UniPaGaGirl

Game

UPRC

USER MANUAL

Education and Culture DG

Credits

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We would like to especially thank the **two children** that agreed to play the game at its first edition and helped us evaluate it and therefore redesign it properly where needed in order to fulfill its purpose. For the record, the two children are dealing with gross motor skills problems and motor impairments.

The game was designed and developed by University of Piraeus Research Center (short: UPRC) within the "Motion-based adaptable playful learning experiences for children with motor and intellectual disabilities" (short: M4ALL) project, which is co-funded through the EC Lifelong Learning Programme, sub-programme Development of innovative ICT-based content, services, pedagogies and practice for Lifelong Learning (Key Activity 3, Multilateral Projects).

Contents

Uni_Paca_Girl Game

The "Uni_Paca_Girl" game aims to help children improve the skills of eye-hand concentration, visual perception, motor planning and execution. It invites children to combine simultaneously many skills, such as their attention, their ability to coordinate properly their movements in space, and react quickly when needed.

Uni_Paca_Girl Game

Game's Core Idea

Children should be able to learn how to execute hand movements that require accuracy, speed, timing, and planning. The "Uni_Paca_Girl" game has been designed to gamify typical therapeutic exercises of the basic movements that need to be performed during a therapeutic session. Normally, these movements are asked by the therapist to be done in front of a mirror (see Figure 1). One typical set of such exercises involves horizontal, vertical or diagonal movements of hands along short, medium, and long paths.

Figure 1. Therapeutic exercises for gross motor skills in front of a mirror

Main Goal

Thus, the **main goal** of the "Uni_Paca_Girl" game is to stimulate children perform hand movements in order to improve:

- ✓ their gross motor skills,
- ✓ visual motor development and
- ✓ attention-concentration.

These goals are in-line with the objectives for therapeutic exercises for dyspraxic children and/or children who suffer from ADHD.

Discussing with therapists, it was found out that children do not complete such exercises due to *fatigue* and *boredom*. So when they feel that an exercise is difficult for them, they quit since there is no motivation to complete the task. Hence, **a mandatory goal of this game is to make children highly engaged in playing a simple game so that they will overpass their fatigue or difficulties in hand movements and also improve the skills mentioned above**.

Hence, gamifying the hand movements exercises and using the basic concept of the well-known “packman” game, the “Uni_Paca_Girl” game was created, where a child is asked to move a little girl along horizontal/vertical/diagonal paths and other paths like mazes (see Figure 2 and Figure 3).

Figure 2. Maze Movement

Figure 3. Screenshot of Uni_Paca_Girl game.

Target Group

The “Uni_Paca_Girl” is primarily addressed to children aged 4 years old and above, who suffer from dyspraxia or/and motor impairments, and/or ADHD. This game can be played by children with moderate IQ (above 70), since it involves visual perception, the skills of eye-hand concentration, motor planning and execution. The game concept is simple and catchy so that even older children (e.g. 16 or 17 years old) with motor impairments due to postoperative ischemic stroke or cerebral palsy with quadriplegia, are motivated to play.

Game's Philosophy

The game was designed to help a child, with the necessary presence and support of a special educator, build and develop basic gross motor planning and co-ordination skills in a playful, engaging and entertaining way. The game's philosophy is based on transforming the basic therapeutic exercises of hand movements that the children with learning disabilities and multiples disorders do in front of the mirror (see Figure 4) into a gamifying experience with the use of Microsoft Kinect camera for XBOX360. Hence, the student (with or without holding an object/toy) performs the therapeutic exercises of the same type, (on horizontal, vertical or diagonal paths and other paths like mazes).

Figure 4. Therapeutic exercises for gross motor skills in front of a mirror with the therapist's help

Each child is considered unique with different skills and learning needs and with the right guidance from the special educator or therapist and also proper use of the customized game, the student can play, learn and improve its skills simultaneously. It's very important to achieve full involvement of the child in kinesthetic activities that stimulate the brain and also cultivate other skills.

