

# 2022 WITSA Global Innovation and Tech Excellence Awards Nomination Form

The 2022 WITSA Global Innovation and Tech Excellence Awards (formerly known as *the Global ICT Excellence Awards*) will be presented to select individuals, academic institutions, corporations, NGOs or governments whose use and applications of digital technologies exhibit exceptional achievement within the following broad categories:

Private Sector/NGO	Public Sector
Digital Opportunity/Inclusion Award	Digital Opportunity/Inclusion Award
Smart Cities Award	Smart Cities Award
Sustainable Growth/Circular Economy Award	Sustainable Growth/Circular Economy Award
Innovative eHealth Solutions Award	Innovative eHealth Solutions Award
Public/Private Partnership Award	Public/Private Partnership Award
E-Education & Learning Award	E-Education & Learning Award
Emerging Digital Solutions Award	Startup Ecosystem Award

In addition, a *Chairman's Award* will be presented to a nominee selected from the entire pool of candidates from all award categories.

Candidates for these Awards are nominated by ICT experts from around the world who span over 80 countries/economies. The 2022 *WITSA Global ICT Excellence Awards* will take place in conjunction with the September 13-15, 2022 World Congress on IT in Penang, Malaysia (<https://wcit2022.com>/<https://wcit2021.org.bd/>).

## Digital Opportunity/Inclusion Award

Award #1: Individuals, academic institutions, corporations, or NGOs  
Award #2: Government authorities

Award Criteria - Individuals, corporations, academic institutions, corporations, NGOs or government authorities that have made a remarkable and successful effort at providing digital opportunities to those in need are eligible for this award. In order for the Digital Age to fulfill its promise, it must consider the unique challenges faced by diverse populations. Examples could include deployment of ICTs and Internet access among inner city populations, or in towns, rural areas or cities in developing and least-developed countries. This award also includes programs and initiatives that aid people with disabilities and others who face longstanding barriers to social inclusion. Digital Inclusion is defined as the “ability of individuals and groups to access and use information and communication technologies (ICTs). Digital inclusion encompasses not only access to the Internet but also the availability of hardware and software; relevant content and services; and training for the digital literacy skills required for effective use of ICTs.”

This award recognizes solutions enabling accessibility for those individuals who have traditionally not benefited from ICT. This award also seeks innovative solutions that create meaningful employment through ICT for those who have traditionally been underrepresented in the labor force. Of particular interest to WITSA are applications that embed inclusion and accessibility in the original design as opposed to retrofitting existing applications.

**YOUR NOMINEES (limit three nominations per award category).** *Please specify whether the nominee(s) are for the private or public sector category.*

**Private/Public Sector:** Public Sector

**Project Name:** Robots4Autism

**REASONS FOR NOMINATION** (NOTE: It is important that you make a detailed description of the nominee and why you think the nomination is justified. The absence of a detailed summary of qualifications as they *relate* to the above-mentioned award description will make it difficult for the awards committee to make an appropriate assessment of the candidate):

**SUPPORTING INFORMATION:** Please send any supporting information to the address above, including information from candidate (i.e. excerpt from program description, web site print-out, press release, etc.)

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[Please insert below the Product or Solution Synopsis, Impact, Case Studies etc.]

### Company Profile

Cerebral Palsy Alliance Singapore (CPAS) is a social service agency that empowers persons with cerebral palsy or multiple disabilities to realize their full potential and lead fulfilled dignified lives. CPAS provides programmes that target specific age groups to provide them with tailored services to match their level of needs. Different services such as Occupational therapy, psychological services, physiotherapy, speech and language pathology, social work, interventionist and assistive technology hub work together through a trans-disciplinary framework to provide a well-rounded and integrated approach to meet the client's needs.

### Name of Product or Solution

## Robots4Autism program

### Background

In Singapore, there is a minimum of 400 new children diagnosed with Autism Spectrum Disorders (ASD) every year [1]. With this number increasing over the years, it is imperative for us as a nation to not only understand their condition and the challenges they face but also, play our part in mitigating some of their daily struggles. A child with ASD often faces repetitive behaviours, restricted interests, unusual interest or sensitivity to sensory input, delays in social or language developmental milestones and most strikingly, difficulties in social communication and interaction. In contrast to neurotypical children who are born with the motivation and capacity to build a relationship with their caregivers [2], children with ASD do not focus on voices and faces and tend to avoid eye contact. Even if they can attend to these aspects of social interactions, they face significant difficulty in interpreting and reciprocating to social cues [3].

