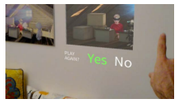
Miloš Paripović

M.A. of Digital Arts /miloʃ pʌripovitʃ/

+1 347 421 9836
milos@milosparipovic.com

Selected Projects



AR / MR / VR
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bitCommander
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EverydayRAVictories
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Museum VR
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3D Scanner
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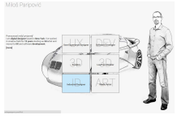

Portfolio Site
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Summary

Cross-disciplinary designer with over 15 years of professional work experience in the creative industry. Worked as a 3D Artist and Designer since 1999, before gradually changing profession to UX Design and Software development in 2007, and finally merging gathered knowledge into the all-encompassing fields of AR/MR/VR.

Professional Experience

Systems Administrator in computer art — 09/2012 - Present

School of Visual Arts, MFA Computer Art, New York City

- Running workshops on AR/MR/VR and helping students with their HoloLens, HTC Vive, Oculus Rift, 360° video, and AR video see-through Vuforia projects
- Managing state of the art computer lab – VR/MR equipment, licensing servers, AD, 30 Windows 3D workstations, 4K editing equipment, 3D scanners, 3D printers, motion capture system, and 50-node render farm
- Built an internal community platform and several desktop programs for the department needs

Contract Work — 2007 - 2014

- Created UX of a small social network and worked on interaction design of several apps - *24 Seven Inc., NYC*
- Redesigned and improved UX for an interactive VR museum visit application - *KHM*, Schatzkammer, *Austria*
- Modeled 3D environments of Gallery Borghese (*Rome, Italy*), Unity VR Application - *Interactive Visit GmbH, Germany*
- Created VRML application – interactive walkthrough; application, 3D modeling (30%) and UV - *Novartis Pharma GmbH*
- 3D Sculpted cca. 30 heads of popular TV personalities in ZBrush for collectible toy series production - *Funko Inc., WA*
- Decreased production cost by building in-house tools (C#) to simplify and streamline specific manual 3d modeling tasks
- 3D Architectural Visualization and managing team of artists, architects, and designers (multiple companies)
- Designed for web, print, and interactive multimedia DVD presentations – Kliker Media (Founder)

UX Designer / Project Manager / Software Developer / Founder — 10/2007 - 12/2010

Idea 8, Novi Sad, Serbia

- Complete R&D of a custom modular laser 3D scanning system for museum applications

3d Modeler and UV/Texture Artist — 03/2007 - 10/2007

a:xperience GmbH and Artifex GmbH, Vienna, Austria

- Created over 100 highly optimized complete 3D models of museum artifacts for Virtual Reality tour application
- Modeling low-poly 3D human anatomy from photo references for interactive DVD presentation of “Body worlds”

Education

Digital Arts (Magister Artium - Mediengestaltung/Digitale Kunst) — 2003 - 2007

University for Applied Arts, Vienna, Austria

(VR) Thesis on human perception and interactivity in virtual 3D environments — Graduated January 2010

Graphic Engineering and Design — 2001 - 2003

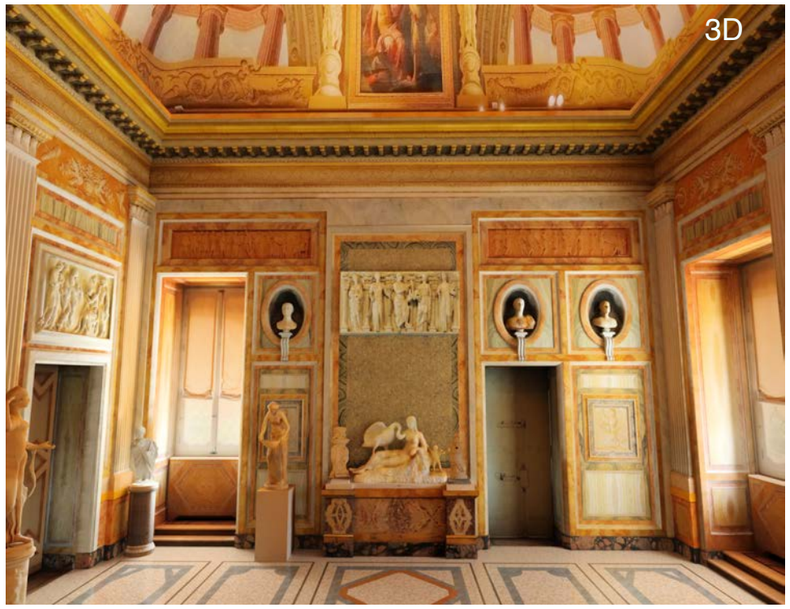
Faculty of Technical Sciences, University of Novi Sad, Serbia