The teacher or special educator can modify the game's settings in order to always be adapted to each child's needs and mood. Also, the fact that the learning experience that the game offers is stored and represented visually for the teacher's convenience is considered an innovative and significant feature that provides the child's progress as it is depicted with learning and kinetic analytics. Therefore, the inclusion of Uni_Paca_Girl game in the learning experience that combines active learning and fun via natural user interaction modalities can achieves improvement on children's skills with the necessary effort that it implies.

Set up

Software and hardware Requirements

- Windows XP or Windows 7
- Microsoft Kinect for XBOX 360 (see Figure 5)
- Installation files

Figure 5. Microsoft Kinect Camera for XBOX 360

Set the play space up

You can connect your computer with a second display screen or a projector or a TV screen for convenience reasons, so that the game will be played in a big screen. First, the Kinect camera should be placed in a secure surface in front of the display screen and centered with it. Then, you need to adjust its angle so that it points to your upper body. Finally, the child should be standing in at least 6 feet distance from the device.

Game Structure

The structure of the game is depicted in the following diagram - flow chart (see Figure 6):

Figure 6. Flow Chart of Uni_Paca_Girl game

Let the game begin

After you have successfully installed the game (find the detailed installation instructions at the Appendix), navigate to **C:\Program Files\Uni_Paca_Girl** folder and double click on **Uni_Paca_Girl.exe**. Opening the application you will see the start screen (see Figure 7).

Important! It may not work properly running the application from the desktop shortcut.

Figure 7. Start Screen of the game.

Choose Settings

Click on the "Start Game" button and you will see the Settings Panel Screen (see Figure 8).

