Drunken Ed - A Balance Game For Public Large Screen Displays

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Abstract
In this paper we present Drunken Ed, a balance game that was specifically designed for public displays. We show that this casual game is well suited for public context and that camera based body tracking offers suitable interaction techniques for large screen displays. This single player game has a very direct control mapping, which uses the orientation of the player's torso in relation to the ground to help Ed keep balance in a wobbling world. In addition we apply the simple gesture of raising a hand to the mouth to drink, to trigger a selection in the menu. This form of mapping has proven to be very intuitive and the game setting is widely accepted, despite its drunken protagonist.

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Drunken Ed, public display, large screen display, balance game, kinect, hci, interaction, gesture control Mandatory section to be included in your final version.

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H.5.m [TODO: Information interfaces and presentation (e.g., HCI)]: Miscellaneous. See: http://www.acm.org/about/class/1998/ for help using the ACM Classification system. Mandatory section to be included in your final version.

Introduction

The balance game Drunken Ed was developed with the goal of creating an application for public large screen displays, which could provide some sort of entertainment. Games are intrinsically motivating [5] [2], thus it is not required that the application fulfills any further useful purpose. By designing the game for a large screen display with vision based body tracking for the controls, Drunken Ed can be easily installed in a public area, such as a waiting room, where it serves to entertain, relieve boredom and shorten the wait. The gameplay of Drunken Ed can be briefly described as a single player game, with the mission to guide Ed home safely. Ed has had a couple of drinks too many, and dangerously staggers along the sidewalk. The player must lean left and right to help Ed keep balance and avoid dangerous obstacles such as passing cars when crossing a street, as depicted in [??]. To ensure suitability for public context, we attempted to fulfill the criteria of acceptability, accessibility, simplicity and flexibility as proposed by [1]. Acceptability was a strongly discussed aspect, since our protagonist Ed indulges in the pleasure of consuming alcohol, which causes him to stagger along the streets drunkenly. However we have found that this situation is widely accepted, specially among young people and not at all troubling. The questioned subjects responded that they could easily relate to this situation and described the experience of steering Ed as fun. Furthermore our game does not encourage people to drink, but points out the problematic consequences of drinking too much. Accessibilty is guaranteed by our physical setup with a large screen and visual tracking in a public space. The game can be played by anybody who approaches it, independent of sex or age. Merely the tracking capability of the Kinect sets a couple of limitations, such as inability to cope with occlusion and bad lighting situations. Simplicity is given by keeping the components of the game minimal and providing the user with a single main control mechanic - bending the upper body left and right in order to help Ed keep balance. The starting point of the game, is the minimalistic level selection menu displaying Ed in a pub shown in figure **??**. Here the player may experiment with the controls and make Ed stagger left and right by leaning. On the counter there are three different types of alcohol: Beer, Wine and Vodka. The player can make Ed drink one of these by positioning Ed accordingly and performing a drinking gesture. This component of choice entails a further motivation factor according to Malone [2]. Animations and hints inform the player about his options. Upon drinking, the game starts and Ed begins his unsteady way home. The difficulty of the selected level depends on the type of drink consumed - stronger alcohol makes it more difficult for Ed to keep balance. The difficulty further increases with time and distance traveled. A counter informs the player about his progress. Upon losing balance and falling down, a highscore list is shown and if the player has managed a top score, he can have his picture taken to be displayed on the list. Ed never actually reaches his home, thus this is purely an endurance game with the goal of getting as far as possible. We hereby allow players who approach in groups to compete with their friends for the best scores. [4]

Drunken Ed is a 2D balance game specifically designed for public displays. The player stands in front of a large display and is tracked by a Kinect. By bending his or her own upper body, the player steers a drunkyard called *Ed*. The goal of the game is to walk as far as possible without falling down. While the time passes, the difficulty increases contineously. So the player has to keep the

balance to not fall down, but at the same time, he or she has to hurry because it is getting harder and harder to increase the walked distance.

One key element of the visuals is the rotating camera: many balance games keep the world static while letting the player balance an object. In this game, the opposite is the case: it is the world around the figure, which needs to be balanced with respect to the upper body.

Mechanics

As long as no player stands in front of the screen, a bar is shown together with three blackboards containing the highscores. A hint invites the player to step onto the mark, which is located in front of the screen. When a player is detected, the main protagonist Edappears. The player can now get used to the controls, without having to worry about balancing yet. At the same time, the player chooses the difficulty, encoded as three different alcoholic drinks: beer, wine and wodka. By bending him or herself, the player can move Ed to the respective drink. The user confirms his or her choice by doing a drink gesture.

