface finishes. The virtual prototype in LightTools enabled JOYA to accurately evaluate and visualize the AR system's performance without building a physical prototype, including:

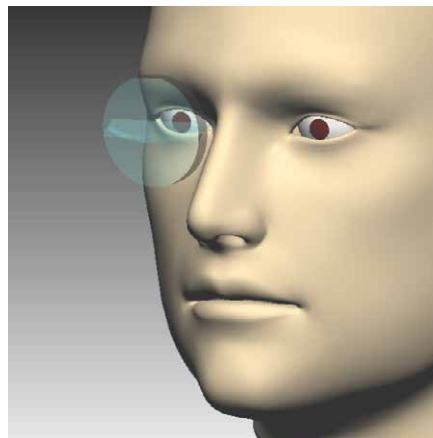
- Image quality and resolution
- Image uniformity
- Color quality
- Contrast
- See-through performance
- Ghost images and artifacts
- Image quality through the system pupil/eye position

Using CODE V and LightTools, JOYA efficiently performed product development tasks to create a cost-effective product:

- Design trade-off studies and optimization
- Requirements definitions based on user feedback
- Short evaluation cycles
- “First-time-right” physical prototyping



Monocle—Brilliant Labs’ first-generation product



Simulated image of Brilliant Labs’ second-generation product as developed by JOYA Optics

To learn more about Brilliant Labs’ first-generation product, visit [www.brilliant.xyz](http://www.brilliant.xyz)

To learn more about the JOYA Team, visit [www.joyateam.com](http://www.joyateam.com)

To learn more about Synopsys Optical Solutions, including CODE V and LightTools, visit [www.synopsys.com/optical-solutions](http://www.synopsys.com/optical-solutions)