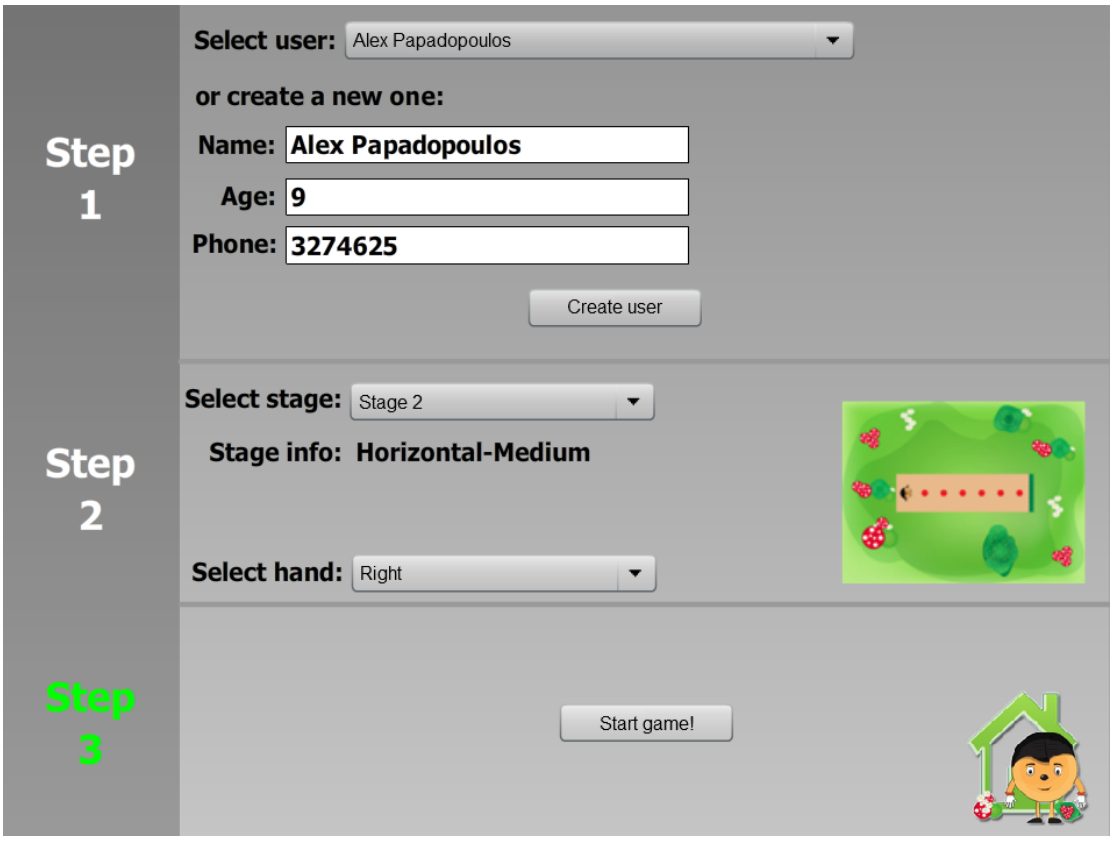

Figure 8. Uni_Paca_Gril Settings Panel Screen

There are several **settings** in the game such as:

- Type of path, i.e. horizontal, vertical, or diagonal paths (see Figure 9)

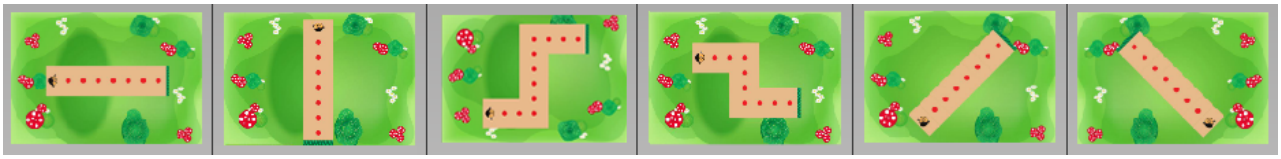

Figure 9. Different Types of stages

- Length of the path, i.e. short, medium, long, which is also depending on the stage that will be selected on Step 2 (see Figure 10, 11 and 12)

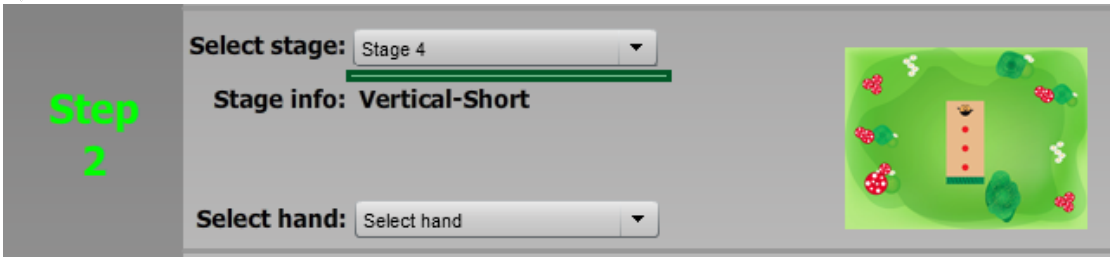

Figure 10. Stage 4 selected (short path)

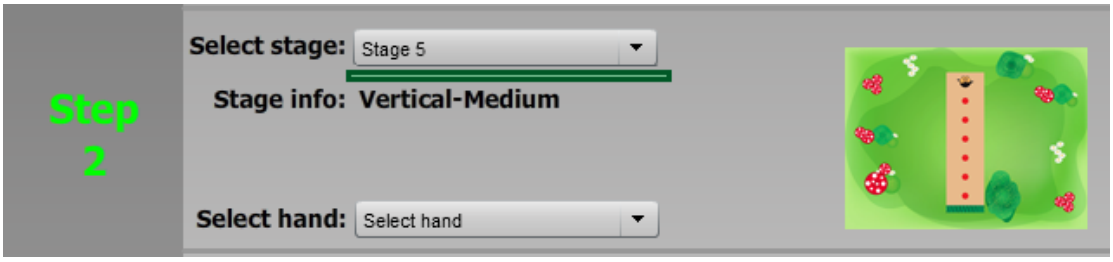

Figure 11. Stage 5 selected (medium path)

