IM-TWIN: from Intrinsic Motivations to Transitional Wearable INtelligent companions for autism spectrum disorder

a European funded project

IM-TWIN system Booklet 1
Deliverable 5.3

Deliverable data

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Acronyms of partners

CNR-ISTC	Consiglio Nazionale delle Ricerche, Istituto di Scienze e Tecnologie della Cognizione (Italy)
UU	Universiteit Utrecht (The Netherlands)
CRI	Centre de Recherches Interdisciplinaires (France)
LA SAPIENZA	Università degli Studi di Roma La Sapienza (Italy)
PLUX	Plux - Wireless Biosignals S.A. (Portugal)

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1. Overview of the deliverable

The deliverable presents the *IM-TWIN system Booklet 1*: this is a brochure which describes the general aims and objectives of the IM-TWIN project, in order to promote the possible involvement of stakeholders in the implementation of the exploitation activities. The content is structured to engage different people, groups and organisations, who may be affected or may affect the project lifecycle. As part of the dissemination activity, such stakeholders – identified and described in the deliverable D5.7 *Identification of target groups and relevant stakeholders 1* – will receive a printed copy of the booklet.

2. A brief description of the booklet

The booklet is 12 pages long and, in broad terms, is divided in 3 main parts:

- **a general introduction**: this part gives to the reader a brief overview of the project and describes its potential impact on society and science. It pays particular attention to: (i) the high potential and the pervasiveness of AI-based technologies, when applied to the context of the treatment of neurodevelopmental disorders; (ii) the strong commitment to traduce the research results into new, valuable products and services; (iii) the high potential of the possible partnerships, due to both the high scientific and commercial level of the partners involved;
- **targeted communications**: this part reports short, tailored messages to the specific stakeholders identified at the beginning of the project, e.g. rehabilitation centres; neurodevelopmental therapists; research bodies; universities; software and hardware developers; toy industries;
- **the contact details:** the last part reports the contact details of the partners, e.g. the mails of the principal investigators; the project social networks; the project website.

The booklet is attached at the end of the deliverable.

3. Future developments

A second booklet will be produced on month 12 (31th October 2021), as part of the deliverable D5.4 *IM-TWIN system Booklet 2*. The new booklet, relying on the several activities planned in the WP5 *Exploitation of IM-TWIN system*, will take into account a more precise definition of the potential target markets.

im twin

from Intrinsic Motivations to Transitional Wearable INtelligent companions for autism spectrum disorder

www.im-twin.eu

CALL TO ACTION

TO TARGETED STAKEHOLDERS

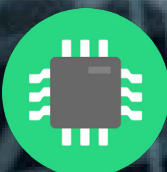 AUTISM SPECTRUM DISORDERS (ASD) THERAPISTS

 INTELLIGENT TOY INDUSTRY

 ASD THERAPY CENTRES

 MEDICAL DEVICE INDUSTRY

 DIGITAL HEALTH HARDWARE & SOFTWARE SMEs

 HEALTH, SOCIAL, EDUCATIONAL SERVICES

 ASD ASSOCIATIONS, POLICY MAKERS, CIVIL SOCIETY

HUMAN-CENTERED ARTIFICIAL INTELLIGENCE EMERGING TECHNOLOGIES FROM THE LAB TO THE MARKET

IM-TWIN is a technological system formed by an interactive toy looking as a panda (PlusMe), a tablet for controlling the PlusMe behaviour, a sensorised T-shirt for emotion recognition, environmental cameras, and information infrastructure for systematic data collection. The system, aims to respond to the need of service providers and caregivers to improve the efficiency of therapy and life quality of children diagnosed with Autism Spectrum Disorder (ASD).

The IM-TWIN system, which is being developed within the European funded project IM-TWIN "from Intrinsic Motivations to Transitional Wearable INtelligent companions for autism spectrum disorder" (2021-2023), derives from previous highly interdisciplinary European research projects linking robotics, artificial intelligence, psychology, and neuroscience. The PlusMe prototype is ready and being tested; the T-shirt and data collection infrastructure are under fast development.

IT'S TIME TO ENGAGE!

