INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

XRbility: Play Without Limits

TECHNOLOGY NUMBER: 2019-207

Accelerate Blue Foundry - 2025 (Physical Sciences)

OVERVIEW

Neurodiverse Children *Parents and Children* *Different mobility-abilities*

This extended reality (XR) technology is designed to enable fast-paced team sport experiences and rehabilitation games for people of all abilities, including children with mobility disabilities, intellectual disabilities, and autism. The underlying core innovation of the “peripersonal boundary” and vector-based game design approach allows a dual-product strategy: a projected augmented reality system for shared physical spaces, such as school gyms (iGYM), and a new product pivot utilizing VR headsets for at-home use (XRbility Arena).

DESCRIPTION

The system uses either top-down projection and visual tracking (in the case of the projected AR implementation iGYM) or VR headsets (in the case of the XRbility Arena) to non-invasively track players, including those in wheelchairs.

The patented “peripersonal boundary-based interaction” displays an adjustable circle around each player, which can be expanded with limb movements or a wireless kick button to manipulate targets, such as a virtual ball, in both AR and VR game environments.

The XR game design approach uses minimal visual cues to enhance physical play experiences and social engagement while reducing the risk of sensory overload or motion sickness.

LINKS

- iGYM research group website: www.igym.solutions
- Projected AR research prototype in action:

Technology ID
2019-207

Category
Software
Software & Content
Accelerate Blue Foundry - 2025/Physical Sciences

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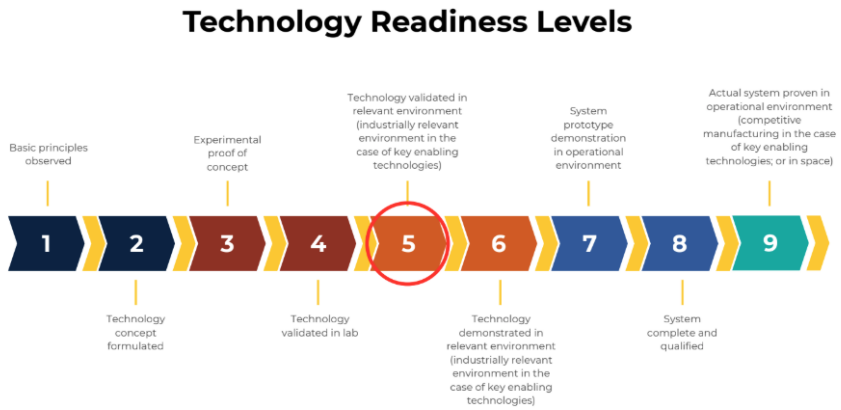
VALUE PROPOSITION

- **Truly Inclusive Play:** Enables sport experiences and physical engagement for people with a wide range of motor and neurodevelopmental disabilities, allowing them to play alongside non-disabled peers in the same space.
- **Personalized and fun exercise:** Real-time software customizes game parameters for each player, such as target speed and peripersonal circle size, to create a balanced and challenging experience for everyone.
- **Scalable and accessible indoor play activities:** The use of commodity hardware such as video projectors or VR headsets makes the platform a cost-effective solution for both schools and individual users, eliminating the need for expensive setups, wearables, or space adaptations.

TECHNOLOGY READINESS LEVEL



The core technology has been de-risked from concept to a functional, projected AR prototype through successful user studies with children in wheelchairs and their non-disabled peers. Furthermore, it has been explored with neurodiverse children in a special education school in collaboration with the research group FUTUREGYM in Tokyo. The next phase focuses on

building a turnkey system for larger multiplayer environments and developing VR team sports applications accessible to multiple users from home.

INTELLECTUAL PROPERTY STATUS

All Issued Patents:

- US11691071- The core game environment and interaction concept are protected by this U.S. Patent
- EP3946659 - Validated in France, Germany, and the U.K.

MARKET OPPORTUNITY

- **Projected AR (iGYM):** Transforms school gyms and recreation environments into inclusive play and exercise spaces, reducing the divide between general education and special education settings and after-school programs. The beachhead market is U.S. special education and general education schools, with over 88,000 K-8 schools in the U.S. alone [1].
- **VR Headsets (XRbility Arena):** Makes team sports and rehabilitation games accessible from the living room. This pivot targets two rapidly growing markets: the at-home fitness market, valued at over $12.2 billion in 2024 and projected to grow to nearly $20 billion by 2032 [2], and the virtual rehabilitation market, valued at over $336.9 million in 2021 and projected to reach over $1.1 billion by 2027. [3].
- [1] Digest of Education Statistics, 2022. (n.d.). National Center for Education Statistics. Retrieved Oct 23, 2024, from https://nces.ed.gov/programs/digest/d22/tables/dt22_105.50.asp
- [2] Home Fitness Equipment Market Size, Share, Report 2030 - Fortune Business Insights Retrieved Sep 11, 2025, https://www.fortunebusinessinsights.com/home-fitness-equipment-market-105118
- [3] Virtual Rehabilitation Market - Global Outlook & Forecast 2022-2027 Retrieved Sep 11, 2025, https://www.arizton.com/market-reports/virtual-rehabilitation-market
- This project has participated in Customer Discovery