

EXPLAINING A MULTISENSORY SPACE FOR ASD

One of the core symptoms of ASD is **sensory processing difficulties**. These difficulties often involve modulation, meaning individuals can be either **very sensitive or not sensitive enough** to certain types of stimuli. For example, some people with ASD may be very sensitive to sounds or touch, while others may not be very sensitive to movement and therefore seek more movement and stimulation. They might be less sensitive to visual stimuli and may use visual input for self-stimulation. Our goal is to encourage users to **interact with their environment in a secure way**. We aim to help them discover their preferences through appropriate interaction rather than inward-focused behavior.



We will use this room design as an example. The first thing we want to explain about this project is that within this room, we have created two parallel but interconnected concepts. The first concept is the **vestibular area**, a dynamic workspace focused on **sensorimotor engagement**.

VESTIBULAR AREA



In this dynamic, movement-oriented, proprioceptive, and tactile area, we focus on the **motor aspect**. This area includes **vestibular elements** equipped with suitable suspension points, tailored to the type of ceiling you have, and uses high-quality vestibular equipment. This ensures that even users weighing up to 120 kg can safely use the equipment without damage. These vestibular elements are crucial for **individuals seeking continuous movement**. For instance, we recommend a **swing** that provides users with a **sense of security** while sitting, offering **proprioceptive input** and **vestibular stimulation**. We always recommend an adjustable swing to suit the user's height, which also includes a rotation cylinder for rotational movements.

To ensure **safety** in this area, we have equipped it with two **tatamis**. Tatamis are denser than mats, providing a more **stable base** for users with **balance difficulties**, enabling them to walk better while still ensuring safety. Adjacent to this area, we have a set of pieces that can



be used to create a **psychomotor circuit** requiring posture changes. These pieces can also serve as steps for getting in and out of the pool, as a slide, or a staircase. For example, when flipped, one piece becomes a **seesaw**, serving as a **vestibular element** for smaller children. This area significantly enhances **proprioception, vestibular function, movement, and body awareness**.



Another important feature is our **special pool**. It's not just a typical ball pool with lights; it has **advanced electronics** allowing for two key features. Firstly, it provides **tactile** and **proprioceptive input**, offering a sense of being surrounded, which is crucial for **body awareness**. What makes this pool special are its **interactive, controllable lighting** and a **vibroacoustic** platform underneath. Vibroacoustics convert sound into vibration, a highly engaging stimulus reminiscent of being in the womb. This helps with **regulation**, either activating or calming the user as needed.

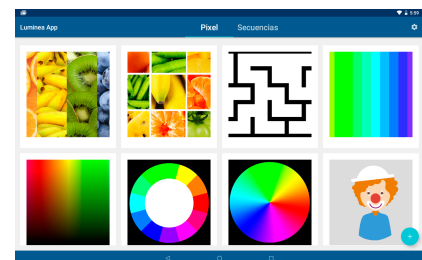


LUMINEA APP

The other feature that makes this pool very special is the electronics system for the lighting devices, known as **Lumineia**. This system is not only in the pool but also in the bubble tube, fiber optics, circular sky, fountain, and carpet.

Why is this electronics system special? Traditionally, pools, bubble tubes, or fiber optics with lighting simply changed color automatically when plugged in. That was all they did, which was a pity because it motivated users to **interact with the element**, but they had no way to do so. The next advancement was the creation of control panels for each element, often connected with a cable.

What does this electronics system allow us to do? This electronics system, Lumineia, goes **beyond traditional systems**. It allows us to use an application called the **Lumineia app**, which lets us **control** the lighting intensity and color. This is important for **educational and therapeutic purposes**, helping to **regulate alertness levels**, activate or relax users, and apply **chromotherapy** concepts.



Moreover, this system allows **interaction through images**. The color of the pixel touched on the app sets the color of the element. The system includes predefined images, but a crucial feature is the ability to **input custom images** based on the **interests of each user** with ASD. Since individuals with ASD often have strong, focused interests, this feature lets us **tailor activities to their preferences**, enhancing **engagement** and **effectiveness**.

CONTROLLERS



Another advantage of this electronics system is the ability to **incorporate various controllers**. These controllers provide different ways for users to **interact** with the elements, which is vital for **engagement**. Unlike other systems, Lumineia offers **versatile interaction** options. For example, users who have difficulty coordinating their fingers on a screen can use a six-button control panel (**Button 6**) to interact with the pool, tube, fiber optics, sky, carpet, and shower.

For users at an **earlier developmental stage** who need to learn basic skills like **cause and effect**, we recommend a simpler controller like the **Button 01** switch. This ensures that all users, regardless of their developmental stage, can benefit from and engage with the multisensory space.



