HARMONIC BIONICS

HARMONY SHR™ UPPER BODY EXOSKELETON

Take your research to the next level with advanced instrumentation that breaks down barriers and limitations set by existing tools.

HARMONY SHR APPLICATIONS IN RESEARCH

Advancing fundamental neuroscience and movement science research

Exploring novel robotic therapy methods for neuro-recovery in spinal cord injury (SCI), traumatic brain injury (TBI), and stroke cases

Accelerating research in human-robot interaction, e.g. brain-machine interfaces (BMI), tele-manipulation, virtual and augmented reality (VR/AR) , etc.

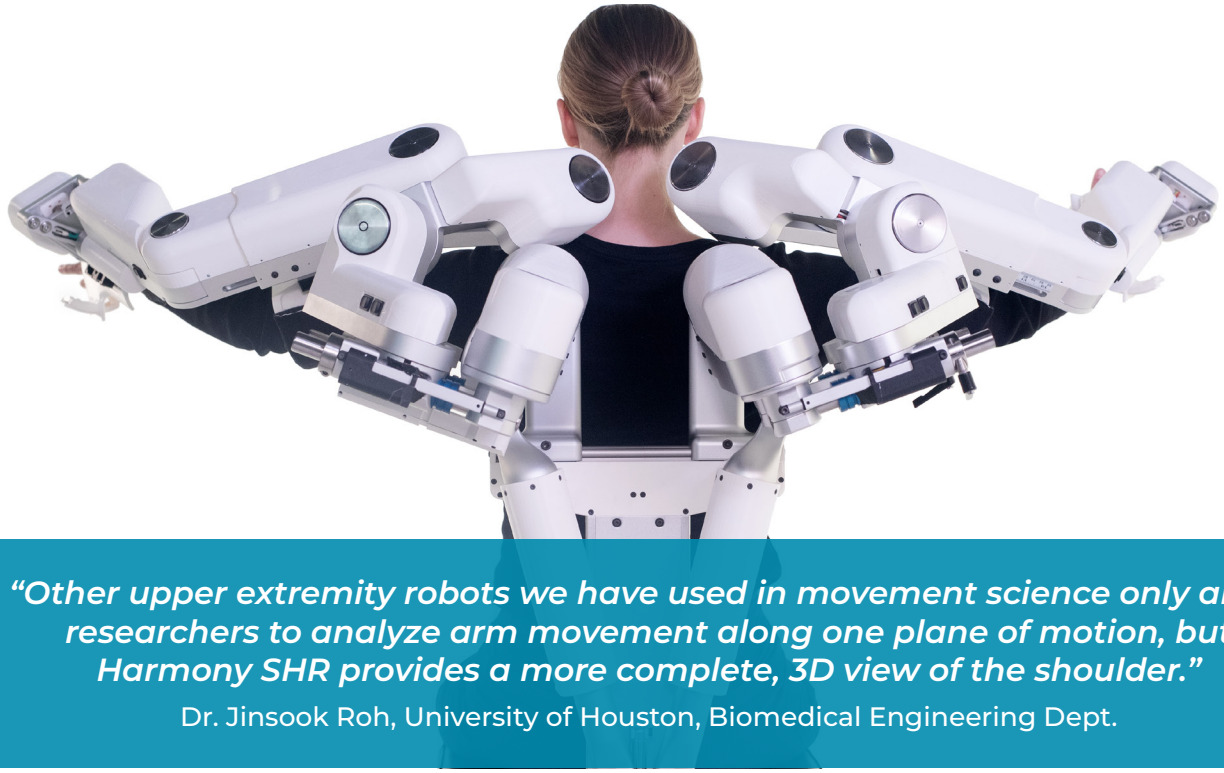
WHAT SETS HARMONY APART FROM OTHER ROBOTIC SYSTEMS BEING USED IN RESEARCH TODAY?

1. **Multi-Planar Design**
Moving in multiple planes, Harmony's anatomically matched design maintains the **scapulohumeral rhythm** of the shoulder for a large, natural range of motion.

2. **Bilateral Structure**
Harmony's unique bilateral design enables mirror image movement allowing a precise comparative assessment of upper-extremity function.

3. **Ease of Use & Customizability**
Harmony SHR is easy to set up and allows for a wide range of size adjustments to perfectly match user needs. Position and torque control modes enable researchers to apply subject-specific assistance within a predetermined range.

4. **Measurable, Objective, Exportable Data**
Over 80 high-speed and high-resolution sensors allow for accurate assessment of the participant's abilities measuring both motion (kinematics) and effort (force generation).



"Other upper extremity robots we have used in movement science only allow researchers to analyze arm movement along one plane of motion, but Harmony SHR provides a more complete, 3D view of the shoulder."

Dr. Jinsook Roh, University of Houston, Biomedical Engineering Dept.

HARMONY SHR MODES OF OPERATION

✔ **Active Freeform**
Subject can move both arms freely with adjustable arm weight compensation.

✔ **Predefined Exercise**
Subject completes pre-programmed arm motions with adjustable assistance and speed.

✔ **Bilateral Sync**
One of the subject's arm movements are mirrored by the other arm.

Harmony's large set of configurable mode parameters and C++ programming API give researchers the ability to easily modify existing modes and create new functions.

Joint and Movement	Harmony SHR Range of Motion
Scapular Elevation/Depression	-6° to 41°
Scapular Protraction/Retraction	-50° to 25°
Shoulder Abduction/Adduction	-65.2° to 70.8°
Shoulder Flexion/Extension	-43.2° to 146.8°
Shoulder Internal/External Rotation	-104.5° to 85.5°
Elbow Flexion/Extension	0° to 135°
Forearm Pronation/Supination	-75° to 75°

TECHNICAL SPECIFICATIONS

Actuator Torque:

- Shoulder: 40Nm
- Elbow: 20Nm
- Wrist (Forearm): 5Nm

Sampling Rate: 200Hz to 1KHz (configurable EtherCAT loop rate)

Velocity: 5 rad/sec

Development Environment: C++

Operating System: RT preempt Linux

Weight: Approx. 80kg

Device's Dimensions: 0.95 m (l) x 0.90 m (w) x 1.20 m (h) | [3'1" x 3'0" x 4'0"]

Power Requirements: 100-240 V / 50/60 Hz / 500W

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