

# Creating Robots with Toddler-Level Intelligence

## Using the OpenCog AGI Architecture

*Research Proposal for the Epstein Foundation*

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### Executive Summary

The core R&D goal of the proposed project is to use the OpenCog system to ***make a humanoid robot that can achieve a high score on the WPPSI preschool IQ test, based on engineering and education not specifically oriented toward that test.*** This test includes tasks involving English question answering, visual pattern recognition, and manipulation of blocks and puzzles.

Achieving this goal involves taking OpenCog functionalities currently being prototyped for the control of virtual-world characters and using them in a robotics context. It also involves implementation of some recent, fundamentally new ideas involving the integration of symbolic AI systems (such as OpenCog's probabilistic logic engine) and subsymbolic AI systems (such as the DeSTIN computer vision system).

This is viewed as an initial step toward the larger goal of creating a "robot toddler" with the general cognitive capabilities of a 3 year old human child – which in turn is viewed as a step in a longer project aimed at creating software and robotic systems with general intelligence at the human level and ultimately beyond. If successful, the proposed research will constitute a major step in the direction of these more ambitious goals, and will constitute a dramatic step forward in generally intelligent robotic communication, learning and interaction.

This would be an augmentation of a similar but less ambitious OpenCog/robotics project that has recently been funded for two years (2013-2014) by the Hong Kong government, in the total amount of HKD\$2.6M (roughly USD\$342,000) including overheads (and requiring a matching USD\$38K corporate contribution). This proposal seeks additional funding to complement the government funding, so as to accelerate the project and improve the odds of success and the quality of the work.

The government funding already achieved will pay for a team of 6 junior researchers/engineers (PhD student or junior programmer level), working on the project in a lab at Hong Kong Polytechnic University for 2 years. This team is already in place and possesses the needed AI software knowledge and experience. However, to achieve the proposed success on the WPPSI test, we would need to carry out some additional AI work, which would require us to augment the team with two more senior R&D staff. Thus, funding is sought to expand the team by two: a senior software engineer and an experienced AI PhD. This expansion will strain the current physical facilities supplied for

the team, so funding is also sought to cover the cost of renting a larger space, and a small amount of additional computing hardware. Finally, the team is currently spending a certain amount of their time on computer network administration tasks; funding is sought to pay an experienced sys-admin on a part time basis. In all, these additions will transform the team from an underfunded-but-operational student research lab, into a professional AGI development team and environment. This will result in a significant productivity boost, roughly estimated as doubling the productivity of the team.

The funding sought is \$480K in total, over two years. It might usefully be supplied in two tranches: 50% initially, and the other 50% after a year has passed. This will allow the funder to observe incremental progress prior to providing the second half of the funding.