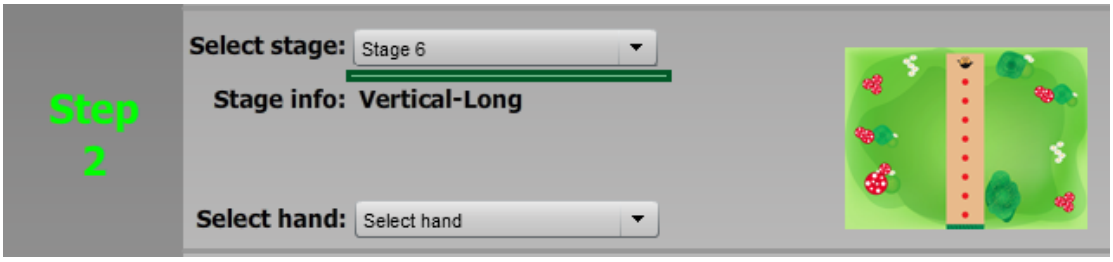

Figure 12. Stage 6 selected (long path)

- Selection of hand, i .e. right, left (on Step 2)
- Time limit, which can be seen by clicking on the “Backend” button on the game screen.
- Width of the path, which can be modified clicking the “Settings” button on the game screen (see Figure 13)

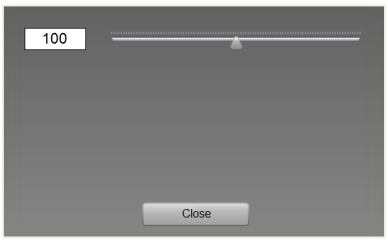

Figure 13. Adjusting path's width

Customizing the settings, the child will make hand movements along a path which might have different shapes such as horizontal, vertical, or diagonal as well as varied width. The shape of the path, the time limit and the difficulty level, which depends on how width the path is can be customized in order to fit to the capabilities of the player and to be as much challenging, as it should.

Adjusting the settings is separated in **three quick steps**:

Step 1

In the first step you have to select a user or create a new one. The required fields are the user's name, age and phone.

Step 2

In the second step you can choose among different types of paths (such as horizontal, vertical, or diagonal paths). These 16 available stages also differ in the length of the path (short, medium, long) and their width can be modified, thus making the game more or less challenging. The choice will be made depending on the capabilities of the child and the difficulty level of the game. There is a preview of the stage and some stage info presented for each path. Last, you need to select the hand (right or left) that the child will use to play.

Step 3

After you modify the game's settings, it's time for the game playing to begin. Click on the "Start Game" button and notice that the infrared sensor of the Kinect camera will start working and emit a discreet red light (see Figure 5 above).

Play Screen

The child gets in position (6 feet away from the camera) and is raising his/her hand (the one that was chosen in the settings panel). The student has to make the “push forward” gesture (see Figure 14), only until the red hand image appears on the game screen (see Figure 15). This means that the camera has detected the child’s hand. Then, the user should move his/her hand (waving either left or right) and keep it steady **over** the main character in order to select it (see Figure 16). The Paca_Girl must be carefully moved along the path gathering the “red dots” avoiding collisions with the edges.

