Creation of Feasible Non-player Character

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Abstract: *Virtual players, also called non-player characters (NPCs), are an integral part of video games. NPCs develop the story of the game and create a critical mass of virtual players making the game more attractive, whether it is educational games or games just for fun. The creation of a virtual player goes through stages that gives plausible human behavior.*

Keywords: Serious games, virtual player, NPC, conversational agent

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1. INTRODUCTION

Most games have virtual player also known as non-player character or NPC for short. This NPCs are used for different purposes, such as quest giving, filling the environment with enemies, companions for carrying their items or a helper for supporting the player during the game.

We can find the following types of NPCs in games:

• Primitive: the virtual player corresponds to player's actions with monologue (simple phrases build in a simple agent)

• Simplified: the NPC is managed by code and has a complex dialog tree to communicate with players

• Intelligent: the NPC is using an artificial intellect to behave more like a human

As we mentioned beforehand there are several types of NPCs. We will look in few of them what they do and what is their purpose.

• Quest givers: usually this kind of NPC is used to give advancement for the main story line. They are usually found in cities or villages in the game, but not excluding other remote place as forests, caves or etc. When approached they may have a simple greeting for the players to draw their attention.

• Shopkeepers: These NPCs are used for the economy of the game. Usually, they sell or buy items, which players can use for crafting or to gain virtual in game currency.

• Guards: In multiplayer games, guards are used to protect low-level players from enemies or other higher-level players. They can usually be found in high-density populated places in game or guarding important places.
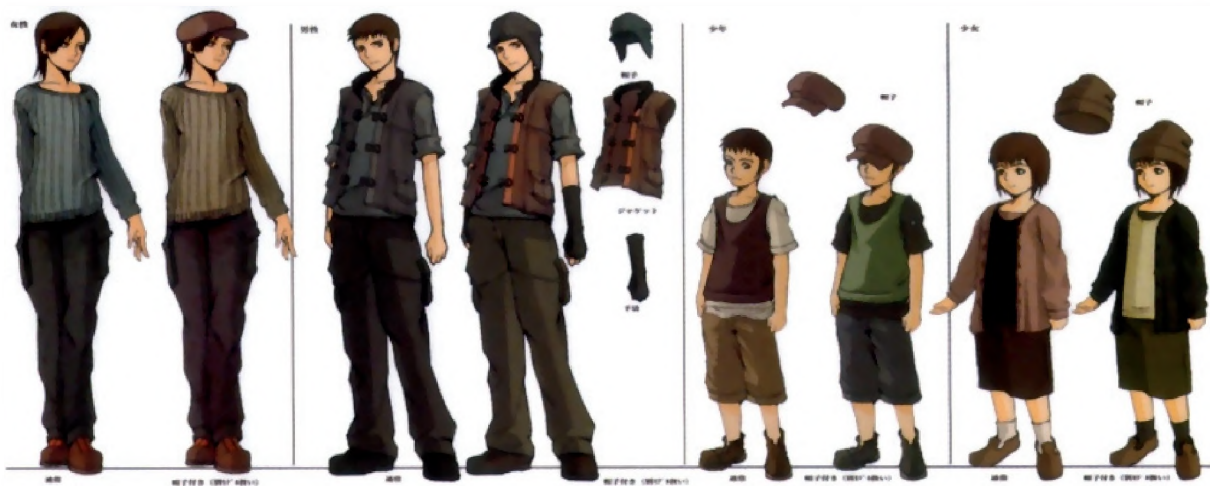
Figure 1. Avatar of NPC (How it is looks in a game)

• Companions: This kind of NPC is given to the player to help him in his journey through the game. One of the common uses of these NPC is to carry items for the player. Another purpose for them is to develop the main story to go forward. Sometimes players can obtain companions by doing a task for them in the form of a quest.

• Pets: Pets are NPCs more or like the Companion NPC. More unique purpose for them is to give information to the player for an enemy base by scouting it undetected. Most multiplayer games use pets for a reward by completing specific task or event.

• Guides: NPCs like this are used in big cities or villages in games to give directions to player for certain places or locations.

2. NON-PLAYER CHARACTERS IN SERIOUS GAMES

Serious games have a high potential for various applications, as they are suitable for different topics and age groups. For most of these games, learning is the main goal[1].