At times, our focus is on **motor skills**, such as standing, balance, and crawling. For this, we use a wireless carpet (**Sensory step**) that can be placed anywhere in the room. It allows us to work on various motor activities, including standing, crawling, and different surface interactions. For instance, placing the carpet on a water bed adds instability, offering numerous modification possibilities.

The Luminea electronics system is **unique** and distinct from other lighting-equipped elements like tubes, fibers, and pools. Now, let's discuss more classic elements of multisensory stimulation.

LUMINEA - LIGHTING ELEMENTS



For example, both the tube and fiber utilize the **Luminea electronics** system we discussed earlier but serve different intervention purposes. The **bubble tube** is often utilized in **attention-focused tasks**, particularly when paired with **mirrors** to multiply its visual effects. It provides a vertical reference point, aiding in the development of **body awareness** and **spatial concepts** such as up, down, front, and back. Observing oneself in the mirror while interacting with the tube allows for **spatial exploration**, enhancing **understanding of the body's midline** and **spatial relationships**.

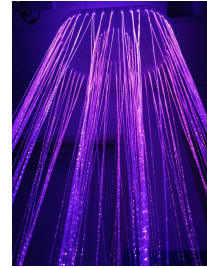
The **bubble tube** serves as a versatile tool for various therapeutic and educational objectives. Besides its visual stimulation, activating the tube's bubbles can also provide **tactile feedback**, capturing the **attention** of users who prefer tactile sensations.

There's no need to worry about users, even adults, leaning on or hugging the tube, as we've designed a **stable base** with plates to support such interactions. Additionally, the mirrors used are safety mirrors, ensuring they **won't shatter upon impact**.

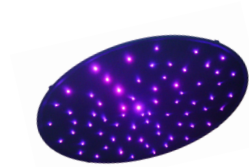
The **fiber optic** is another classic element of stimulation. Typically used in bundled strands form, fibers are versatile tools for various purposes. They're often employed to **develop manipulative and stress management skills**, offering **proprioceptive** and **tactile feedback** when applied to the body. While the visual stimulus is more dispersed compared to the tube, fibers allow for the **exploration of cognitive aspects**, albeit with a more scattered focus.



The tube and fibers are classic elements of multisensory stimulation, but within this project, we've introduced three variants. Let's start with the fiber optic **Fountain** which differs significantly from the strands fibers. While strand fibers concentrate visual effects **tactically and proprioceptively**, the suspended fountain creates a visually **defined space** with dispersed effects, ideal for creating **psychological containment** and promoting **relaxation**. This corner serves as a perfect relaxation and dispersion area.



Most of the modules in this corner are **removable** and **interchangeable**, except for the fixed backrest, designed for protection and comfort. For example, the pouf can be placed under the fountain for users to relax on, providing **versatility** and **customization** options.



Next, let's discuss the **circular sky** and the **carpet**, both of which provide **dispersed visual stimuli**, promoting **relaxation**. The circular sky, positioned above the bed, serves as a **calming visual element**, complementing the bed's role as a place for returning to tranquility. The carpet, being movable, can be placed in various spaces to create a similar **calming effect of dispersion**.

The **LED lines** embedded in the walls serve as general lighting for the room, providing illumination when specific elements are not in focus. These lighting systems can be **adjusted to control** brightness, dimness, and color, catering to the activity being conducted and contributing to either activation or relaxation.

All these elements—tube, optic fiber, circular sky, carpet, fountain, LED and pool—are equipped with **special electronics** that allow us to use them with the control panel, switch, or carpet for interaction. Another essential feature we've seen in the pool is the inclusion of **vibroacoustics**. However, in cases where entering the pool might not be suitable, we've incorporated three additional vibroacoustic elements.

VIBROACOUSTICS

The first is a **water bed**, a common feature in stimulation rooms, which provides sound through vibration, resembling the **intrauterine environment**. Additionally, the movement of water in water beds offers **vestibular stimuli**, contributing to sensory experiences.



Water beds offer more than just relaxation; they also facilitate **rocking, changes in posture, and mobilization**. Many users, particularly those sensitive to movement, may find **comfort** and **security** in the continuous water movement provided by water beds. Additionally, water beds feature legs underneath, allowing wheelchair users to transfer safely using a floor crane.



However, for users who may feel insecure due to **heightened sensitivity to movement**, we offer a **special pouf**. This pouf can be adjusted to provide either a flat surface, offering **proprioceptive input** and **molding to the body**, or a banana shape, enveloping the user with proprioceptive input and providing a **supportive** mold behind the body, akin to a **comforting hug**. This configuration promotes a **sense of security** and **body awareness**, enabling users to **lower their activation levels** and relax comfortably.

