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Project on the first phases of User-Centered Interactive Systems Design methodology and prototype design.

**Teaching and interactive assistive elements with augmented reality.**

1. The idea:

When comes to teacher needs, in order to analyze and demonstrate a mechanical, electrical or any other structure, the most preferable way is to show all the main parts that system consists of and analyze their properties braking apart the structure or virtually present each part over a screen. The problem that arises, is that students are not familiar with the whole system or structure and it’s hard for them to understand and realize how all parts coexist and counteract.

A possible solution could be an assistive presentation of that system’s assembly with the help of augmented reality, so the teacher shall show both units and parts of a system together with the system assembly in a real time manner. Thus, students shall be able to realize the system straightforwardly and avoid misconceptions.

1. Ideas from users in relation to the proposed system.

So far, a lot of work has been done from the 3D design sector presenting expensive educational solutions with 3d models and animations included in a proprietary presentation software. e.g.

Web AR

<https://en.wikipedia.org/wiki/Augmented_web>

<https://ar-link.net/ar-demos/rims/>

<https://www.whatiswebar.com/>

<https://createwebxr.com/webAR.html>

<https://www.banuba.com/blog/best-web-ar-platforms-and-tools>

<https://gravityjack.com/news/webar-handbook/>

<https://www.8thwall.com/discover/automotive>

<https://rockpaperreality.com/web-ar/how-does-web-based-augmented-reality-work/>

AR links & trends

<https://mobidev.biz/blog/augmented-reality-trends-future-ar-technologies>

<https://library.harvard.edu/services-tools/teaching-and-learning-3d-content>

<https://www.educause.edu/ecar/research-publications/learning-in-three-dimensions-report-on-the-educause-hp-campus-of-the-future-project/pedagogical-uses-of-3d-tech>

<https://www.iste.org/explore/Computer-Science/Harness-the-power-of-3D-models-in-the-classroom>

<https://medium.com/@ImaginusVR/why-3d-models-are-great-for-education-692b2f9c03ab>

<https://www.emerald.com/insight/content/doi/10.1108/JARHE-06-2020-0172/full/html>

<https://blogs.oregonstate.edu/inspire/2018/08/15/5-ways-3d-models-can-help-in-education/>

<https://www.researchgate.net/publication/295264063_Using_3D_Modeling_Techniques_to_Enhance_Teaching_of_Difficult_Anatomical_Concepts>

[HTML Image Maps (w3schools.com)](https://www.w3schools.com/html/html_images_imagemap.asp)

AR/VR (XR) solutions

<https://semcon.com/>

<https://semcon.com/offerings/training-solutions/authoring-tools/>

<https://www.arvizio.io/>

<https://program-ace.com/blog/augmented-reality-sdk/>

<https://www.inglobetechnologies.com/ar-media>

<https://www.youtube.com/watch?v=1t1gBVykneA> magic window 2d

<https://aframe.io/>

<https://developers.google.com/web/updates/2018/06/ar-for-the-web>

questionnaire to be given to typical users: [todo]

1. The basics of design. [todo]
   * Hardware:
     + Public: Hosting services (e.g., Hostinger, Amazon AWS)
     + Testing – Private: Localhost
   * Software:
     + Angular.js
     + Three.js (library for 3D rendering) \*\*Too complicated for now\*\*
     + JavaScript
     + HTML, CSS
   * Input/Output devices:
     + Desktop: mouse (left-click, hover, scroll)
     + Mobile: touch
   * Technical Restrictions:
     + Mobile: no hover

WIMP (Windows, Icons, Menus, Pointers) interface. The structure of the website should be as follows:

* + File
    - Open
    - Save
    - Close
    - Exit
  + Edit
    - Preferences {}
  + View (Navigation Bar)
    - Tools {}
    - Nav tools {Zoom, Tilt, Pan, Reset}
  + Learn { Learning Tab Content
    - Learning Area: When selecting a system from the drop-down menu, the learning area updates with the current system. The user can interact with the system (zoom in, zoom out, rotate, etc.) and can click in certain points of interests which are indicated with a special icon. When clicking to those points the user can read more about that component from a small pop-up dialog.
    - Side-bar: The side-bar provides in a list form the different components of the current system that is displayed in the learning area. When the user clicks in a component, the corresponding pop-up dialog appears in the learning area.

}

* + Test { Testing Tab Content
    - Testing Area: Displays the test for the selected car system. The system contains blank boxes where you drag and drop the name of the specific component

}

* + - Language options (Greek, English)
  + Car Systems
    - Drop-down menu with the different car systems (break system, engine, gear system, etc.).
    - Select student’s level (primary school, high school, university level)
      * Based on the selected level the info texts for the components change accordingly.
  + Help
    - About

1. User Requirements Specification. [todo]

* Personas: [todo] (student of Cyprus technical school)
* Scenarios: [todo] (Learning task through navigation \*)
* User’s Requirements:
  + Learn through an interactive process.
    - Fast responses when navigating between components
  + Different language needs to be used for explaining the systems’ components based on the student’s level.
  + No personal data are provided by the user.
  + No login or signup process.
  + Ability to Navigate back to start page/ previous page.
  + [todo]

1. Prototype Design & Evaluation. [todo]
2. Experiences. [todo]