

A MOTION-DETECTION GAME FOR ADHD CHILDREN

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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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This report is submitted in partial fulfillment of the requirement for the Bachelor of
Computer Science (Media Interactive)

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2011

DECLARATION

I hereby declare that this project report entitled
A MOTION-DETECTION GAME FOR ADHD CHILDREN

Is written by me and is my own effort and that no part has been plagiarized
without citations

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DEDICATION

To my beloved parents and sisters.

ACKNOWLEDGEMENTS

I would also like to thank my beloved parents, sisters, friends and relatives who have been giving me moral support and motivation throughout my project and helping me in testing my game and giving me advices. I would also like to thank every lecturer that have taught me before, guiding or guided me.

ABSTRACT

This project is to develop a multisensory game for Attention Deficit Hyperactive Disorder (ADHD) children as choice for indoor activity for them. ADHD is a type of disorder in neuropsychology that causes a few symptoms on the person who suffer from this disorder. Those symptoms include inattention, hyperactive and impulsive behavior. ADHD children prefer physical activity because physical activity enables ADHD to burn up their excessive energy. Multisensory covers visual, audio, kinesthetic and tactile senses. Motion-detection categorized under multisensory. Motion-detection provide real time interactivity which react on movements. By combining the motion-detection technology, an indoor computer game which required physical movement is able to be produced. The methodology used in this project is agile. This methodology is iterative between planning, designs, develop, test and analyze. In the end of this project, the expected finding will be proving that the motion-detection game in improving their concentration and engagement in all activity they will be in. The result from the testing proves that the objectives of the game are met. A multisensory game which uses motion-detection method and a complete report is produced after the completion of this project.

ABSTRAK

Projek ini adalah bertujuan untuk membangunkan permainan *Multisensory* untuk kanak-kanak *Attention Deficit Hyperactive Disorder*(ADHD) sebagai salah satu pilihan kepada kegiatan yang boleh dijalankan di dalam bilik atau rumah. ADHD adalah disebabkan gangguan neuropsikologi dan menyebabkan beberapa simptom. Simptom-simptom yang dinyatakan adalah seperti berikut: capat hilang tumpuan, hiperaktif dan bersikap impulsif. Kanak-kanak ADHD lebih suka aktiviti fizikal kerana aktiviti fizikal membolehkan ADHD menggunakan tenaga yang berlebihan pada diri mereka. *Multisensory* merangkumi deria penglihatan, suara, sentuhan dan gerakan. *Motion-detection* adalah dikategorikan di bawah *Multisensory*. *Motion-detection* membolehkan interaksi secara langsung dan bertindak balas pada gerakan. Dengan adanya teknologi *Motion-detection*, sebuah game komputer yang memerlukan gerakan fizikal dapat dihasilkan. *Methodology* yang digunakan dalam projek ini yang *Agile. Methodology* meliputi ulangan antara perancangan, reka-bentuk, pembangunan, ujian dan analisis. Pada akhir projek ini, diharapkan semua penemuan dapat membuktikan permainan *Motion-detection* dapat meningkatkan penglibatan kanak-kanak ADHD dengan activity lain yang akan disertai oleh mereka. Hasil dari ujian membuktikan bahawa tujuan dari permainan dipenuhi. Sebuah permainan *Multisensory* yang menggunakan kaedah *Motion-detection* dan laporan yang lengkap akan dihasilkan selepas projek ini.

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CHAPTER I

INTRODUCTION

1.1 Project Background

The project that is going to produce is under the field of motion detection or multisensory field. The integration between human and multisensory includes visual, auditory, kinaesthetic, and tactile. Motion detection is categorised under multisensory field, it covers visual, auditory, and kinaesthetic.

A motion detection game will be developed for Attention Deficit Hyperactive Disorder (ADHD) children as a better indoor physical activity. The technology can be achieved by comparing the contrast threshold between the image. If the threshold is higher than a certain predefined value, a certain action will be taken. The difference of threshold is commonly named CST (change sensitivity threshold) where it is the differences of pixels between pictures or image that trigger instructions. The interaction between player(s) and the game is real-time interactivity. This means the action triggered is instantly. The player(s) will feel like controlling the game directly.

ADHD can be defined as a disorder in neuropsychology; a compilation of symptoms that include inattention, hyperactive and impulsive behaviour. To firstly diagnose ADHD on children, they will show persistent on the above behaviour for at least 6 months to the degree of dysfunctional.