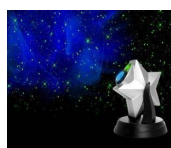
Another intriguing vibroacoustic element is the **therapeutic rocker chair**, which offers both **vibroacoustic** and **vestibular stimulation**. The linear and repetitive movement of the rocker helps some users relax by providing **inhibitory stimuli**. The rocker comes with **wedges that stabilize** it when needed, ensuring **safety** during transfers and minimizing the risk of falls. These wedges can be removed to allow users freedom of movement.



In summary, we offer four vibroacoustic options: the water bed, pouf, rocker, and pool, each catering to different **sensory preferences** and **therapeutic needs**.

SPECIAL EFFECTS

A notable feature is the **UV spotlight**, which highlights fluorescent and white elements, **directing attention to specific areas** for **sustained focus**. Spotlights are recommended to control the dispersion of UV light and **maintain focus on targeted elements**, preventing distractions from other white objects in the room.



Another special effect is the **star projector**, which creates slow-moving dots to provide **dispersed visual stimuli**, aiding in **relaxation**. When integrated with the SHX system, the star projector **synchronizes with scenes** depicting night settings, enhancing thematic **immersion**.

Fans in the multisensory room serve **tactile stimulation** rather than cooling purposes. They activate during scenes representing windy environments, providing **additional sensory input** and enriching the **immersive experience**.

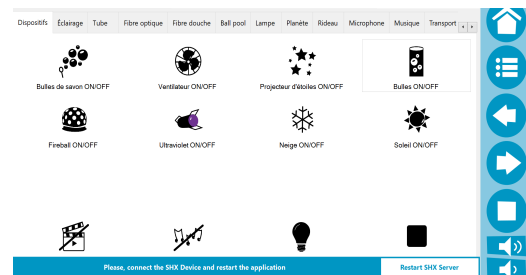
SHX SYSTEM

Furthermore, all the elements discussed thus far can be **integrated seamlessly** using our proprietary **technology**, which coordinates the room's components to create scenes. Scenes involve delivering content coherently **through various sensory channels**. For example, visual projections can be synchronized with the lighting tools, such as the LED lines, fountain, tube, fiber, and pool, ensuring consistency with the predominant colors in the projection. Additionally, sound effects through the

vibroacoustic elements, bed, pouf, rocker, and pool are synchronized with the visuals, providing a holistic and **immersive experience**. This multisensory approach enhances **cognitive accessibility**, making the content **easier to comprehend** as it is delivered through different sensory modalities.

The system comprises a projector and speakers that deliver immersive sound in this spacious room. At its core is a centralized device serving as the brain, **orchestrating all operations**. It also features a potent vibration amplifier and a tablet.

The **tablet** provides convenient **control** from any point in the room. Users can **effortlessly select** and **manipulate elements**, adjust lighting levels, and choose specific features to engage with. For instance, users can dim the lights to work with ultraviolet light, illuminate the room gradually, and focus on individual elements such as the tube, fiber, or fountain while playing soothing music—all through the tablet interface.



Beyond individual control, the tablet facilitates the **activation of scenes**, categorized into two main types: **semantic scenes** and **immersive environments**. Semantic scenes focus on **specific categories** like transportation, animals, fruits, colors, insects, sports, and more, designed to meet educational or therapeutic goals. Immersive scenes transport users into **vivid environments** such as underwater depths, waterfalls, rivers, or sunsets, offering engaging **sensory experiences tailored to specific objectives**.

Moreover, the controllers introduced earlier, such as Button 6, are **seamlessly integrated** with the system, enabling users to interact with tactile actions and scenes. Whether it's providing a hug, engaging in global movements, exploring cause-and-effect scenarios, or participating in interactive activities like imitating dances or guessing sounds, all controllers enhance **user engagement** and **participation** across various sensory modalities.

The system's true strength lies in its ability to **integrate custom images, videos, and stories**, allowing us to **tailor materials to each user's interests** and the content we're working on with them.

VOICE KIT

There's one more aspect to address: **certain elements rely on our system**, necessitating its presence for operation. Specifically, two such elements are the **voice kit** and the **magic table**. The voice kit comprises microphones enabling various effects. It facilitates three key functions: firstly, transforming sound effects into lighting changes; for instance, based on detected sounds, LED lines, fibers, and tubes alter their visual display. This feature aids in **speech development** by encouraging **vocalization** and **word segmentation**, enhancing users' awareness of sound cues. Additionally, the voice kit utilizes body-generated sounds, such as rhythms, body schemas, and movements, to work on **breathing techniques** and awareness. These tools are integral to our multisensory approach, **enhancing user engagement** and sensory experiences.



