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| The Pleo  |

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| MIXED REALITY ROBOTICS |  About the Pleo  |

Pleo is an animatronic robot designed to model the hypothetical behaviors of a baby camarasaurus. Some features of the Pleo include the ability to react to new situations and different types of stimuli, the ability to progressively develop new traits as the Pleo engages in more and more interaction, and the life-like ability to express different emotions and behaviors. The Pleo was designed by Caleb Chung, the co-creator of Furby, Chung’s company Ugobe sold Pleo and was manufactured by Jetta until 2009, when Ugobe filed for bankruptcy and Jetta re-launched the Pleo line under their own name.

The Pleo robot has camera-based vision for light detection and navigation, two microphones that can detect sound directionally under quiet conditions, twelve touch sensors that make Pleo responsive to contact, four foot sensors for surface detection, fourteen force-feedback sensors (one on each joint), an orientation tilt sensor so that the Pleo can recognize when it is not upright, an infrared sensor for object detection in the mouth, the ability to communicate with other Pleos through infrared two-way, and infrared detection for external objects. These hardware components provide a realistic and highly interactive experience for the user with Pleo.

Created initially as a children’s toy, Pleo exhibits behaviors that are often pleasing to children: Pleo often initiates play and cuddling sessions, and isn’t difficult to bring back into a positive state if made upset. The range of behaviors for Pleo, however, is only as large as Pleo’s states of varying emotion, and it includes playfulness, contentedness, sadness, fear, and frustration.

By using artificial intelligence and sensor input to interpret emotion, Pleo will respond accurately to his situation. For example, if Pleo is left alone for a prolonged period of time, he may walk forward and make attention-seeking noises. If Pleo is tired, he may put himself into a sleep position and snooze off. One of Pleo’s most dramatic emotionally responses comes from when he feels that he might be in danger: or namely, hanging upside-down by the tail. We challenge the reader to find out for himself how Pleo will respond.

Pleo’s producing company, Ugobe, understood the potential benefits of being able to use Pleo for development in robotics. Due to Pleo’s large amount of sensors and detecting mechanisms, the ability to create new behaviors for the Pleo isn’t an obscure challenge- and Ugobe is supportive of developers thanks to the publication of a very comprehensive programming guide and a developer resource center on their website. To write new behaviors for Pleo, one needs to familiarize themselves with Pawn and the individual sensors so that they can put together new movements and reactions for Pleo. Pleo comes with an SD Card slot on the underside of his stomach, and new behaviors and actions can be written on the SD Card in Pawn, and inserted for Pleo to execute these behaviors.

The Pleo is a very useful tool for learning robotics or expanding one’s programming horizons. Just to be able to learn and analyze all of Pleo’s current behaviors and how they are executed via artificial intelligence and movement is a feat of its own, the ability to write one’s own is a step towards understanding how to create an accurate and entertaining interaction between the user and the robot. Pleo is a robot that requires time and one’s participation to fully get to know, but the realistic, and even fun, nature of the interaction will make that time and participation invested an appealing investment.



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| MIXED REALITY ROBOTICS |  Past Projects  |

Schuyler Middle School: A comprehensive lesson plan for middle-school students and developing for Pleo.

[**http://www.digitalwish.com/dw/digitalwish/view\_lesson\_plans?id=6361**](http://www.digitalwish.com/dw/digitalwish/view_lesson_plans?id=6361)

[**http://teacherweb.com/NE/SchuylerGradeWW/DPrescott/apt22.aspx**](http://teacherweb.com/NE/SchuylerGradeWW/DPrescott/apt22.aspx)

Georgia Tech: A curriculum developed for the Pleo and understanding robotics and perception. They have their own wiki relating to using XBee and MiGio.

[**http://ipr10.wikidot.com/pleo**](http://ipr10.wikidot.com/pleo)

ICE Distance Education: A collection of projects that students can do with Pleo in the Pawn language, ranging from beginner to advanced levels of difficulty.

[**http://ice-web.cc.gatech.edu/dl/?q=node/573**](http://ice-web.cc.gatech.edu/dl/?q=node/573)

Hampton University: A research paper describing how Pleo was used to assist children with cerebral palsy learn how to dance.

[**Wii Nunchuk Controlled Dance Pleo! Dance! to Assist Children with ...**](http://www.google.com/url?sa=t&rct=j&q=pleo%20project&source=web&cd=24&ved=0CHAQFjANOAo&url=http%3A%2F%2Fwww.aaai.org%2Focs%2Findex.php%2FFLAIRS%2FFLAIRS12%2Fpaper%2Fdownload%2F4456%2F4859&ei=6sErULePF6T2iwK6uYDQAQ&usg=AFQjCNEHgJamyWjD5pabF76dAVmNhoprMw&sig2=HpY0U-igN9PpqRh2cKN6rw)

Pleo Development Kit: The ideal starting place for anyone hoping to begin developing for the Pleo robot.

[**http://www.pleoworld.com/eng/pdk.php**](http://www.pleoworld.com/eng/pdk.php)

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| MIXED REALITY ROBOTICS |  Resources  |

Bob the Pleo: A discussion forum and website of compiled resources in regards to modifying and “hacking” the Pleo.

[**http://bobthepleo.com/forums/index.php?topic=732.0**](http://bobthepleo.com/forums/index.php?topic=732.0)

Lirec: Hack your Pleo and connect it to a game that is played on your Android phone using a bluetooth module.

[**http://www.lirec.eu/pleohack**](http://www.lirec.eu/pleohack)

Pleo Dinosaur Life: A good start for overall information regarding the Pleo robot, its hardware capabilities, and general behaviors.

[**http://pleodinosaurlife.blogspot.com**](http://pleodinosaurlife.blogspot.com)

PleoWorld: Articles and blogs pertaining to new developments with Pleo.[**http://www.pleoworld.com/pleo\_rb/eng/news.php**](http://www.pleoworld.com/pleo_rb/eng/news.php)

Pleo Wiki: A comprehensive compilation of papers regarding Pleo’s use in research. A good place to start for research and project ideas.

[**http://pleo.wikia.com/wiki/Pleo\_in\_Research**](http://pleo.wikia.com/wiki/Pleo_in_Research)