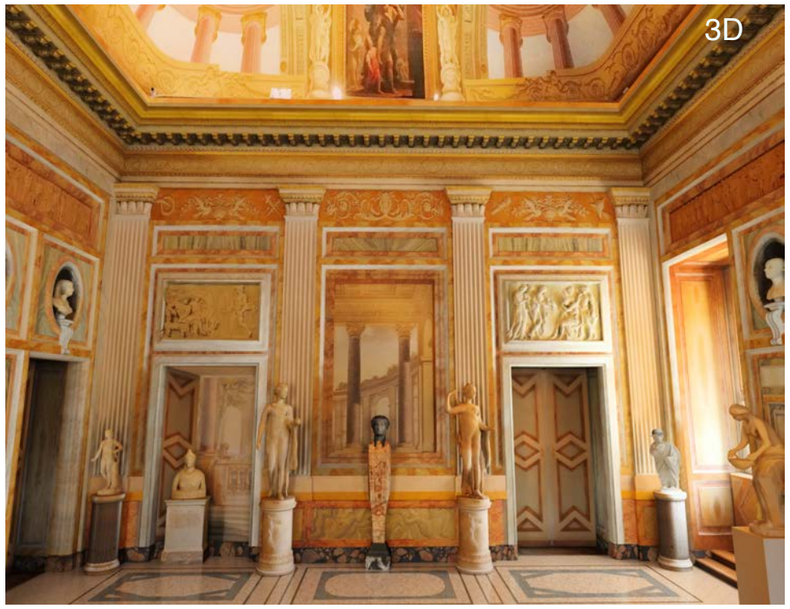
AR / MR / VR

Working on VR applications since 2003; started with VRML architectural walk-through applications, and since then created numerous 3D objects and a few environments for Virtual Reality application, mostly in cultural heritage space.

Environment 3D modeling for VR

3D modeled and textured from photos



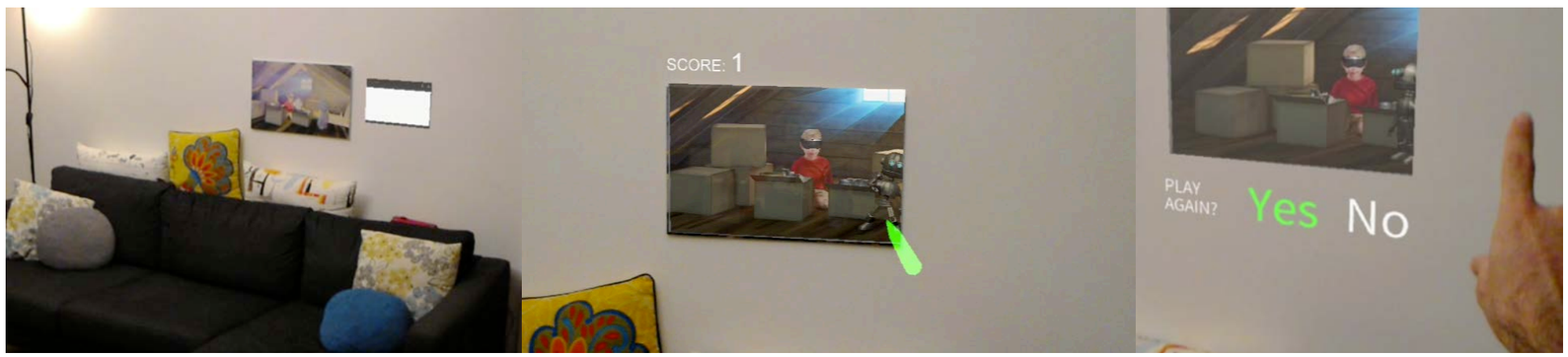


Low-Poly 3D Modeling for VR

3D modeled and textured over 100 museum artifacts and other objects

Running Workshops on AR / MR / VR

at School of Visual Arts, NYC
Helping students with their conceptual and technical challenges with 3D, HoloLens, Vive, Rift, and video see-through AR Vuforia projects



Future Boy HoloLens App
Using HoloLens to interact with a physical print (Vuforia)
Video: https://youtu.be/A5Nryjd4RoU