ADHD children have difficulties staying indoors. They are more engaged with activities that require higher energy usage, in other words, physical activities. This is due

to Hyperactive children needs to burn up their energy during play time, that include run and jump or any form of actions.(Taylor,J.,2008). Physical activities are very limited to indoors. and therefore a motion-detection game is proposed to be a solution for this problem.

As mentioned above, this motion-detection game only react if it detects movement, therefore, player(s) need to move their body in order to play this game. This thus cause burn up energy and the real time interactivity will cause player(s) more immerse to the game and more engaged with the game. The simple instruction for the game is a bonus as ADHD children doesn't need to practice complicated rules as this might cause them to felt bored. These characteristics of the game make it a good choice for indoor activities for ADHD children.

In summary, motion-detection game is real-time interactive, require physical movement and have simple instructions. It is a very suitable physical indoor activity for ADHD children.

1.2 Problem Statement

Currently, the indoor activities that are prepared for the ADHD children are lack of physical movement. For example, puzzle. Since there is some facts supporting that ADHD children are obsess toward activities that need to burn up energy, and a game that is not complicated. A suitable game should be developed as a solution.

ADHD children are more prefer to involve in games that required body movement. Although puzzle is categorized as the suitable indoor game for ADHD children, the long time sit still position might cause ADHD children to lose their interest. If a parent can accompany ADHD to play puzzle, this might increase their interest in playing puzzle. However, parents nowadays are too busy to accompany their children for a long period of times. Follow-the-leader is a type of game that we can held in indoor. In this game, players can include any form of movement that is achievable. However, this game will only be fun if it involved a large number of players, at least 2 people involved. Finding

members for the game is sometimes very hard, and as mentioned above, parents might be too busy to always spend time to accompany their children to play.

Therefore, a motion detection game is solution for the lack of physical indoor activities for ADHD children.

1.3 Objective

The objectives for this project are:

- 1) To study the effectiveness of motion-detection games in improving ADHD children's concentration and engagement.
- 2) To create an indoor physical activity for ADHD children to fulfil their needs for active high-level energy consumption activities.
- 3) To reduce the number of request for outdoor activities from ADHD children.

1.4 Scope

This project only covers a completed motion-detection game in .swf format and also a short tutorial to guide the player. The limitation of this project is user must have flash player and also webcam. However, there are a lot of plug-in webcam available in the market; flash player are free downloadable from the internet.

1.5 Project Significance

The target users that will benefits from this project are ADHD children and also those people that are parenting or taking care for ADHD children. When this

project is successfully developed, it will bring contribution in providing an idea indoor physical activities that will attract ADHD children, fulfilling their needs in releasing excessive energy during playtime, increase their engagement to the game and less request for outdoor activities.

1.6 Summary

In conclusion, I hope that this project can bring benefit to ADHD children in help them on attention improvement and also as a game that will be idea as a physical indoor activity for them. In the next chapter, I would like to discuss about literature review and project methodology.

CHAPTER II

LITERATURE REVIEW & PROJECT METHODOLOGY

2.1 Introduction

ADHD children often show inattention behavior (eg: often not seem to listen when spoken to them), hyperactive (eg: cannot sit still), and impulsive (eg: not patient, cannot wait for their turn). To let them play indoor game, the game must include physical movement and most importantly, no complicated rules is adapted. Motion-detection game is an idea indoor game for ADHD children as it require movement. A complete motion-detection game in .swf format is developed in this project/..

2.2 Domain

Children with excessive energy and always lose focus in listening to what other people say are always trouble the parents, teachers and others. Those children always being yelled by parents, being put at the edge and get least attention because they are categorize as “bad boy/girl”. They seldom get praise or encouragement. Actually, those children (or even adults) that having problems with attention, often shows hyperactive and impulsive are likely to be an ADHD.