Virtual players in serious games are used as companions to give the player hints or help them with their task when needed. Other way the NPC can help the player is by showing them what they need to do in certain situation. Such an example is in the beginning of a game, to explain to the player what the controls are and how to play it, NPC is used to show him how to move the camera or his character in game, how to interact with objects how

Figure 2. Dialogue between NPC and Player (Dialogue)
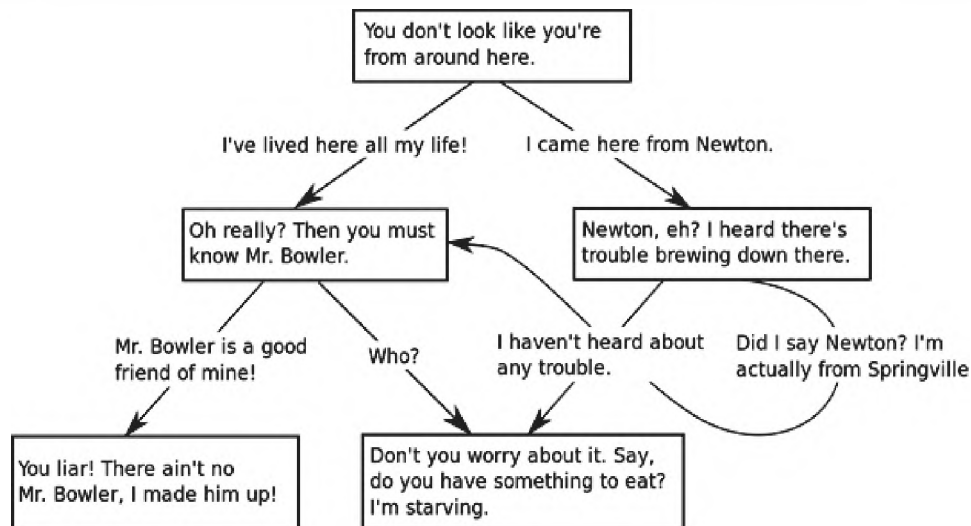
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[1] *Michael, Chen* 2006.

Figure 3. Example for a dialogue tree

to move them, etc. Usually, these kinds of NPC walk around the player or follow him closely performing random actions by interacting with the surrounding environment. This is done for the purpose of the NPC to look like it behaves more like a human.

Communication between the NPC and the player in serious games is done in several ways.

• Dialogue trees: usually they present an actual tree with options, which branches in different direction based on the player choice.

• Conversational agent: The player has the option to ask any kind of questions on which the NPC can find the answer using an intelligent conversational agent[2].

In addition, virtual players in serious games has the ability to be personalized depending on the preferences of the player. It can look different or can behave different based on the performance and emotions of players.

3. RESEARCH METHODOLOGY

The research question of this study is to create a *feasible non-player character*. The work methodology reflects practical problems in the process of creating a non-player character in educational video game. It includes planning, developing and integrating the NPC and its modules into educational video game[3].

Creating character model, communication dialogs, walking behavior using pathfinding and communication agent in the educational 3D video game with historical content dedicated to the life and work of Valchan Voivoda:

• Creating the 3D model, which will represent the NPC in the video game.

• Collecting and creating the dialog and text for communication with the player in the game.

• Developing a pathfinding pattern for the NPC.

• Creating and integrating a conversation agent.

• Integrating the NPC in the educational game Valchan Voivoda.

4. NPC design

NPC Models: When designing the NPC we provided several models, which can be chosen at the start of the game. Each player can choose between the implemented models depending on his/ her preference. The models were created using Maya and Photoshop. Other models are selected from already made assets from the online store of Unity.

Dialogue text: A module of the conversation agent uses predefined text, which is stored in XML format in the video game. Those texts are collected from real facts and information about Valchan Voivoda. There will be predefined questions about these texts, which the player can use to communicate with the NPC.

Pathfinding: For the walking behavior, we use integrated tools from Unity. They use predefined points in the game environment, which the NPC can chose at random for it to walk between them[4]. The points are positioned in front of the boards containing the information (Each room in the maze contains such boards).