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Museum VR Application

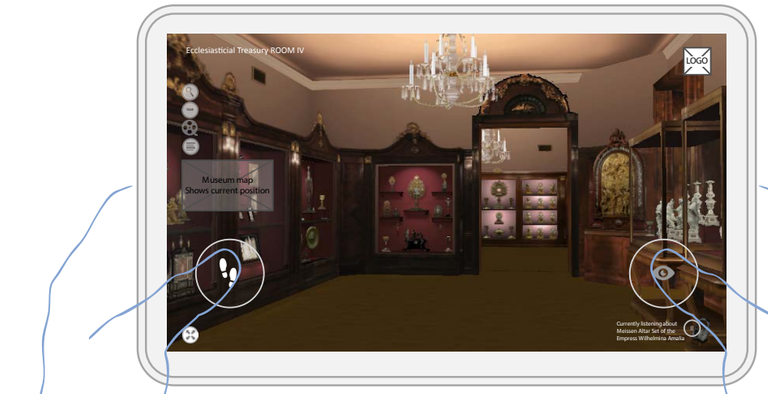
2011

Museum of Treasury / Schatzkammer - Vienna, AT

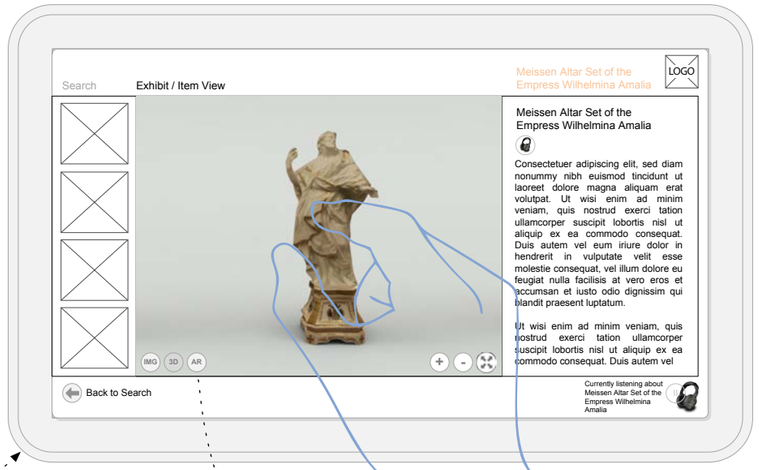
- Optimized and **unified user experience** across different platforms: Tablets, PCs running Windows and OS
- **Reduce amount of work** for the developers by reusing most of the existing controls in an improved thumb-reachable layout
- Made it **more immersive** and game-like with a goal to invite younger audience to take interest in art

Development team behind the interactive VR tour software, a:experience GmbH, had to make many UX compromises because of the deadline for DVD release. I was working as contractor remotely at the time, managing team of 3d modelers.

After a small user testing session I offered to redesign the experience and also make it compatible with the emerging tablet market.

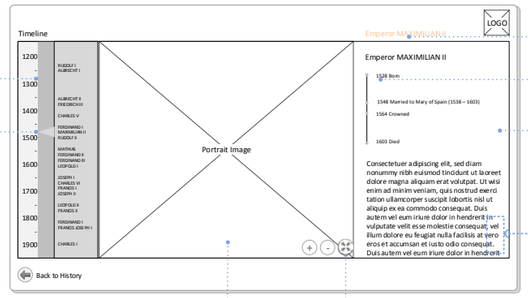


Item View Modes



3D View

Timeline



Interface to represent emperors in the timeline

Moving the arrow, user selects year/emperor
- Tapping the emperor name is also possible

If the panel is scrolled, the emperor's name stays visible fixed over the panel

Timeline which represents significant years in the emperor's life

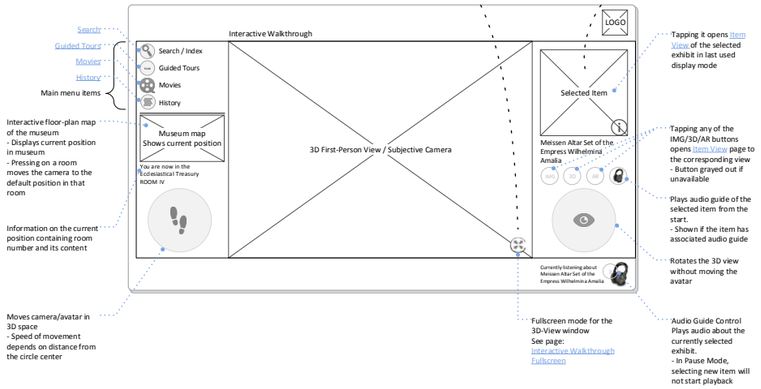
Full panel scrollable with finger motion
- If using computer mouse, Scroll Control is shown on hover, in the bottom-right corner
- Scrollable with mousewheel

Scroll Control

Portrait of the selected emperor
Panning image through dragging motion
- Zoom with pinch gesture or using buttons

Fullscreen

Interactive Walkthrough



Interactive floor-plan map of the museum
- Displays current position in museum
- Pressing on a room moves the camera to the default position in that room

Information on the current position containing room number and its content

Moves camera/avatar in 3D space
- Speed of movement depends on distance from the circle center

Tapping it opens Item View of the selected exhibit in last used display mode

Tapping any of the IMG/3D/AR buttons opens Item View page to the corresponding view
- Button grayed out if unavailable

