

---

# Artificial teacher

---

Alex Ivanov Tsvetanov  
*High School of Mathematics*  
*Sofia, Bulgaria*

UNDER THE DIRECTION OF  
ASSOC. PROF. ZLATOGOR MINCHEV  
&  
ASSIST. PROF. EMIL KELEVEDJIEV



SUMMER RESEARCH SCHOOL, 2017  
Blagoevgrad, Bulgaria

# Contents

<b>1</b>	<b>Introduction</b>	<b>4</b>
<b>2</b>	<b>Implementation</b>	<b>5</b>
2.1	Problems . . . . .	6
2.1.1	Application Programming Interface . . . . .	6
2.1.2	Design . . . . .	6
2.1.3	Communication . . . . .	6
<b>3</b>	<b>Techniques</b>	<b>6</b>
<b>4</b>	<b>Future</b>	<b>7</b>
<b>5</b>	<b>Acknowledgments</b>	<b>8</b>

## Abstract

In fact there are a lot of built-in learning management systems, but there are not any system that combines the newest technologies in education - there are not any system that uses artificial intelligence and virtual reality at once.

The core aim of our project is to create a system that combines these techniques and to build "artificial teacher" that combines best practices in organizing training so that it will be interesting, useful and much easier for the students. The most important part of our project is to fertilize students, showing them that their subjects is not as difficult as sound.

Teacher will train students with different types of exercises which will include theoretical part, but will mostly be oriented practically.



# 1 Introduction

## "Learning management system"

It is a software application for the administration, documentation, tracking, reporting and delivery of educational courses or training programs.

---

Wikipedia

## "Artificial teacher"

It is a system that must teach students by interactive, interesting, useful and much easier way for them. It can be represented as "individual mentor" in specific subject.

There are a lot of built-in learning management systems, but there are not any system that combines artificial intelligence and virtual reality at once.

The aim of our project is to create system that to build "artificial teacher" by following newest technologies and best practices in organizing training so that it will be interactive, interesting, useful and much easier for the students. The most important part of our project is to fertilize students, showing them that their subjects is not as difficult as sound.

Teacher will train student by lessons and different types of exercises which will include theoretical part, but will mostly be oriented practically.

## 2 Implementation

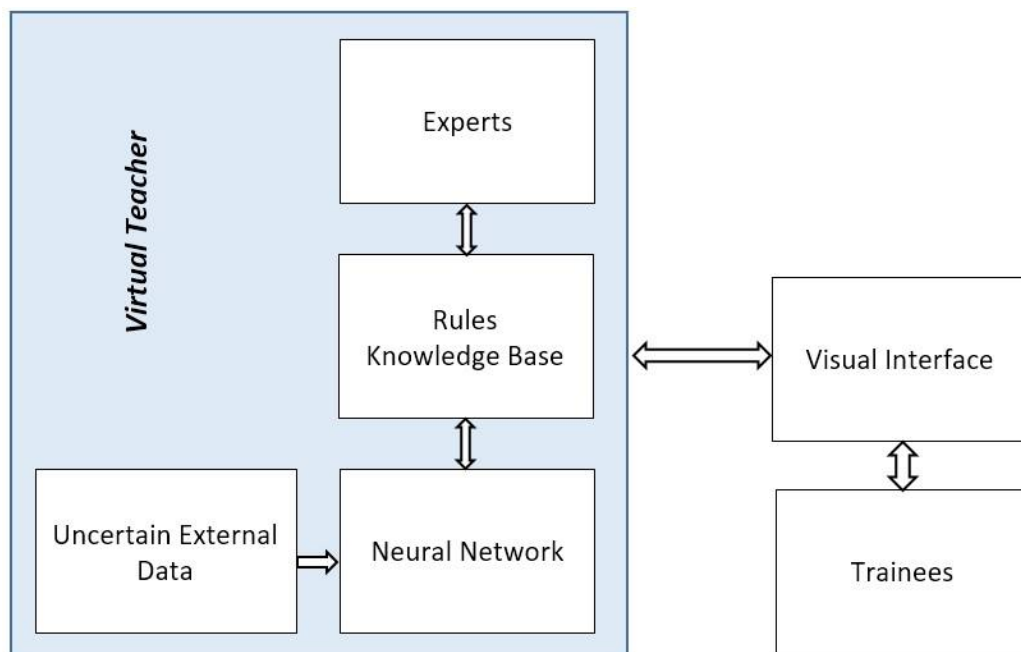
The project is divided into three parts:

appearance Design, which must implement human facial expressions for better and realistic interactive communication.

intelligence Application Programming Interface that must return material which must be learnt by student

This interface uses data base to make information which will be used to build knowledge base where data base is simple data about how students visit resources and knowledge base is system of logical conditions.

communication Live bot chat for all questions during the lesson that "artificial teacher" presents.