IM-TWIN: A MODULAR SYSTEM WITH A HIGH POTENTIAL

We are working on the development and integration of different components:

1. Augmented PlusMe Transitional Wearable Companion (TWC)
2. Innovative Wearable Sensors
3. Emotion Detection
4. Multisource data collection and elaboration
5. Integrated IoT System

Each of the components forming the IM-TWIN represents a potential economic value we want to test and exploit as business opportunity capable to scale up in different industrial and SME segments and markets.

The present Call to-Action is aimed at identifying Industries, Research Centers, Companies, Public Bodies, and Associations interested to collaborate with us to bring the IM-TWIN System technological innovations to the market.
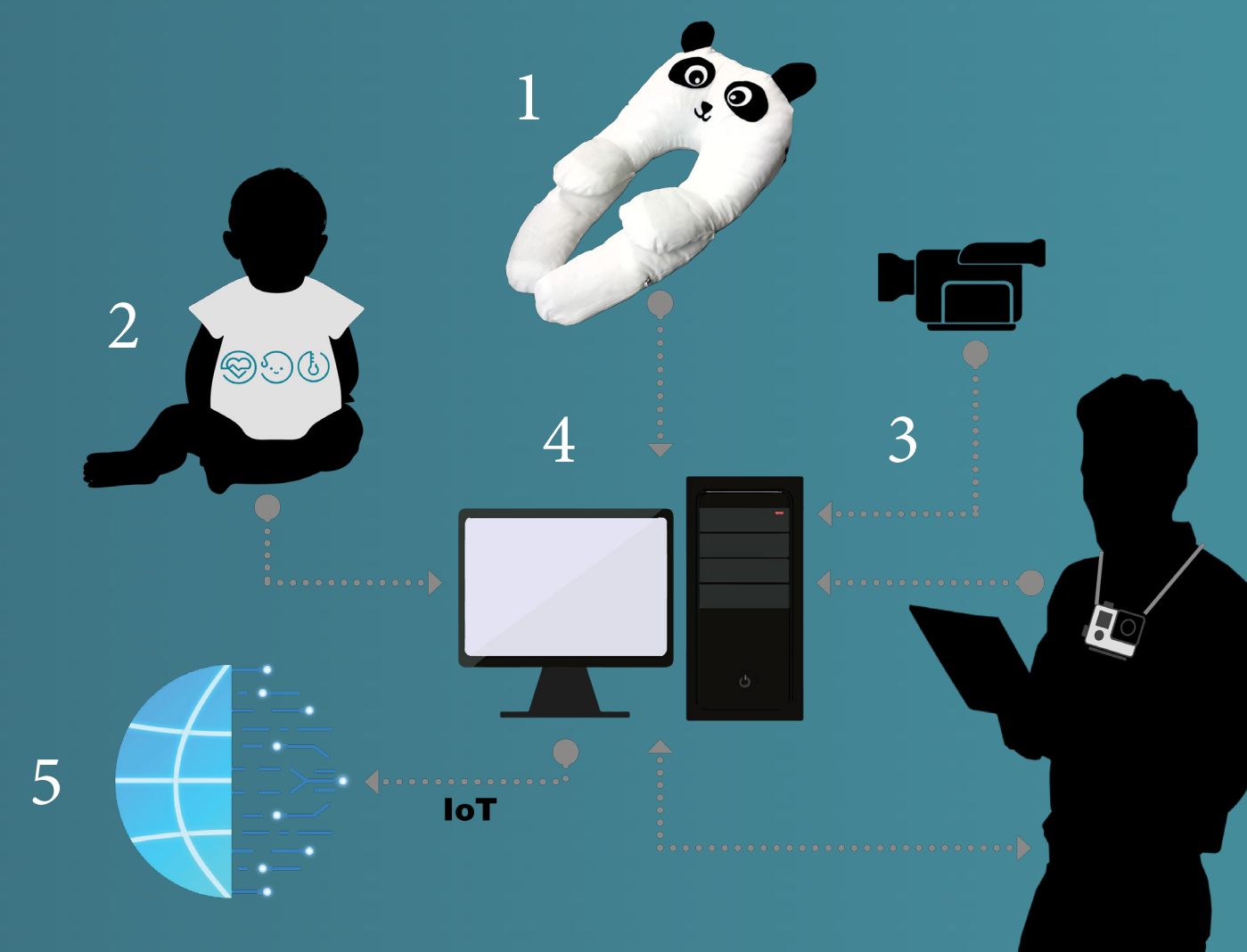
We want to maximise the beneficial impact of our Human-centric AI technology for the society and to do so we fosters a collaborative market driving to develop new markets and services in order to increase our overall competitiveness.