Although inattention, hyperactive and impulsive are the common symptom for ADHD, but ones cannot declare or recognize another person to be an ADHD unless that person fits the following criteria:

Table 2.1: DSM-IV Diagnostic Criteria for Attention-Defect/ Hyperactivity Disorder (Comings, D.E. et al.(2005)

1.	Fits either A. or B. of the following symptoms.	
	A.	<p>Fits six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:</p> <p>Inattention</p> <p>(a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities</p> <p>(b) often has difficulty sustaining attention in tasks or play activities</p> <p>(c) often does not seem to listen when spoken to directly</p> <p>(d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)</p> <p>(e) often has difficulty organizing tasks and activities</p> <p>(f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)</p> <p>(g) often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)</p> <p>(h) is often easily distracted by extraneous stimuli</p> <p>(i) is often forgetful in daily activities</p>
	B.	<p>Fits six (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:</p> <p>Hyperactivity</p> <p>(a) often fidgets with hands or feet or squirms in seat</p> <p>(b) often leaves seat in classroom or in other situations in which remaining seated is expected</p> <p>(c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)</p> <p>(d) often has difficulty playing or engaging in leisure activities quietly</p> <p>(e) is often "on the go" or often acts as if "driven by a motor"</p>

	<p>(f) often talks excessively</p> <p>Impulsivity</p> <p>(g) often blurts out answers before questions have been completed</p> <p>(h) often has difficulty awaiting turn</p> <p>(i) often interrupts or intrudes on others (e.g., butts into conversations or games)</p>
2.	Some hyperactivity-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
3.	Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).
4.	There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
5.	The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by other mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Recently, BrainTrain's cognitive training software has introduced an ADHD testing software that helps in improving ADHD diagnosis accurately. This is called IVA+Plus. IVA+Plus works through mixing the visual and auditory stimuli on the testing, creating a task that is more "real-life" to enhance the accuracy of identifying auditory and visual attention deficits and the level of impulsivity. "In a validity study, IVA+Plus correctly identified clinician-diagnosed ADHD children 92.3% of the time and had a low false positive rate of 10% (BrainTrain's cognitive training software, (2011))." The complete evaluation test on audio and visual attention deficiency and impulsivity only takes less than 20 minutes. Also, clinician advice will be provided straight away, making the diagnosis report viewable in just a few minutes. The data storage capabilities allow future analyses to be carried out. There are more benefits to IVA+Plus, which has resulted in an increase in the number of IVA+Plus users.

The main misconception on ADHD is public tends to thought that it is due to bad parenting. An experiment done by Comings, D.E., et al (2005) to a few pairs of twins with ADHD suggests that ADHD are a kind of genetic factor, not cause by an environment factors or bad parenting. ADHD is a dysfunction due to imbalance in the brain's neurotransmitter chemicals, noradrenaline and dopamine. It is common to see some parents shouting to their kids or even serious case, parents tie a rope on the kids hand and they hold another end of the rope. This scenario is common to happen especially in public location, although the second scenario is not common. it isn't something strange or novel. The main reason for the parents to do this is because they have no better idea to control the excessive movement of their kids. This might further related to kids abuse issues. Actually, these kids are having high possibility in having ADHD. Although bad parenting is not the main cause of ADHD but this kind of parenting technique certainly will worsen the behaviour of those kids. The best way to solve this problem is allow consultant on ADHD and ADHD test to be done on the kids. Appropriate and professional test is very important because not every mischievous' behaviour is due to ADHD, it might also due to the environment. the gene and some is related to the upbringing technique by parents.

Most people think that ADHD children do not pay attention in performing any activities. Actually, ADHD children have strong attention retention, once they wanted to do something, they will never stop it until they finish doing the task they wanted to do. This always frustrated those teachers when they wanted to stop an ADHD child from doing what ADHD child is doing. For example, after the drawing class ended, they want those children to keep their colour pencil and prepared for the next class, which is singing class. Other children in the class will keep their colour pencil instantly but this will not happen to the ADHD child, this is because he/she wants to finish the drawing before they can proceed to the next task. A clinical case that recorded by Barkley, R.A. (2006) stated a case, where the ADHD child named Jesse is actually having this ADHD problem but his parent does not aware of it. His teacher, after attend a ADHD talk, found out that he might have this problem, after tests done, the result is positive, Jesse is an ADHD kid. "The teacher found that tape a schedule to Jesse desk is helpful to him. But is an assembly or other activity caused the class to deviate from that routine, Jesse became tense and overwhelmed. Sometimes he even yelled or screamed". "If he were talking about video games (a particular interest of his), he would list the ratings of various video games for as long as a conversational partner would listen to him, ignoring obvious signs of boredom" (Barkley,