Afterwards, the main game starts. The player must make Ed walk as far as possible to the right. Ed does not walk in a controlled manner, but always follows his center of mass. This resembles a typical accentuated movement of a drunken person. The player bends his or her upper body to control Ed's upper body, which in turn shifts his center of mass. Ed gets faster, the more he bends. The core mechanic is the rotating world: The upper body of Ed has the same orientation as of the player with respect to the screen, but not with respect to the rotating world around Ed. Therefore, the player must compensate the world's rotation to not tumble, which happens as soon as the angle between the upper body and the floor gets too

narrow. Alternatively, Ed tumbles by getting to fast. The higher the difficulty, the faster and uncontrollable the world rotates, which makes it hard to hold the balance and move to the right at the same time.

Ed will eventually fall down. The game over overlay appears and the distance Ed walked until falling down is presented to the player. The distance is the score. If the player got a top three score, he or she can take a picture of him or herself to appear in the highscore list of the bar. The player does so by doing the drink gesture, in order that the picture captures him or her in a drinking posture. If the player does not want to take a picture, he or she has to wait for some seconds without doing anything or to leave the play area. Afterwards, the game restarts and the player gets back to the difficulty selection.

During gameplay, the arms of Ed play an important role: In the difficulty selection, the arms are controllable by the players arms. However, in the main game, resembling typical cartoony postures of drunkyards, the arms are saggy, pointing straight towards the floor. Firstly, this emphasizes the loss of physical control, because the players arm movements are ignored now. Furthermore, they contribute to the players orientation, because Ed's arms being aligned with the upper body mean a neutral posture without movement. When they are not aligned, the angle helps estimating the movement. In addition, the arms have an important feedback role: if Ed is getting too fast, they start to flail. If Ed is about to overbend, they start to swing. Players quickly understood those actions as alarming indicators.

Design

Since *Drunken Ed* is a public display game, it has to have several properties:

- It must be very easy to understand and to play. Therefore, the game is reduced to one main input (the upper body) and one simple goal (walking to the right).
- One game session must be quite short. The game and also public display games in general are targeting people, which are actually not planning to play. Therefore, they might not want to spent to much time with a game, that they started spontaneously. Furthermore, *Drunken Ed* is a single player game, so players have to take turns, which is easier with short game sessions.
- The narrative elements must be reduced to a minimum. There are no cutscenes, long texts etc. to tell the game's background. The animations, the players actions and keywords like "distance" give the game a humorous context.

Drunken Ed targets at the joy of failing, that is, letting Ed eventually tumble and fall asleep. Ed's tumbling is not implemented as an animation, but physics based, i.e. depending on Ed's locomotion and angular velocity. This means, that failing varies from player to player, since they can take Ed into individual, often awkward, sleeping postures. This also attempts to compensate the fact, that *Drunken Ed* is a single player game, because spectators can have fun seeing others fail.

Future work

The game is still under development. Right now, placeholder graphics are replaced and new obstacle elements are added to enhance the gameplay.

Design Process

Project Outline
After brainstorming we specified the project outline defining the setting of the installation, theme and main mechanics of the balance game and clarified the requirements. [picture of sketch] Furthermore we created a fictional persona for whom we designed the game.

Storyboarding and Interviews
In order to explore possible scenarios for the deployment of our game we created story boards [picture of story board]. With these we approached three potential users and conducted semi-structured interviews to enquire about the need of such a form of entertainment in the given situation and also clarify the desirability of a game such as Drunken Ed and the acceptability of its drinking context. From these interviews we learned that.. [TODO] At a later point we invited participants to take part in an online vote, to make sure that this controversial subject was truly well accepted. Here we offered the option of a balance game featuring [TODO: dishwasher, ed or ...?] A total of x people participated with a majority of votes for Drunken Ed.

Paper Prototype and User Study
Prior to implementation we performed user studies with a detailed paper prototype. Here we researched the comprehensibility of our menu, the users readiness to learn the controls and the need for hints and explanations. At this stage we made valuable observations on which we based our design decisions (TODO: eg?)

The Drinking Gesture
Expressive gesture explained by hints as proposed by Walter et al. [6] TODO

Heuristic Prototype Evaluation

After developing a first interactive prototype, we analyzed our game regarding Nielsens 10 Usability Heuristics [3] and added two further principles, which we deemed essential for a casual game in public context. Here we wish to explain our additional principles.

1. Motivation: All difficulty levels are available to play, so an advanced player does not need to stagger through all the easier stages first to reach a sufficiently challenging level. The highscores displayed above the level selection should provide the necessary motive to start another game and improve your score.

2. Learning curve (Additional Principle): A player can improve his performance and score, if he plays more often.

Changes were made according to the results of this evaluation, as to the visibility of system status by adding a countdown at level start and including a highscore list for motivation.

A think aloud study was performed with several users of varying expertise, which lead to further improvements of the game according to Nielsen's heuristics. Among others we discovered the necessity of additional hints with both animated text and icons to ensure the user is constantly aware of his options and implemented a warning to be desplayed when the user leaves the optimal tracking region for error prevention. [picture of users]

Implementation

We implemented body tracking with the Microsoft Kinect camera, using the OpenNI library.

Acknowledgements
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