KNOW MORE about the project.

FIND OUT if your organisation could have an interest in our research results and technological outcomes.

HELP US to identify potential market opportunities and areas of collaboration to focus the further development of the technology according to your business needs.

CANDIDATE your organisation as our next partner.

GET in contact with us.

ASD THERAPY CENTRES

IM-TWIN system aims to respond to the need of service providers and caregivers to improve the efficiency of therapy and the quality of life of children diagnosed with ASD. We are addressing three critical challenges in the field of ASD research and therapy:

1) strengthening the role of early intervention relying on automatic affective and stress state detection, exploiting novel Machine Learning techniques;
2) offering novel personalised technological tools in real-time to support the child in daily life;
3) contributing to the early diagnosis of ASD.

IM-TWIN can be used as a whole or in parts: we are interested in acquiring the widest experimental evidence as possible on the effectiveness of the IM-TWIN and its components for therapy and for support of daily life activities.

HEALTH, SOCIAL, EDUCATIONAL SERVICES

ASD is a neurodevelopmental condition, typically evident from early childhood, mainly characterized by important life-long challenges in the social and communicatives areas. As a significant part of the population is diagnosed with this condition, with a dramatic impact on well-being, interventions and treatments should reflect individual uniqueness at each developmental stage.

The IM-TWIN project research program focuses on play skills, joint attention and effective socio-emotional communication strategies of children between 24-60 months, as part of intensive behavioral and educational interventions that are crucial in early childhood.

In line with the European communication document on enabling the digital transformation of health and care in the Digital Single Market (ref. COM(2018)233) the project contributes to support data infrastructure to advance ASD research, disease prevention and personalised health support and care.

KNOW MORE about the on-board intelligence and tablet control of PlusME, the first world Transitional Wearable Companion we are developing since 2015 to support ASD Therapy.

HELP US to extend the experimentation on the device adopting PlusMe in your organization therapy programs.

CANDIDATE you organisation to be selected among the 10 Therapy Centers we plan to involve in our research activity starting from January 2022.

GET in contact with us to ask for your PlusME by the 31st July 2021.

KNOW MORE about the clinical trials with pediatric population conducted by the project partners University of Sapienza, Department of Human Neuroscience (Rome) and Center for Research and Interdisciplinarity (Paris).

FIND OUT if your organisation could have an interest in evaluating IM-TWIN research findings on emotion-detection in the framework of neurodevelopment surveillance protocols (screening programs in primary care).

HELP US to foster the network of ASD researchers and healthcare providers by joining research and partnership.

CANDIDATE your organization to participate to our dissemination activities with the active participation of your representatives.

RESEARCH BODIES, UNIVERSITIES

We promote the IM-TWIN system as a new research tool that will produce a fully integrated dataset usable for research on ASD, built on a highly interdisciplinary integration of the last advances in signal processing, cognitive sciences, artificial intelligence, autonomous robotics.

The open data pilot offers new scientific opportunities for sustaining research excellence, promoting research collaborations and hopefully developing new areas of enquiry in the field of neurodevelopmental disorders, psychology, neuroscience, emotion monitoring.

The data collection strategies will be in line with regulations on data collection, protection, and treatment and will represent a high-quality source for real-world evidence representing a valuable asset to support research in the healthcare sector.

DIGITAL HEALTH SOFTWARE INDUSTRY, SMEs

We are developing new wearable solutions for the IM-TWIN system target users (e.g., children with ASD). The Project will benefit from PLUX Wireless Biosignals S.A. (a company in Lisbon), which has more than 10 years of experiences in the biosensors development, from design concept to market delivered products.

The wearable sensors and the software generate a platform of integrated data acquisition for socio-emotional detection and adaptive interaction that can be used for a wide range of clinical applications, at lab/clinical environment or at home (for remote monitoring scenarios).

Software industries interested in digital health can envision new solutions/products by developing new tools for this suite.

KNOW MORE about our fully integrated dataset of individual physiological, behavioral and emotional data for socio-emotional detection and adaptive interaction.

