# REHYB

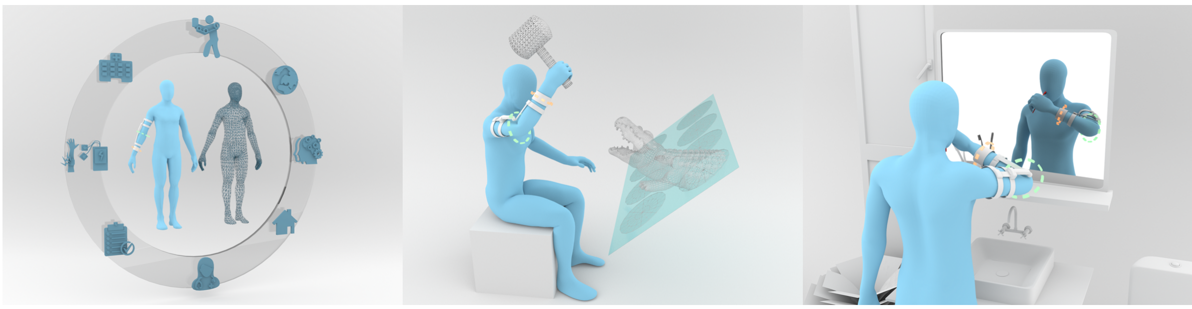
*rehabilitation based on hybrid exoskeleton*

REHYB

## PARTNERS

| | |
|---|---|
| Technical University of Munich | www.itr.ei.tum.de |
| IUVO S.R.L. | www.iuvo.company |
| Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna | www.santannapisa.it/en/wearable-robotics-laboratory |
| Össur hf | www.ossur.com |
| TECNALIA Research & Innovation | www.tecnalia.com |
| Imperial College London | www.imperial.ac.uk/human-robotics |
| Institute for Bioengineering of Catalonia | www.ibecbarcelona.eu |
| Technical University of Denmark | www.dtu.dk |
| Stelar Security Technology Law Research UG | stelar.de |
| Schön Klinik Bad Aibling SE & CO. KG | www.schoen-klinik.de |
| Congregazione Suore Infermiere dell'Addolorata | www.valduce.it |

A research group led by Sandra Hirche at Chair of Information-oriented control, Technical University of Munich is taking challenges on advancing upper-body neuroprosthetics for supporting stroke patients during rehabilitation and activities of daily living. The REHYB project, coordinated by the team, will receive EUR 7.5 million in funding from the European Union's Horizon 2020 Framework Programme over the next four years to develop a new exoskeleton for which the team contributes their expertise in control engineering and human modelling techniques in collaboration with 10 other research institutions, industries and end-user groups across Europe.



Advancements in mechanical engineering and automation technologies have led to global expectations for robotic devices in rehabilitation to cope with a forecast of global ageing and shortage in clinical professionals in the near future. In particular, stroke patients often have to go through extensive rehabilitation or lose daily skills required for an independent self-determined life due to motor deficits. In contrast to classical physical therapists, robotic systems are able to tirelessly and precisely apply intense manual labour, while accurately measuring performance and improvements of the patient. Active exoskeletons meet these requirements and possess the additional advantage of non-stationary design that allows for flexible training and mobility of the patient. Preliminary studies indicate that the training efficiency can be improved if, in addition to the guidance by the exoskeleton, the users motor functions are actively controlled using functional electrical stimulation (FES). Such hybrid systems are advantageous because the users' own muscular activity initialise the movements and are not passively guided through an external force. However, the required control which coordinates the active exoskeleton and stimulation for the human motor functions, especially in terms of dexterity skills necessary for activities of daily living, is more complex due to the unsolved questions on shared control and the missing models of the human motor function with respect to FES. Thus, the ReHyb project designs an upper-body hybrid neuroprosthesis using cooperative control strategies based on data-driven system identification and probabilistic estimation techniques for the internal human states, namely digital twin of a user. Our goal is a patient-specific, assist-as-needed device which maximises the training efficiency during home-based rehabilitation as means of serious gaming, and offers a pleasant user experience by supporting patients in daily life activities.

# MORE INFORMATION

The REHYB project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 871767

Website: https://rehyb.eu/
facebook: https://www.facebook.com/H2020REHYB
twitter: https://www.twitter.com/H2020REHYB
linkedIn: https://www.linkedin.com/company/rehab
https://www.linkedin.com/groups/8868891
Researchgate: https://www.researchgate.net/project/REHYB-Rehabilitation-Based-on-Hybrid-Exoskeleton

# MEDIA RELATIONS

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