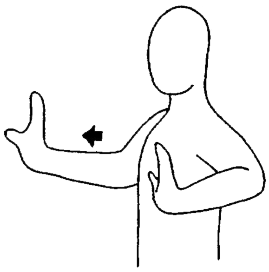

Figure 14. "Push forward" gesture

Figure 15. Main Game Screen

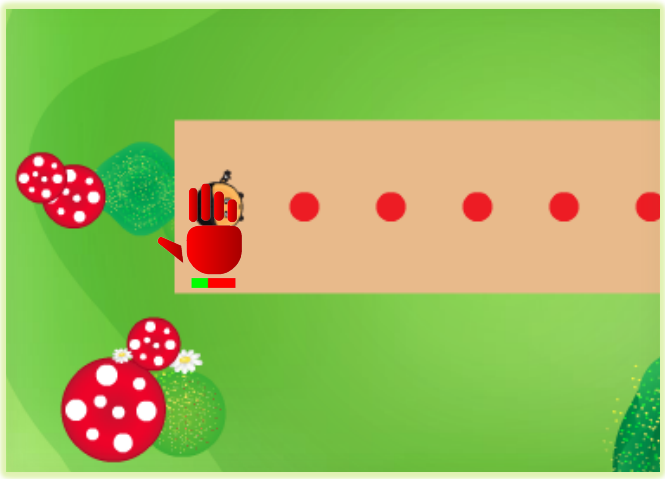

Figure 16. Selecting the UniPacaGirl

Important Note: The stage will be completed only when the user has collected **all** the red dots.

- ***End Game - Achievements***

At the end of each game, the player has the opportunity to check his/her mistakes and try to do better, thereby improving these skills gradually. Teachers and children can make plans on how to proceed with other therapeutic sessions for improving children's gross motor skills and attention-concentration gradually depending on the reports from the game's back-end system.

- ***Back – End Results***

This back-end monitoring system collects data about the child's achievements and progress and presents them graphically. This means that during the game interaction, the game engine captures the hand movements in order to visualize them appropriately. Thus, when the gamified training session is over, the teacher has access to a screen, which shows visually all the attempts that the child made, the time spent in the game and the game's settings. There is also the possibility to "replay" the mode of interaction in the game (like a video replay of the child's movements) and all the movements of children along the various paths.

For example, in the Figure 17 below, the student seems to have completed 4 times the first stage. In particularly, in his third attempt he used the right hand and completed the movement in 6.134 seconds with 150% wider path. The red and the green lines represent the student's and the optimum route respectively. Hence, the therapist can see how steady the child's hand was and also how accurately he moved it, in comparison with the optimum movement.