FIND OUT if your organization is carrying out work relevant to our objectives and is interested in starting a collaboration.
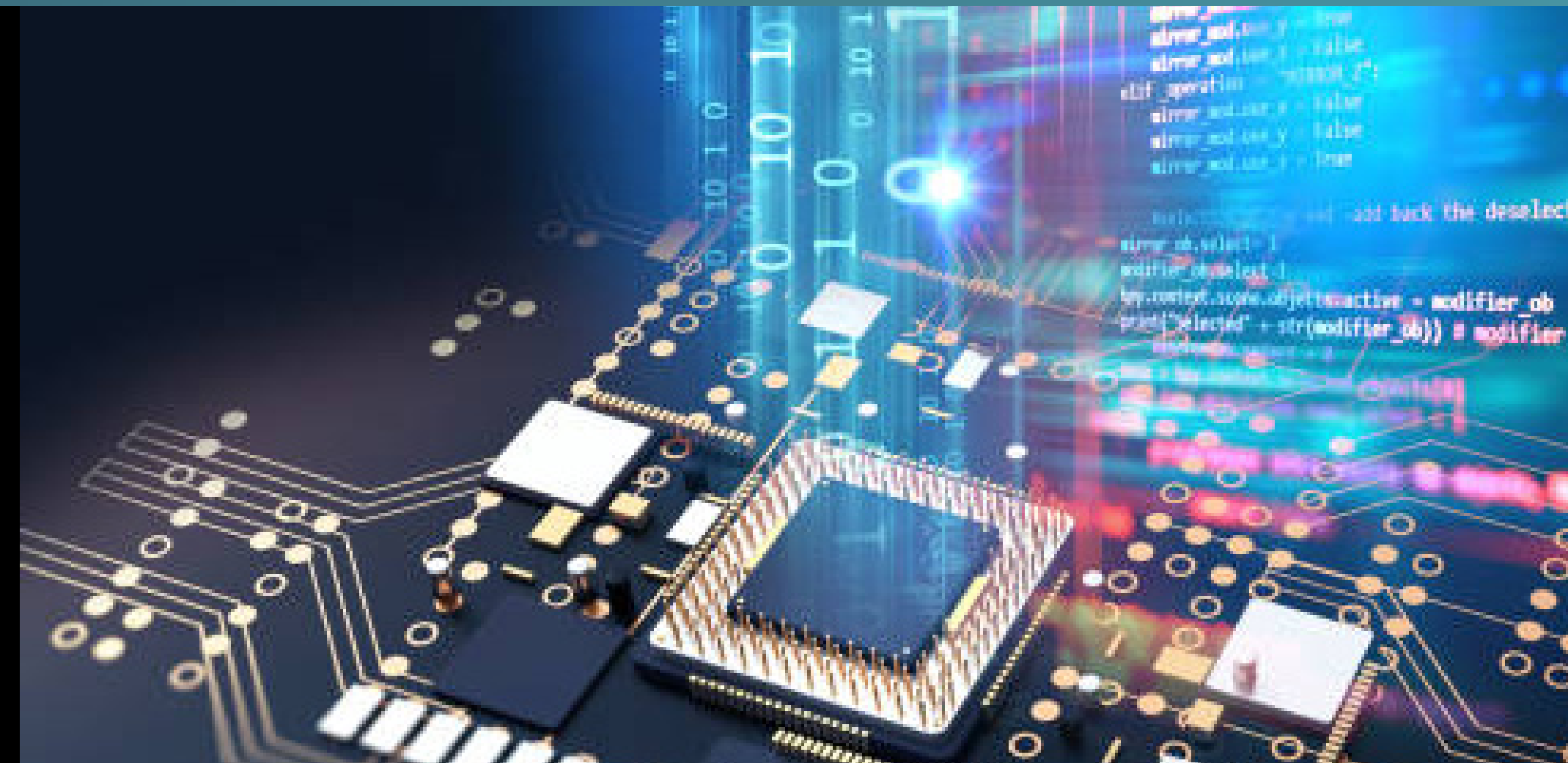
GET IN CONTACT to discover the list of accessible tools generated by our project.

KNOW MORE about our the innovations of our integrated IoT platform with bio-sensors and wearables.

