

## “Mood-modules”

### - Interconnected Toy Units for Spontaneous Creation of Play and Learning Environments.

**Category:** Game design: □ – Innovative game mechanics, game worlds, and interfaces etc.

**Field of Study:** Interaction Design, Electrical Engineering, Aalborg University.

#### **Vision:**

The *Mood-module* project intends to go beyond traditional rule based games by addressing team based play, where the team can co-construct social play environments. The project consists of three to five interconnected wireless toy units embedded with sensors that function as tools to create and facilitate new ways to play, socialize and learn among children and potentially adults. The toy modules operate on two levels: 1) They ‘observe’ and respond to user actions, when they are positioned arbitrarily in a space. 2) They can function as platforms for different game types and play environments that can be downloaded into them. In this way the *Mood-module* concept makes it possible to arrange intelligent environments for physical and social play, enactive and kineasthetic learning. The toy units could possibly be open for teachers and instructors to develop assignments in relation to specific learning and therapy situations.

#### **Motivation and Objectives:**

This project focuses on enhancing the process of physical and social learning that happens when children start to play and express themselves collectively through electronic devices. The question is, if the elimination of the object focus\* will strengthen children’s social awareness, and if the toy units can be used as tools for a team based expression. The main hypotheses are as follows:

1. Children will obtain **physical awareness** when they work strategically and simultaneously within a scenographic and sonic environment.
2. In the interaction with interconnected sensor devices (toy modules), children will **discover their physical abilities as a team** and co-construct a virtual space around them through their mutual flow of actions.
3. The **aesthetics of the medium feedback** that happens as a result of the interaction with the toy modules will encourage children to **express themselves as a team**.
4. When a group of children **manipulate a medium**, their play will mainly be **dramatic**.
5. A scene of **improvised story telling** will arise from the children’s **cooperative usage of the sensor devices** as tools of expression.
6. The interconnected toy modules will provide possibilities for **simultaneous expression**.
7. An **ensemble** type of performance situation challenges children to **understand and adjust** to each other’s social desires and needs.

#### **Background and “State-of-the-Art”:**

Many physical play environments that have already been developed lean towards traditional sports. Others focus on the modular construction of physical elements. Yet others function as musical instruments and tools of communication. The *Nintendo Wii*<sup>ii</sup> and *Eyeto Kinetics*<sup>iii</sup> game platforms provide people with physical and social computer games that are based on well-known sports game metaphors. With *Lego Mindstorms*<sup>iiii</sup> and the related project *PicoCricket*<sup>iv</sup> children can program behaviors into assembled toy units with screen based software programs. The *Topobo*<sup>v</sup> toy modules have kinetic memory, where children can ‘program movement into the toy’ by assembling and moving parts. Game environments that turn interactive games into a play scenario are Kompan’s *Body Games*<sup>vi</sup> concept, where floor tiles direct different kinds of jumping games. Similarly, the *Sprock-it* robot toy reacts to children’s behaviors.<sup>vii</sup> In the *Lambent Reactive* interface, players obtain a collaborative music experience<sup>viii</sup>. The *Mood-module* project aims to

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\* Object focus: relationship between a person and an object, not the relationship person to person. This object focus is currently seen in interactive toy units like Lego Mindstorms, where the attention is mainly directed towards to object.

eliminate the *Lego Mindstorm's* separation between the programming of behaviors and the actual play action in order to avoid the object focus. The group of interconnected toy modules are instead thought of as tools to support children's awareness of each other: their joint physical awareness and skills in a social play situation. This can be done through spatialization of computer game features, where the action feedback is ambient and not focused on a screen interface like the *Nintendo Wii* and *Eyeto Kinetics*. As C. Breazeal's research project, *Leonardo<sup>ix</sup>*, studies the social learning between a person and a robot, this project will study the social learning between people, when action based communication happens through a community of interconnected responsive sensor modules.

### Scientific Methods:

The research activities of the project will focus on the following:

1. Documenting **behavior of children in mediated playing environments** by analysis of multimodal information. The methods developed will lead to implementations of control strategies of the *Mood-modules* in relation to the **social behavior and interaction of children** with themselves and the modules.
2. Conceptual models and algorithmic **distributed control strategies** (game mechanisms) that will incorporate the reactive behavior of the *Mood-modules* and facilitate communication between the modules and instructions from the users.
3. Development of **learning strategies and games** and documented systematic knowledge on the influence on children's behavior and activities when interactive environments facilitating physical play and learning are introduced.