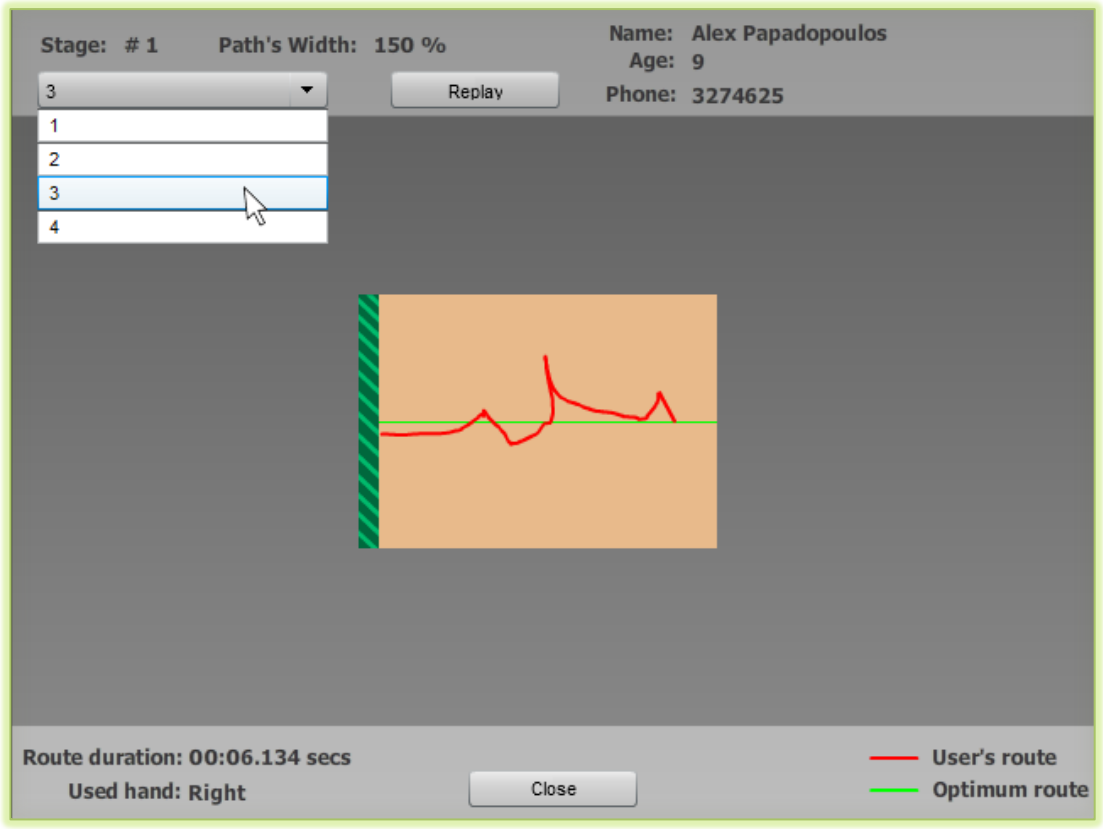

Figure 17. All the attempts of the specific student for the first stage.

The "Replay" button can represent the student's movement for every completed game in video form (see Figure 18).

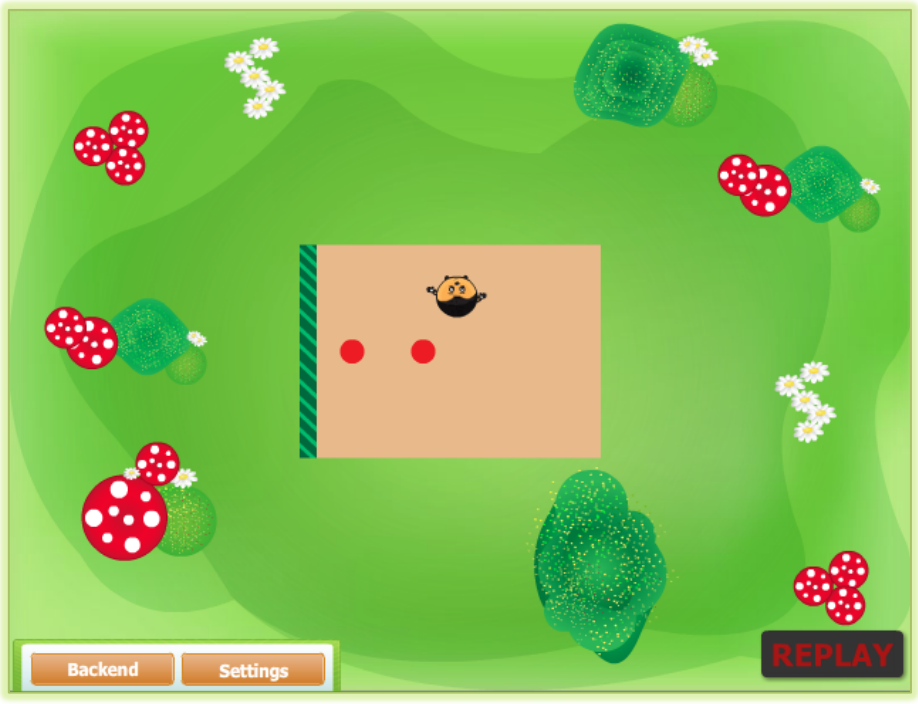

Figure 18. Replay function

Example of use

The teacher can modify the game's settings for the individual needs of each child, and also have access to kinetic and learning analytics of the child's interaction progress and achievements, since these data are being safely stored and vividly presented.