FIND OUT if your organization is interested in starting an industrial partnership to co-develop innovative services and products.

CANDIDATE your organization to participate in our activities addressed to SMEs working in our potential addressable markets such as digital health, socially assistive robotics, ICT, autonomous robotics, etc.

GET IN CONTACT to track our progress and to propose synergies and joint ventures.

ASD INDUSTRY, SMEs

We are developing the IM-TWIN as a whole IoT System based on cutting-edge technologies at the intersection between Autonomous Robotics (AR) Socially Assistive Robotics (SAR) and Artificial Intelligence (AI), with improved Machine Learning (deep neural networks) applied for processing physiological signals, videos and other data for affective state detection and patient monitoring.

Our research program is specifically aimed to collect experimental evidence on the beneficial use of the IM-TWIN system as a basis to monitor ASD and to improve the efficacy of child-customised therapies.

Our objective in the medium-long term is to validate IM-TWIN System under the REGULATION (EU) 2017/745 on medical devices, planning, conducting and documenting a clinical evaluation providing evidence of its intended clinical benefits to patients.

INTELLIGENT TOY INDUSTRY, SMEs

According to the McKinsey & Company (2018), by 2030 the need for the technological, social and emotional skills will grow at a much faster pace than the need for physical and manual skills.

Going beyond analytical and reasoning skills, the educational toy market faces a new challenge, that of interactive/adaptive toys to develop emotional and social intelligence, along with the pleasure of making new discoveries (curiosity and exploration).

PlusMe, front-product of the IM-TWIN system is the world first Transitional Wearable Companion, a new class of interactive toys we are developing and prototyping combining our specific know how on developmental psychology, soft robotics and artificial intelligence.

KNOW MORE about the clinical validation activities we have already conducted and we are planning.

FIND OUT if your organization is interested in starting a collaboration to focus on the best parametres to be used to determine the acceptability of the benefit-risk ratio.

HELP US funding and supporting the high costs of the clinical development plan.
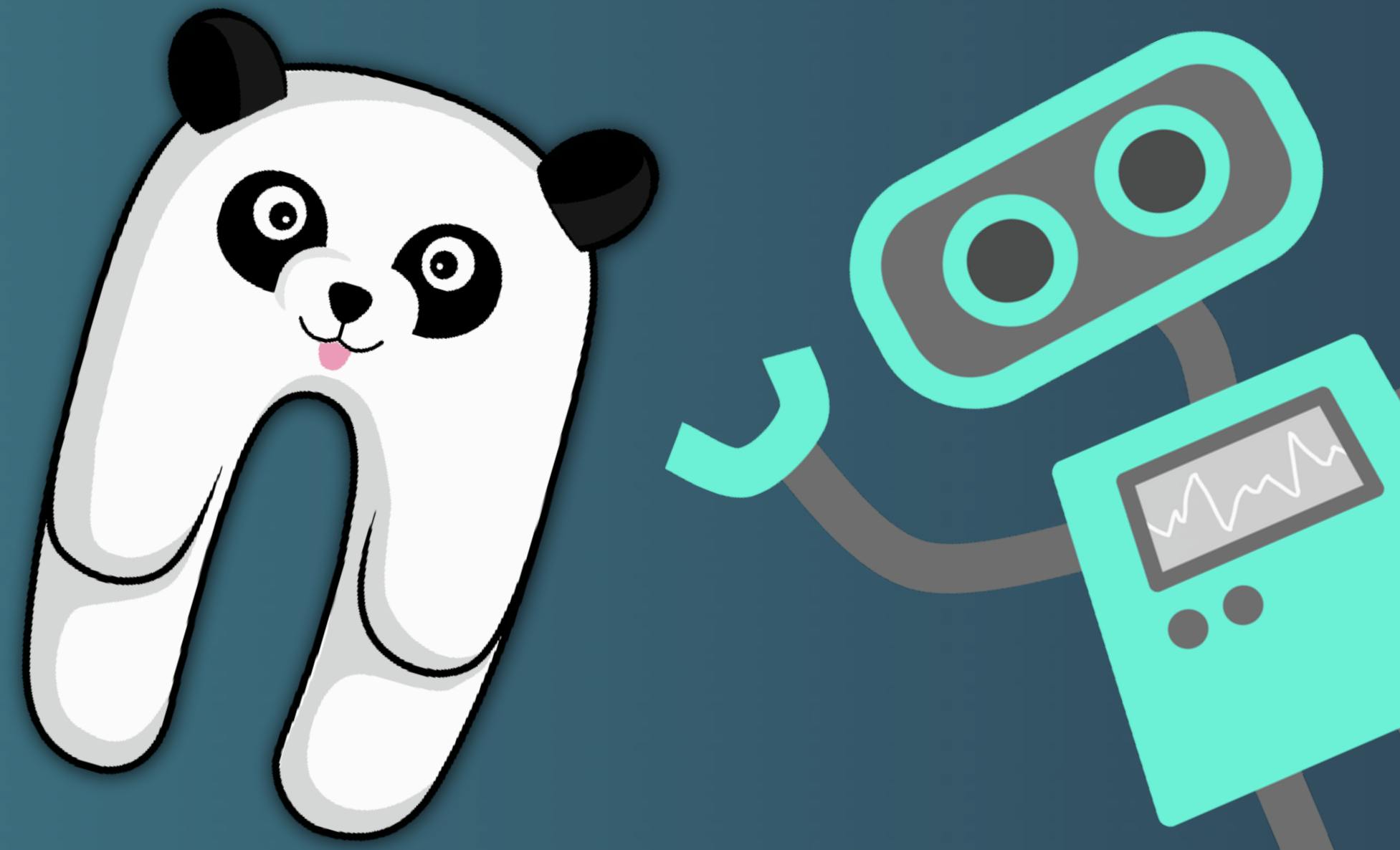
CANDIDATE your organization as our take-to-market partner in the ASD device market.