The solution will consist of three to five multimodal sensor devices and their related software applications. (The amount of sensor devices is determined by the processing power available on one personal computer, so that they are readily available to anyone, who owns a personal computer). The software applications are games and play environments, where sounds are generated and projected out into the space as a result of the children's interaction with the toy units. Games and play environments will be designed and tested through video observations and field studies. The actual design of the games or play environments will be based on methods used in music therapy as they are presented by i.e. Tony Wigram in *Improvisation - Methods and Techniques for Music Therapy Clinicians, Educators and Students*.

**Expected Outcome:** The Moodmodule research is expected to result in toy modules that do the following:

1. Create an **enactive and kinaesthetic learning environment**, where spatial distribution and organization of reactive multi-modal electronic devices provide children with the ability to obtain physical awareness.
2. Encourage children's investigation of their **physical affordances as a group**.
3. Create an intuitive learning situation, where physical play stimulates **social awareness and co-invention of roles**.
4. Facilitate a **team-based workspace**, where children can **jointly manipulate an ambient medium** in order to co-construct narratives and play scenarios.
5. Create an intelligent space, where children can **project their intentions into the space** by communicating through interlinked electronic devices.
6. Expand the conception of non-verbal language as a tool in a dialogue situation, where **expression can be multi-threaded and simultaneous**.
7. Facilitate a **scene of improvisation**, where children can obtain social skills through their mutual contribution to **an ensemble** of sonic and visual media forms.

### Potential Significance and Applications:

This research project aims to contribute to the new genre of physical computing devices that support physical and social awareness between children and possibly adults in learning situations. This involves collective action strategies as well as the idea of the 'ensemble', where the goal is a form of simultaneous expression that gives all 'players' an aesthetic experience. The intension behind this project is to provide parents, teachers and therapists the opportunity to use the toy

modules for music therapy in order to help children and possibly adults to focus and concentrate in a social situation. The toy units can possibly help teachers and therapists to decode social relationships among children and adults.

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<sup>i</sup> The Nintendo Wii game controller, <http://wii.com/>

<sup>ii</sup> EyeToy Kinetic, [http://www.us.playstation.com/PS2/Games/EyeToy\\_Kinetic/OGS/](http://www.us.playstation.com/PS2/Games/EyeToy_Kinetic/OGS/)

<sup>iii</sup> Lego Mindstorms NXT, <http://mindstorms.lego.com/>

<sup>iv</sup> Rusk, Natalie, Mitchel Resnick, Robbie Berg, Margaret Pezalla-Granlund, "New Pathways into Robotics: Strategies for Broadening Participation", *Journal of Science Education Technology*, vol 17, Number 1, (February 2008), <http://www.springerlink.com/content/v577336622432hj5/>

<sup>v</sup> Raffle, Hayes, Amanda Parkes, Hiroshi Ishii and Joshua Lifton, "Beyond Record and Play Backpacks: Tangible Modulators for Kinetic Behavior, Ubiquitous Computing", *CHI, Conference on Human Factors in Computing Systems*, (2006), <http://portal.acm.org/citation.cfm?id=1124772.1124874&coll=portal&dl=ACM&CFID=65688875&CFTOKEN=51345709>

<sup>vi</sup> Lund, Henrik Hautop, Thomas Klitbo, Carsten Jessen, "Playware technology for physically activating play", *Artificial Life and Robotics, Volume 9, Number 4* (December 2005), <http://www.springerlink.com/content/728n5wq567770443/>

<sup>vii</sup> Burleson, Winslow, Camilla Nørgaard Jensen, Trine Raaschou and Stefan Frohold, "Sprock-it: A Physically Interactive Play System", IDC, *Interaction Design And Children*, (2007), <http://portal.acm.org/citation.cfm?id=1297302&jmp=cit&coll=portal&dl=ACM>

<sup>viii</sup> Keating, Noah H., "The Lambent Reactive: an audiovisual environment for kinesthetic playforms", *NIME, New Interfaces For Musical Expression* (2007), <http://portal.acm.org/citation.cfm?id=1279740.1279815&coll=Portal&dl=GUIDE&CFID=65816333&CFTOKEN=87898783>

<sup>ix</sup> Breazeal, Cynthia, "Robot's play: interactive games with sociable machines", *ACM Computers in Entertainment, Vol. 2, No. 3, Article 5a*. (July 2004), <http://portal.acm.org/citation.cfm?id=1027154.1027171&coll=Portal&dl=GUIDE&CFID=25753932&CFTOKEN=96933650>