Plays audio guide of the selected item from the start.
- Shown if the item has associated audio guide

Rotates the 3D view without moving the avatar

Fullscreen mode for the 3D-View window
See page:
Interactive Walkthrough Fullscreen

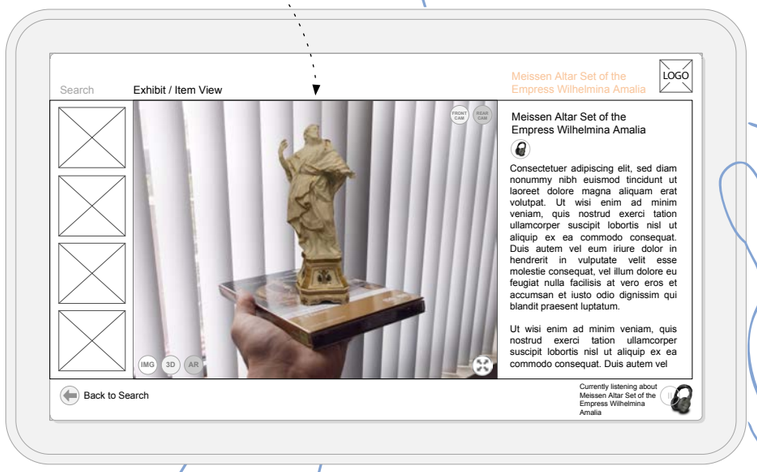
Audio Guide Control
Plays audio about the currently selected exhibit.
- In Pause Mode, selecting new item will not start playback

Thumb-controls are displayed on tablets, while desktop users can use arrow-keys + mouse for navigation, as in a FPS game.

Double-tap on an artifact/window bring the user's avatar in front of it.

Users inexperienced with FPS game-controls have guided tours with animated camera for easy navigation.

Designed the interface for 16:9 screens which scales to fit device width. Height proportionally scales on other screen aspect ratios, while the background graphics fit the entire screen.

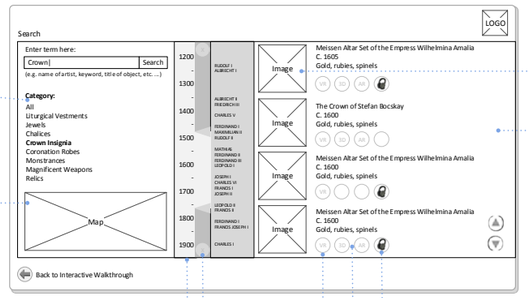


Augmented Reality View

Augmented Reality (AR) view of the selected museum artifact enables new level of immersion for the user. The software overlays virtual imagery on the real world object.
- Uses original Schatzkammer DVD box for 3D tracking reference
- Three-dimensional virtual object appears standing on a DVD box
- 3D Position of the DVD box is tracked in real-time.

If using a tablet, user can choose between front or rear camera.

Search



Filtering search result by category
- Default: All
- If Search Term is empty, all exhibits are filtered by Category

Rooms containing searched and filtered exhibits are marked on museum floor-plan map
- Clicking on a room, further filters the results

Thumbnail of the exhibit
- Tapping opens Item View in Image mode

Search results
- Scrollable with finger motion
- If using computer mouse, Scroll Control is shown on hover, in the bottom-right corner
- Scrollable with mousewheel

Filtering search results by period

Tapping X expands ranges to full

If exhibit contains audio guide, icon will be shown
- Tapping opens Item View and starts playback

If exhibit is modeled in 3D, both "3D" and "AR" icons will be shown
- Tapping opens Item View in corresponding mode

If exhibit is available in Interactive Walkthrough, the icon will be shown
- Tapping opens Interactive Walkthrough and navigates to the item