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[2] *Vishnoi* 2020.
[3] *Bontchev et al.* 2019: 491-498.
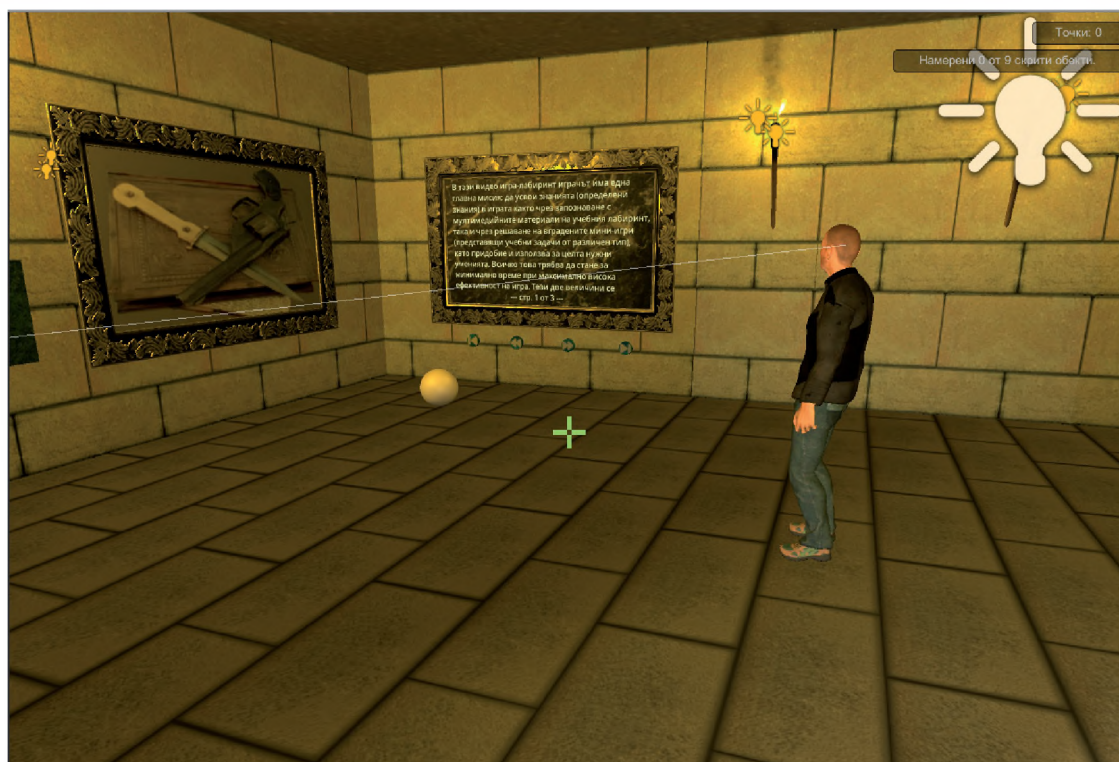[4] *Unity Technologies* 2019.

Figure 4. NPC in the educational maze game 'Valchan Voivoda'

Conversation agent: Module of the game allowing conversation between the NPC and the player using one or more ways of communication: text, speech, graphics, gestures, etc. The typical cycle of activity in a dialogue system contains the following phases:

• The user speaks and the input is converted to plain text.

• A natural language comprehension program analyzes the text.

• Semantic information is analyzed, preserving the history and state of the dialogue.

• A dialog manager connects to one or more task managers who have knowledge in the field.

• A dialog manager produces a text output.

• Finally, the output is displayed using an output render.

The real player (client) asks a question to the virtual player (NPC). The conversational agent returns an answer to the real player's question through the virtual player. The communication between the real player and the talking agent is carried out via HTTP protocol (WEB based service)[5]. The answer can be derived from a pre-prepared context of the question in text format, which in turn allows the content to be changed. If the context of the question is not used in the communication with the conversational agent, the answer to the question asked by the client will be extracted from another source, which is web-based (example of such a source: www.wikipedia.org)
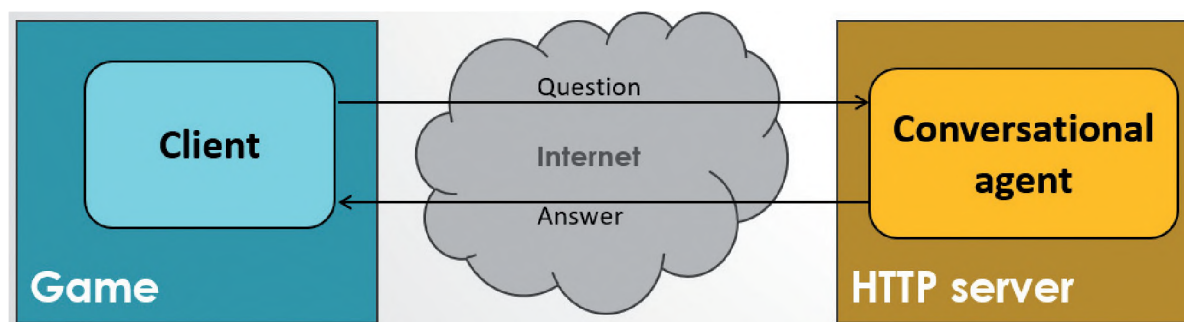

Figure 5. Conversational agent

[5] *Vishnoi* 2020.

Figure 6. NPC coming to player

5. CONCLUSION

Virtual players make serious games more exciting and useful for learners – thanks to their help, the real player has increased interest, commitment and motivation to learn better. The project for a video game dedicated to Valchan Voivoda provided for the creation of only simplified virtual players. Thanks to the talking agent, virtual players will be intelligent – they will be able to meaningfully answer random questions from the real

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Създаване на правдоподобен виртуален играч

Иван Найденов и Илко Адамов

Виртуалните играчи, наричани още non-player characters (NPCs) са неразделна част от видеоигрите, те развиват сюжета на играта и създават критична маса от играчи, правейки играта по-привлекателна, независимо от това дали е сериозна, или игра само за забавление. Създаването на един виртуален играч минава през етапи, които придават достоверност в поведението му.