Furthermore, the **projection system** dynamically **responds to sound inputs**, generating a color ladder that adjusts based on **sound intensity**, along with reactive nebulas that vibrate in response to detected sound. These features, dependent on our system, contribute to the **immersive** and **interactive** nature of the environment. Additionally, the SHX-dependent Magic Table represents a pioneering innovation, enriching user experiences with its unique capabilities.

MAGIC TABLE/PROXIMITY

The **Magic Table** features a proximity card detector, allowing us to attach objects to these cards. This functionality **simplifies manipulation** for users and aids **cognitive understanding of the environment**. For instance, we can affix toy animals, such as a rubber duck, cow, or horse, onto these cards. When a user places a toy horse on the table, the projection depicts the horse, the room adopts a green hue, and the sound of a trotting horse resonates, complemented by corresponding vibroacoustic feedback. This **interactive approach** extends to various items, including plastic fruits, colors, and socks of different hues, as well as clothing accessories. For example, placing a rain hat triggers a rain scene, while a wool hat prompts a snow scene, bridging the gap between tangible objects and abstract concepts like weather phenomena.

CONCLUSION

In conclusion, our multisensory room represents a **comprehensive and innovative approach** to providing **tailored experiences** for individuals with diverse needs, particularly those with Autism Spectrum Disorder. Through a combination of **dynamic elements, interactive technology, and personalized content**, we aim to create a therapeutic and engaging environment conducive to **sensory exploration, cognitive development, and emotional regulation**. By leveraging advanced systems like Luminea and SHX, we strive to empower users to **interact, learn, and thrive** in a safe space that fosters inclusivity, creativity, and holistic well-being.

KEY FEATURES PER ELEMENT FOR PEOPLE WITH ASD:

VESTIBULAR:

- **BJ-EV120030 Child Cuddle Swing:** Sensation of security, proprioception, vestibular (movement).
- **BJ-EMT095C Large Tatami:** Safety and protection; helps with balance.
- **BJ-EPS808 Set 94 - 5 pieces:** psychomotor circuit, body work, vestibular.

LUMINEA:

- **BJ-LTUB Luminea Tube:** Relaxation, focus, attention, memory work, social interaction. Vertical reference, body schema.
- **BJ-LFIB2 Luminea fiber 2m:** Manipulative components work, proprioceptive and tactile element.
- **BJ-LDFIB Luminea Fountain:** Psychological containment space.
- **BJ-LAFIB Luminea carpet:** Dispersed visual stimulus, relaxation.
- **BJ-LCCFIB Luminea Circular Sky:** Dispersed visual stimulus, relaxation.
- **BJ-LLLT Luminea 5m Led line:** Control and interaction; regulation; chromotherapy.

VIBROACOUSTICS:

- **BJ-LPIS-V Luminea vibroacoustic pool:** Proprioception, body awareness, sense regulation.
- **BJ-EMCA-V Vibroacoustic waterbed:** Ancestral stimulus; sound through vibration in aqueous medium. Rocking, posture, mobilization.
- **BJ-EMPT-V Vibroacoustic transformable pouf:** Proprioception and security. Body awareness.
- **BJ-EMBT-V Vibroacoustic therapeutic rocking chair:** Repetitive linear movement; vestibular; relaxation.

CONTROLLERS:

- **BJ-LCTRL Button 6:** Interactivity; broader movements where they associate and discriminate.
- **BJ-LCTRL1 Button 1:** Early development; do not associate and discriminate; cause-effect.
- **BJ-EMSST Sensory Step:** Body work, balance, crawling, movement.
- **BJ-EXKV Voice Kit:** Allows voice work to be done by converting it to colors or vibration. Increases motivation to produce vocalizations in pre-verbal users.
- **BJ-EXMAG Magic Table:** helps comprehension on a cognitive level.

SPECIAL EFFECTS:

- **BJ-EX43 SHX Stars:** Dispersed visual stimulus; relaxation.
- **BJ-EX41 SHX Fan:** Tactile stimulation.
- **BJ-EIFUVLX SHX UV Spotlight:** Encourages concentration on reflective elements, isolating the rest.
- **BJ-KUV Sensory bag:** Sustained attention.

SHX:

- **BJ-EX02 SHX Rack:** Seamless integration of multisensory elements, semantic scenes for educational or therapeutic content; immersive environments for vivid sensory experiences