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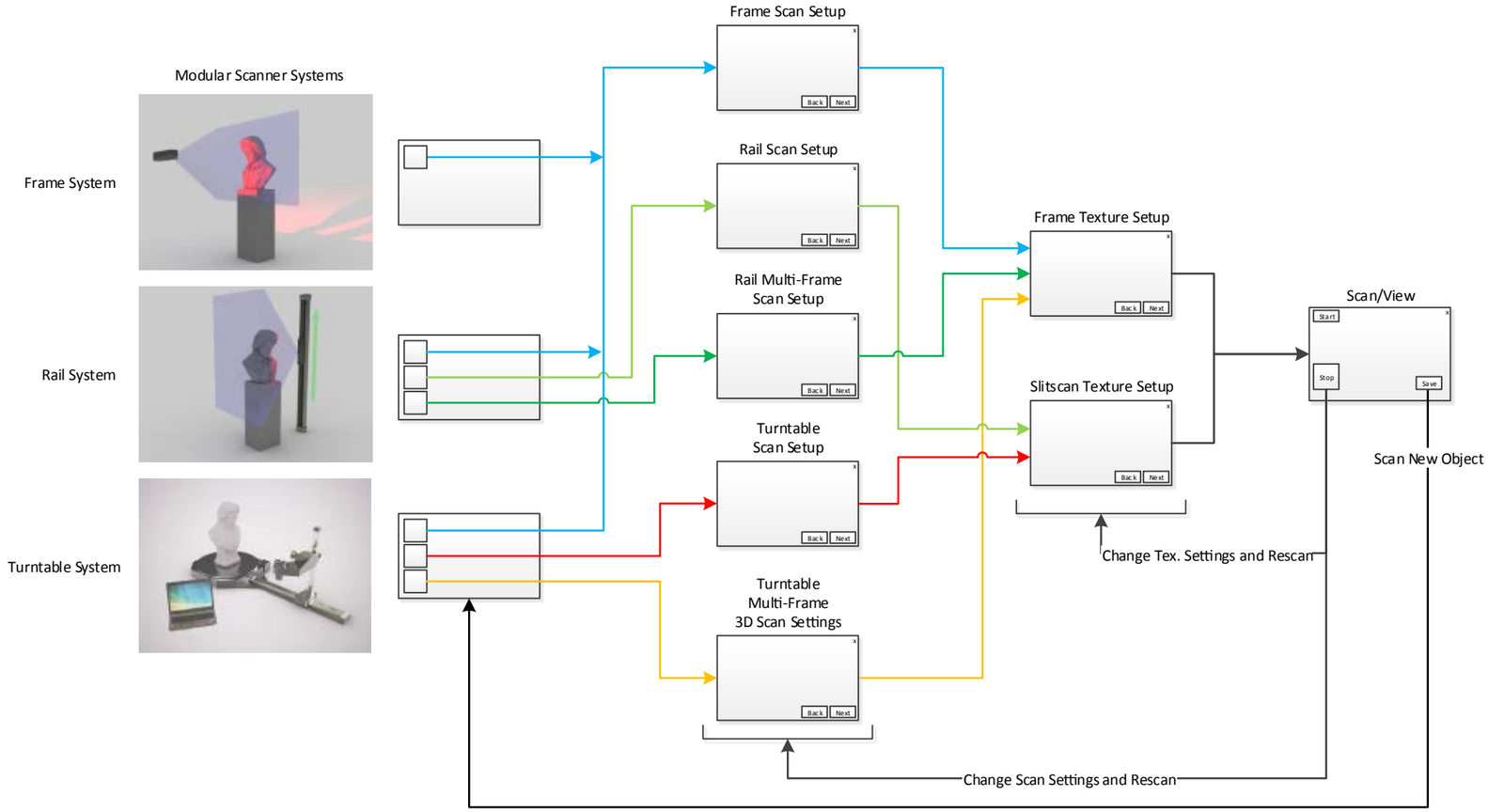
Laser 3D Scanner

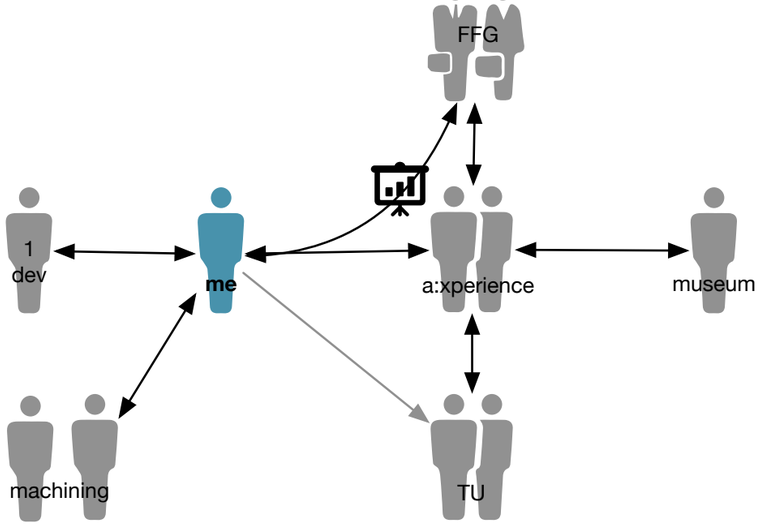
1/3

2007 - 2011

Responsibilities

- Project Management
- User Experience Design
- Hardware Design
- Software Development (C++, OpenGL) - Wrote 90% of code
- Industrial Design





After several years of manually 3d modeling museum artifacts using photographs for purpose of making **Virtual Reality tours**, I have suggested to the company that contracted me for that task to switch to 3D scanning. But, the 3d scanners on the market in **2007** were expensive, and our research showed that they were not suitable for museum usage because of their many **disadvantages**: high device price, unsatisfactory scan resolution, inability to acquire color information, low speed, inability to scan through safety glass in which some exhibits were enclosed, usage of visible light, or even requiring placing sticky markers on priceless museum artifacts.