KNOW MORE about the scientific psychological theory underlying the concept of Transitional Wearable Companion.

FIND OUT if your organization is interested in starting a collaboration to bring PlusMe closer to the market and further develop the family of TWC with new ideas and prototypes.

HELP US better understand the specific needs of your organization.

CANDIDATE your organization as our take-to-market in the toy market.

ASD ASSOCIATIONS, POLICY MAKERS, CIVIL SOCIETY

We firmly believe that emerging AI technologies have a huge potential to transform our society for the better, with new challenges and ethical question to be addressed to avoid any risk and negative impact.

We strongly believe that every AI technological innovation has to serve people with the ultimate aim of increasing human well-being, in line with the European communication document on Human-Centric AI (ref. (COM(2019)168).

Our research activities ensure high standard of protection of personal data and the respect of the ethical guidelines for a trustworthy AI.

We pursue the objective of directly involving ASD associations, parents and families, caregivers, therapists, civil society and policy makers to share with them the challenge to unfold the positive impact of our research activity to improve the ASD child's life!

KNOW MORE about the IM-TWIN project.

FIND OUT if your organization is interested in collaborating with us.

HELP US disseminate the objectives and purposes of the project and to reach key actors involved in your network.

CONSORTIUM COMPOSITION AND AREAS OF EXPERTISES

4 RESEARCH INSTITUTES

National Research Council of Italy,
Institute of Cognitive Sciences
and Technologies
www.istc.cnr.it

AI, Machine Learning, Neural Networks,
Autonomous Robotics,
Transitional Wearable Companions

Utrecht University,
Department of Information and
Computing Sciences
www.uu.nl

Affective Computing,
Signal Processing,
Machine Learning

Center for Research and
Interdisciplinarity
www.cri-paris.org

Developmental Psychology,
Testing of Typically Developed Children,
Testing of Smart Toys

University of Rome Sapienza,
Department of Human Neuroscience
www.uniroma1.it

Neuro Developmental Psychiatry,
ASD diagnosis, Treatment, Research,
Large Screening

1 HI-TECH COMPANY

Wearable sensors for the detection of
physiological signals: multi-sensor acquisition
platforms for biomedical research, biosignals
sensor processing

Plux Wireless Biosignals S.A.
www.plux.info

2 THIRD PARTIES

CNR-ISTC Third Party
Quamtum Leap
www.quantumleap-ip.com

Technology Transfer,
Market Identification,
Business Planning

CNR-ISTC Third Party
AI2life
www.ai2life.com

AI Consulting for Hi-Tech Companies,
Networking,
Talent scouting

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WAYS TO GET ENGAGED

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