These challenges are primarily due to difficulties in responding to social stimuli, imitating behaviours, and recognizing and understanding mental states in themselves and in others [4-5]. There is often nothing about how children with ASD look that sets them apart from other people but because their brain is wired differently, the way they see and experience the world is quite different. They may communicate, interact, behave, and learn in ways that are different from most other

people that can cause significant communication, social and behavioral challenges for the child. These difficulties influence the child's adaptation to their environment, with implications for their cognitive, linguistic, and emotional development [6]. It is no surprise that due to these challenges, abilities to form connections with others and express emotions in socially appropriate ways are impaired, which may lead to feelings of isolation and worsen into adulthood, potentially leading to the onset of the other mental health challenges such as anxiety and depression later in adolescence and adulthood [7]. Taken together, it calls for healthcare professionals to take a closer look at how the needs of this population group can be more efficiently met.

### Synopsis of Product or Solution

Robokind, an education technology company, developed a humanoid robot, which we have named Ella, in partnership with clinical experts to help these children develop critical social and emotional skills. Ella delivers an evidence-based curriculum through interactive lessons and the curriculum focuses on mastering the following skills: understanding conversational dynamics, understanding emotions, understanding social situations and emotion regulation. A 1-year pilot programme done with 15 students by the South Carolina Department of Education found that ninety percent of students demonstrated mastery in all the domains, resulting in observable generalizing, transference to human-to-human interaction [8]. On the neural level, another study found that there was significantly higher activity in 3-5

functional areas of the brain within 3-4 months of intervention with Ella robot, which could not be achieved with years of traditional psychologist-client therapy [9].

Research findings attempting to understand the effectiveness of interventions for children with ASD indicate that children with ASD needed the facial expressions to be strong and marked so that they can be perceived as such [10]. In addition, different forms of robots could interact safely with children with ASD, but humanoid robots could help to a faster generalization of skills [11], verbal children showed more interest in the proposed task [12], and better recognition of robot's facial expressions contributes to a more general social acceptance [13].

### Adopting the Innovation

Implementation and adoption into our Early Intervention Program for Infants and Children (EIPIC) services were made possible through funding support from the National Council of Social Services (NCSS), coordination with Robokind and support from DesignSojourn. Robokind offered support for technical or/and practical issues, responding quickly to troubleshoot and guide us. Robokind provided online training to staff to be better equipped to understand the technology.

### Innovativeness of Solution

Ella is the first-ever implementation of this program in Singapore and Asia. This makes it one of the first-ever therapeutic technological solutions that use a facially expressive humanoid robot to deliver an evidence-based curriculum for children with social-emotional deficits, particularly children with ASD. It has several innovative features and functionalities that make this solution not only accessible but also effective in delivering a social skills based intervention to this population.

Firstly, Ella is a humanoid robot that can move, speak and laugh. It comes as no surprise that children are in fact more intrigued by Ella, compared to a traditional therapy session with a psychologist. Research found that that children with ASD had high levels of engagement with the humanoid robot [14]. With increased engagement, interest and also spontaneous imitation of Ella, children are able to learn the skills taught more effectively.

In addition, humans, unlike robots, are not consistent in their display of expressions. While my smile can be a smirk on some occasions, on others it can be completely different. Due to fatigue or different intensities of emotions we experience, the way we express emotions using facial expressions would not be consistent. Ella on the other hand can model a range of marked facial expressions consistently. Children with ASD need the facial expressions to be strong, distinguished and consistent so that they can be perceived and learnt accurately.

Overall, the curriculum is delivered in repetition at a customizable pace, and it has the ability to provide consistent social narratives and lessons for learners with ASD. Ella never gets frustrated and tired, providing consistent care and support for learners with ASD. Ella provides a more predictable and mechanistic delivery, which is less confusing or overwhelming than human stimuli for children with ASD.

The curriculum also provides a framework for the skills taught within the robot-delivered curriculum to be reinforced and generalized to human interactions in structured and real-life activities across different settings (school and home). The framework provides resources that extend the activities to support in-therapy, teachers, and parents' interactions with the child after completing each Robot4Autism module. This would support the child's learning and internalization of social and emotional skills more effectively.

With the unpredictability of covid and the impact it has had on conducting face-to-face sessions, new software adaptations have provided facilitators with the option of conducting the sessions virtually instead, whereby a virtual robot will appear on the student's tablet screen. This promotes accessibility and continuity of lessons and prevents potential disruptions to a child's social skills learning/exposure.