In my spare time I have built a simple **prototype** with **off-the-shelf** components and by demonstrating it convinced the company to **finance R&D** for custom in-house 3D scanning solution. After we had agreed upon the specifications required to overcome these limitations, they had contracted me to build a 3d scanner to simplify our work of producing quality 3d objects for creating VR museum tours in real-time engines (Panda3D).

Because museum artifacts sizes range from a few centimeters to several meters, had various material properties or are immovable or hardly reachable, my proposal was to make a **modular 3d scanning system** that would consist of a **single scanning head** and multiple railing and turntable systems extending its range of operation to adapt to all situations.

We were not supposed to use structured light scanning or any other visible light method, so the idea was to scan using simple infrared **laser triangulation** with high resolution camera. For the next prototype I used a 650nm 5mW laser that was supposed to be replaced with infrared laser in the final version.

System was intended for in-house operation of scanning museum exhibits to produce textured low-poly 3d objects suitable for real-time rendering, but soon after the idea was pitched and the first prototype demonstrated, several museums became interested in the device and business plan was changed. Project **received funding** from Austrian research society (FFG) and Technical University was included in testing.

New scanner had to be fully functional and low maintenance device, affordable and simple to use, so that museums could get one of their own for archiving, curating and restoration purposes, while we would get our low-poly objects for building VR tours.

Device housing had to be also redesigned for easier production, service and marketing purposes. After a few hand built prototypes I came with a design that was easy to produce in ABS plastic using vacuum-forming over CNC machined tool.

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Laser 3D Scanner

Desktop Scanning Software

2/3

- Designed complete UX
- Developed in Visual Studio, C++, MFC, OpenGL; 90% of code
- IC Imaging Control SDK interfacing CCD Camera
- Interfacing Arduino microcontroller in the 3D Scanner via USB

During the next several months of iterating and several hundreds of test scans, I have managed to make scanning workflow linear and to separate it into **4 distinctive steps**. The workflow and the user interface had to be simplified so that the museum personnel could learn it quickly and use it without much effort. I have determined that **Wizard** was best UI type for such complex process. Similar elements got **persistent position** between wizard steps to make the process less intimidating by reusing user's knowledge gained in a previous step.

Step 1 is start of the wizard where the scanner operator deals with **physical world**. The scanner operator makes decision on the best method for scanning a particular object in given conditions.

Step 2 is used for setting up the **3d data acquisition**. UI is separated into **3 main panels/sections** to further atomize steps. Left section takes half of the screen and features real-time preview window showing processed frame. It is on the edge of the screen, so the operator can simultaneously see the preview and the scanner itself over the left edge of the laptop screen. Middle section is the same for all scanning types and modes. It shows relevant histograms, camera and laser controls, and 3d processing settings. All changes immediately reflect in the preview window. Section on the right and is different depending on a scanning module connected. It allows the user to select scanning method and adjust attached module's settings.

Step 3 is used for setting **texture acquisition,** and it has similar layout to Step 2. Left section also has a preview window, but it shows live color preview from the camera. Middle section has similar layout as in the step two, with the difference of having color histograms and additional camera controls. Instead of 3D processing settings it shows texture acquisition settings. Section on the right has only a few controls from the Step 2, but it only allows controlling the attached module within the bounds set in the previous step.

Step 4 is the actual **scanning** process. Preview panel takes ¾ of the screen and has multiple view modes so that the operator can check 3d quality in real-time. Operator can use the scanning time to enter cataloging details of the object being scanned. Operator has multiple ways to stop the scanning process: Stop button is very large so it can be easily hit with a mouse; Esc is most accessible key on the keyboard and it can be also used for stopping the scanning process. In addition, operator can hit emergency stop pushbutton on the scanning module itself.

3.1.2.5 Turntable Multi-Frame 3D Scan Settings Window

1 Camera Feed View
- Zoom with Scroll-Wheel around mouse cursor or +/- buttons
- Pan with LMB+Drag
- RMB opens popup with Move Laser Here button (see .1)

1a Zoom Controls for 1
1b Camera View Modes Radio Group
1b1 View Mode Live Radio Button
- When active, 1 shows video directly from the camera without any processing

1b2 View Mode Processed Radio Button
- When active 1 shows processed image
- Visualizes the calculated position for laser line, black and white thresholds 1c

1d Region Selection Button
- Enables user to select region 1e to be processed
- Double-click to select whole window