The customization of learning experience is crucial for learning effectiveness. Hence, in the first attempt of a student to play the Uni_Paca_Girl, it's important to start with an easy route, in order to become familiar with its purpose and functionalities. If the child finds it difficult to make the **horizontal movement**, then, you can select the stage 1 (short path length) of the game instead of 2 or 3 (medium and long path length respectively), which also include horizontal path. That is because it has the shortest path and three red dots only, so it would be easier for him/her to complete without getting disappointed and quit. Later, when the student gets the hang of the game and it isn't so challenging for him/her, the teacher can increase the game's difficulty by selecting stage 2 (medium path) or even stage 3 (long path) which have longer paths and the child is demanded to gather more red dots.

Also, another important feature is the **width** of the path, which can be modified in real time during the game playing by clicking on the "Settings" button. Thus, the teacher can increase game difficulty by decreasing the default width from 100% to a lower price (it can go down to 50%). Respectively, increasing the path's width (150% top limit) will turn the stage into an easier route and prevent children from getting easily frustrated and quitting the exercise before it's finished (drop out).

Welcome to my World!!

Let's start playing!!

APPENDIX

Installation Steps

Before starting the installation process you should make sure there are no Kinect for windows drivers installed on your computer (such as Kinect for Windows Drivers v#, Kinect for Windows Runtime v#), or else Kinect camera for Xbox may not work or correspond correctly. After that, follow the below steps:

1. Double click OpenNI-Win32-1.3.2.3-Dev.msi and follow the instructions of the wizard (Figure 19).

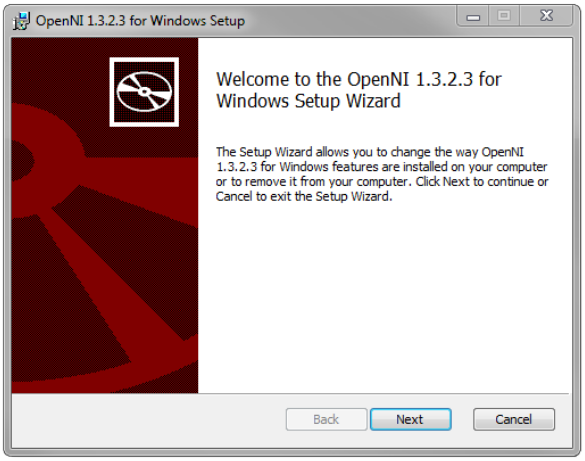

Figure 19. Installation Wizard

2. Likewise, double click on NITE-Win32-1.4.1.2-Dev.msi and follow the instructions.

3. Then, navigate to folder and double click on SensorKinect-Win-OpenSource32-5.0.3.4.msi and follow the wizard's instructions.

4. Lastly, navigate to avin2-SensorKinect-2d13967 > platform > Win32 > Driver folder and double click on dpinst-x86.exe, or dpinst-amd64.exe, only if required by the OS (see Figure 20). Then follow the instructions. In case of error on the hidden file "._psdrv3.inf" delete it from the "Driver" folder.

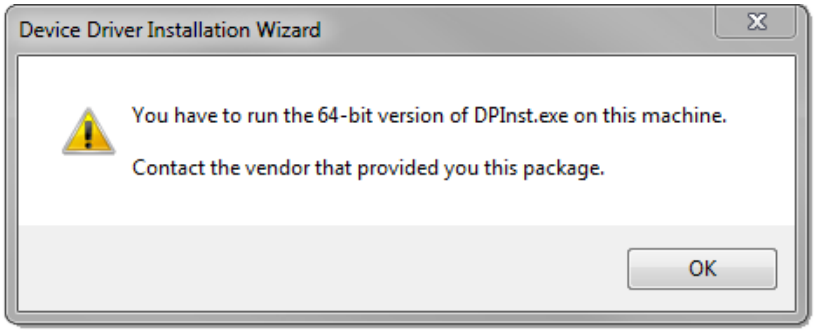

Figure 20. In case you have 64-bit OS.