Each part has a lot of specifics and the project is quite challenging, but it would give a different, modern outlook to the future learning process.

## **2.1 Problems**

### **2.1.1 Application Programming Interface**

The most important thing, when you develop artificial intelligence by Neural Networks, is that you must have enough information, which is performed as systematic organized data, that you will use as material for building knowledge base.

The current training data is only sample data but is enough for start.

### **2.1.2 Design**

The design is not ready yet, because it costs a lot of time until we design 3D object and until we implement all human facial expressions.

### **2.1.3 Communication**

The biggest problem in this part of the project is how to understand what the student want to know. It will be solved by "machine learning" where the data will be conversations between real students and teachers.

## **3 Techniques**

- C++ for AI in combination → FastCGI++ for the API
- WebGL for rendering the 3D model of the teacher
- MakeHuman for building the 3D model of the teacher

## 4 Future

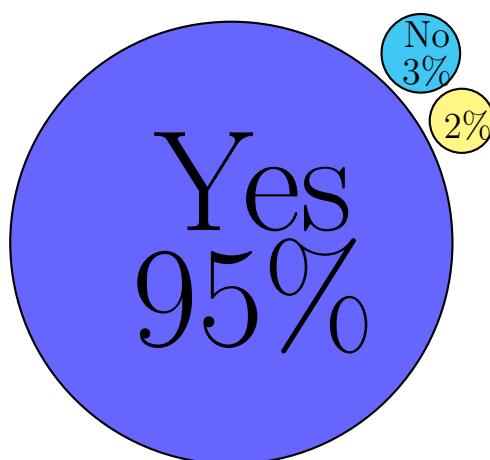


Future development includes building a 3D model of the teacher and developing of the facial human expressions together with psychologists. It includes also improving "intelligence" of the teacher and applying the technology in school starting from Sofia Professional High School of Electronics "John Atanasov" and Sofia High School of Mathematics "Paisii Hilendarski".

### Survey questions

1. Do you support building an online learning system and using it in school?

The diagram shows the results of non-representative survey conducted among 55 students of SHSM:



So those results stimulate us to make it better and better and to make it make more interesting, more interactive and more entertaining.

## 5 Acknowledgments

Special thanks to:

- Zlatogor Minchev for the improvement of the idea
- Emil Kelevejiev for helping during the development of the application
- Alexander Targov for the improvement of the documentation

Thanks also to:

- High School Students Institute of Mathematics and Informatics
- Bulgarian Academy of Sciences
- Sofia High School of Mathematics

## References

- [1] *Artificial Intelligence: A Modern Approach*, 3rd Edition, Prentice Hall, 2010.  
Stuart Russell & Peter Norvig.
- [2] *Virtual objects seem totally real.*  
<https://www.theverge.com/2017/8/1/16070188/avegant-light-field-display-ar-headset-next-level-video>.



- [3] *Amelia*. <http://www.ipsoft.com/amelia/>.
- [4] *The Future Of Chatbots And Artificial Intelligence*.  
<https://www.lifehacker.com.au/2016/05/meet-viv-the-future-of-chatbots-and-artificial-intelligence/>.
- [5] *Your DNA Avatar - What Happens When Artificial Intelligence Meets Cutting-Edge Genetics?*.  
<https://www.wilsoncenter.org/blog-post/your-dna-avatar-what-happens-when-artificial-intelligence-meets-cutting-edge-genetics>.
- [6] *MariaDB++*. <https://mariadb.org/>.
- [7] *GNU Compiler Collection*. <https://gcc.gnu.org/>.  
Copyright © 2009 Free Software Foundation, Inc.
- [8] *MariaDB*. <https://mariadb.org/>.  
Copyright © 2017 MariaDB Foundation
- [9] *MariaDB++*. <https://mariadb.org/>.  
Copyright © 2017 MariaDB Foundation
- [10] *LaTeX*. <https://www.latex-project.org/>.