2 Settings Control
- Enables user to Load, Save or reset settings to Default
- Load Button opens dialog to load settings from settings file or from another scan (See .1)

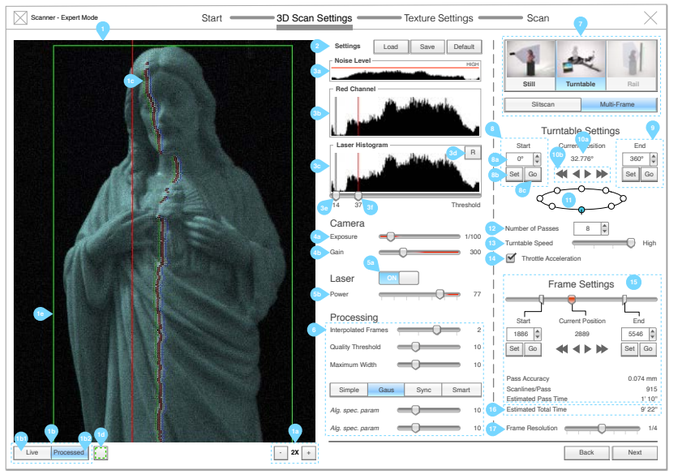
3a Noise Level Histogram
- Visualizes noise by subtracting histogram data of two consecutive frames, applying Math.Abs and plotting values

3b Brightness Histogram
Visualizes data of red (laser wavelength) channel in real-time

3c Laser Histogram
- Visualizes laser-affected red channel
- It is calculated subtracting a frame captured with laser turned ON, with a reference frame captured with laser OFF. Laser frame is captured only when some of parameters are changed or user pushes Reset Button 3d, or scanner is moved which is detected by accelerometer

3e, 3f Thresholds for Black and White points for laser-line extraction
- Range [0-255]
- This parameter is graphically represented as black and red lines in histograms 3b and 3c

4a Exposure Slider with range 1/50 to 1/2000
- Slider has marked range which negatively influences scan



7 Scan Mode Selector
(See 3.1.2.1 3D Scan Settings Window - Shared)

8 Turntable Range Start Control

8a TextBox with spinner

8b Set Button
Copies current turntable position from 10a to 8a

8c Go Button
Rotates turntable to the position from 8a

9 Turntable Range End Control
See parameters of 8

10a Turntable Position Indicator
Shows turntable position relative to calibrated 0 position

10b Turntable Position Controls provide two different speeds for rotation in both directions. Turntable is rotating while the button is held pressed

11 Turntable graphics with visualized Pass Positions set in 12 from which Frame Scans will be made
- Clicking on a Pass Position rotates turntable to the clicked position.

12 Number of Passes TextBox with spinner
- Changing the number also changes number of Pass Position Indicators in 11 and estimations in 16

13 Turntable Speed Slider changes maximum speed of the turntable rotation. Speeds are descriptive

14 Throttle Acceleration Checkbox
- Adds ease-in and ease-out to the turntable rotation to prevent accidental movement of light objects on the turntable

15 Frame Settings Group
(See 3.1.2.1 Still 3D Scan Settings Window)

16 Estimated Total Time Text.
- When updated by changing related parameters, it flashes for a moment to draw attention to the value change

17 See 15

3.1.3.5 Turntable Multi-Frame Texture Settings Window

1 Live Camera Feed View
- Zoom with Scroll-Wheel around mouse cursor or +/- buttons
- Pan with LMB+Drag

2 Zoom Controls for 1

3 Settings Control (See description in 3.1.2.5)

4 Noise Level
- Visualizes noise by subtracting histogram data of two consecutive frames, applying Abs and plotting values

5 Brightness histogram visualizes brightness distribution of RGB channels in real-time

6 Camera Controls Group directly accessing camera's hardware settings

6a Exposure Slider with range [1/1 to 1/2000]

6b Gain Slider
- Has gradient indication of high values

6c Brightness Slider

6d Contrast Slider

6e White Balance Slider

6f Color Picker
- Enables user to pick 3x3 spot on 1 with known gray value
- White Balance Slider 6e updates accordingly

6g Auto Button
- Attempts to automatically adjust all settings

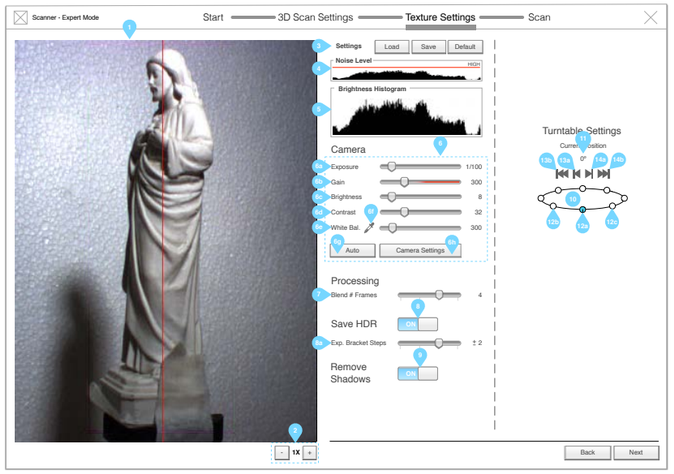
6h Camera Settings
- Opens camera system settings