5. Connect Microsoft Kinect camera for XBOX 360 in a usb 2.0 port. Wait until driver installation finishes and a green led will begin flashing on KINECT camera (see Figure 21).

Figure 21. Microsoft Kinect Camera for XBOX 360

6. Double click Uni_Paca_Girl.exe and follow the instructions to complete the installation (see Figure 22 and 23).

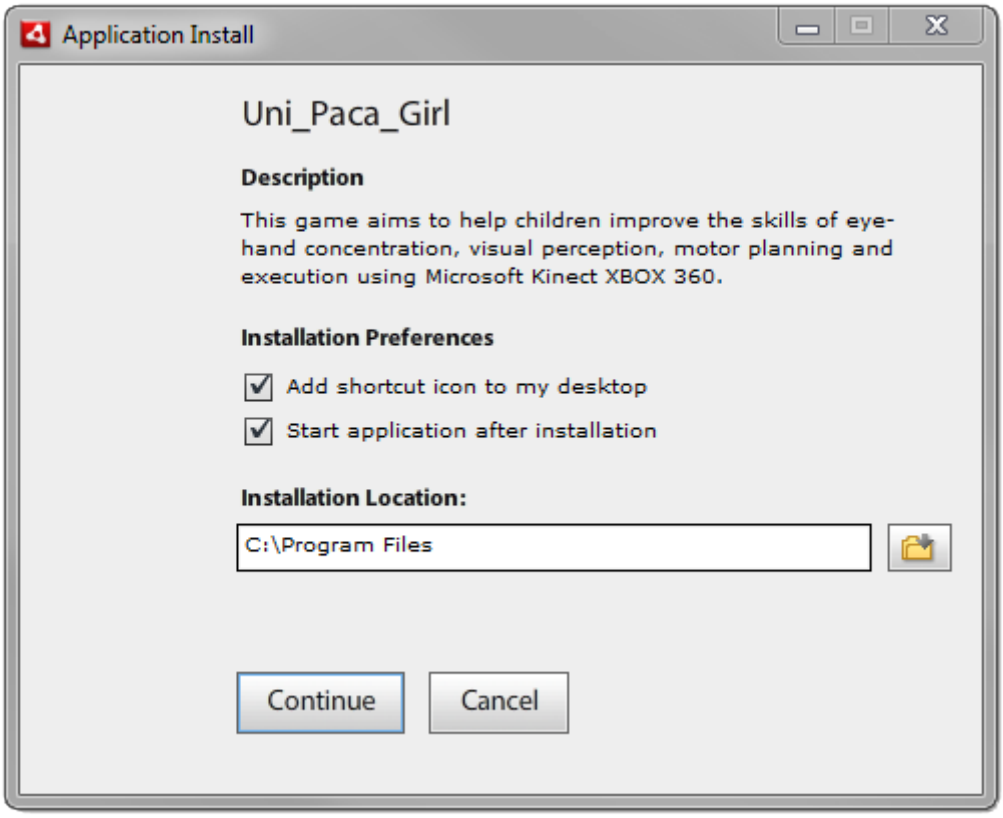

Figure 22. Uni_Paca_Girl Installation Wizard (1)

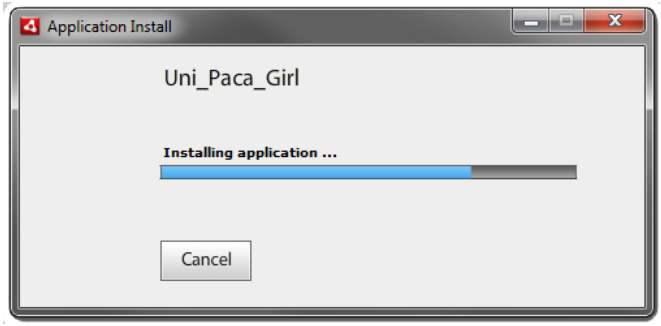

Figure 23. Uni_Paca_Girl Installation Wizard (2)