An Individualized Education Plan (IEP) feature has also been added. As a form of educational planning around the child's needs, many schools around the world use this system of planning of goals of the child and interventions to meet the child [15].

Ella has a feature that allows the facilitator the opportunity to input an IEP goal based on a pre-determined drop-down list that has already been pre-programmed to bring you to the tailored curriculum that shows you all the necessary lessons that are related to building the skills needed to meet that specific IEP goal in line with the skills the curriculum has to offer. This function was created to allow the facilitator to tailor the curriculum according to the needs of the child, as some children may have mastered certain social skills and not others at the same time increasing efficiency of tailoring the curriculum to the child.

Monitoring features within the programme such as self-reported student mood trackers and performance and progress trackers embedded in the software allow for convenient generation of quantitative data to aid the facilitators to understand the children's developmental journey better.

Lastly, a group function is available to give facilitators the opportunity to conduct group sessions among students with similar cognitive capacities and needs, increasing accessibility to more clientele as well as provide students an opportunity to practice skills among their peers, increasing generalization of skills learnt.

### Adapting the Innovation

The programme was adjusted in 4 ways to increase efficiency and adoptability with our clients. Firstly, a progress report card has been created (Refer to Appendix

A) where lesson completion is indicated, feedback is given, and their child's grasp on the lesson content is rated. The progress report card has two functions; to keep parents informed of their child's progress in the curriculum, and to identify strengths and weaknesses in their child's social skills.

Secondly, in order to boost their learning and allow exposure of learnt skills to out-of-school settings, parent resource booklets were created. These booklets (Refer to Appendix B) were conceived as a complement to the Robots4Autism Program, specifically to guide parents/caregivers and teachers. It provides parents/caregivers with information, explanations & resources to support and reinforce the skills that their child is learning with Ella. It provides caregivers with the visual supports & narratives used during sessions so that learning and reinforcements are consistent for their child. In addition, it consists of a myriad of fun activities that parents can engage in to reinforce their learning.

Thirdly, we also introduced the programme to other Allied Health Professionals (AHPs) (I.e., Speech-Language Pathologists, Occupational Therapists etc.). AHPs can bring in their own expertise to mediate Ella-child interaction and make lessons more flexible, intriguing and suitable for the learning needs of the client. For example, during periods of dysregulation, an occupational therapist can bring in her expertise and regulate the client from a sensory perspective, allowing the child to redirect his attention to Ella more effectively. The involvement of AHPs also increases

collaboration, maximizing the client's holistic development. Fidelity is ensured from the standardization of the manual by Robokind, allowing for consistency of implementation and execution of the lessons across different facilitators.

Lastly, the population group to which we offer the programme to has been expanded to not only include children with ASD but also children with other neurodevelopmental delays who exhibit social-emotional difficulties. This allows for broader utilization of technology.

### Business Impact and Value

Currently, the department of psychology receives referral cases, where the clients would go through the intervention process. The psychologist spends a significant amount of time on the intervention process, including observation of lessons, clinical conceptualization, stroke formulation, psychological testing, and execution of the intervention plan. Regardless of the case's complexity, the psychologist would be required to plan and execute the intervention meticulously. The duration of the process depends on the clients' profile and the severity of their behaviour too.

The implementation of Ella gives us a framework to identify clients who would need the intervention rather than relying on referrals through inclusion criteria to determine eligibility. This would allow us to take a more proactive approach rather

than a reactive one. As Ella provides a systematic structure of training modules and comes with in-built training modules, it helps reduce the time taken for the psychologist to plan sessions to develop social and emotional skills, with a total estimated reduction of 525 hours per psychologist in a year, increasing productivity.

The specialized program would comprise 40% of the cases, and the Psychologists would be able to focus on the other 60% of referral cases. Ella would be an effective technology in engaging the more straightforward cases. As the program could be executed with the assistance of trained Teaching Aides, psychologist can offload the less complex cases, and at the same time, the psychologist would be able to prioritize their time on the more complex cases. If necessary, the clients from the specialized program might be referred to a psychologist for further assessment. Also, with the assistance of teacher aides, it could also extend utilization to a wider population to potentially benefit more individuals. CPAS has potential plans to expand this implementation to the Special Education (SPED) School.

The future of mental health is moving towards integrating evidence-based technologies to accelerate progress and support professionals and caregivers of children with social and emotional difficulties. The success of the Robots4Autism Program has paved the direction toward adopting many other digital therapeutics for our clients.

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