7 Blend # Frames Slider
- Controls number of frames to be captured and values averaged into one texture image. Values [0, 2, 4, 8]

8 Save HDR Toggle
- Enables creating additional EXR image

8a Exposure Bracket Steps Slider
- Enables user to choose number of exposures around set value

9 Remove Shadows Toggle
- Enables creating additional image with compressed dynamic range to remove shadows



10 Turntable graphics with visualized Pass Positions (12a, 12b, 12c…) set in previous window

11 Turntable Position Indicator

12 Shows turntable position relative to Start Position

12a, 12b, 12c… Pass Positions (set in previous step)
- Clicking on non-active Pass Position rotates turntable to the clicked position

13a Turntable Left Button
- Rotates turntable one position left

13b Turntable Go To Start-Position Button
- Rotates Turntable to the start position.

14a Turntable Right Button
- Rotates turntable one position right

14b Turntable Go To End-Position Button
- Rotates Turntable to the end position. If turntable is set to make full circle

3.1.4.5 Turntable Multi-Frame Scan Window

1 Preview Viewport
- In 3D modes navigation is as follows:
  - RMB + drag: Orbiting around center point
  - LMB + drag: Panning
  - Mouse wheel: Zooming in/out

3D modes use adaptive degradation to maintain performance If Frame Time increases over 10 ms, number of visualized points decreases

- In 2D Modes navigation is as follows:
  - Click&Drag to pan
  - Mouse Wheel to zoom

2a-2h Visualization Modes Toggles

2a Live Toggle
- Shows live feed from the camera without any processing

2b Processed Toggle
- Shows scanning in progress
- Visualizes scanning region, calculated position for laser line, black and white thresholds

2c "2.5D" Toggle
- Shows camera view with visualized Z-Depth as grayscale values

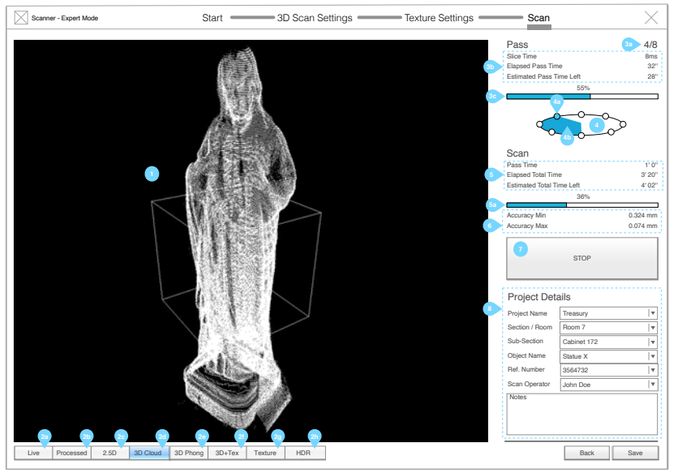
2d 3D Cloud Toggle
- Shows 3D Point cloud as vertices are being calculated

2e 3D Phong Shading Toggle
- Shows 3D scanned object with phong shading (See .2e) Applies simple triangulation method

2f 3D+Tex Toggle
- Shows Scanned shaded mesh as in 2e with applied texture map (See .2f)

2g Texture Toggle
- Shows Texture only. Displays captured texture map

2h HDR Toggle
- Shows calculated HDR texture



3a Pass Text
- Shows current pass and total number of passes

3b Pass Time Text
- Shows Slice Time, Elapsed Pass Time and Estimated Time left to complete current pass

3c Pass Progress Bar
Shows graphical representation of current pass progress with percentage display

4 Turntable graphics with visualized Pass Positions

4a Currently active Pass Position

4b Visualized percentage of completed scan

5 Scan Time Text
- Shows one Pass Time, Elapsed Total Scan Time and Estimated Time Left to complete scan

5a Scan Progress Bar
- Shows graphical representation of total scan progress with percentage display

6 Shows calculated Minimal and Maximal scan accuracy

7 Emergency Stop Button
- Large size for fast access
- Immediately turns laser off and stops scanning
- Keyboard access with Esc key
- Displays Scan Stopped Popup (See .1)

8 Project Details Block
- To save time, operator can add project information while waiting for the scan process to complete.
- All input areas are DropDown controls which suggests text (See .3)

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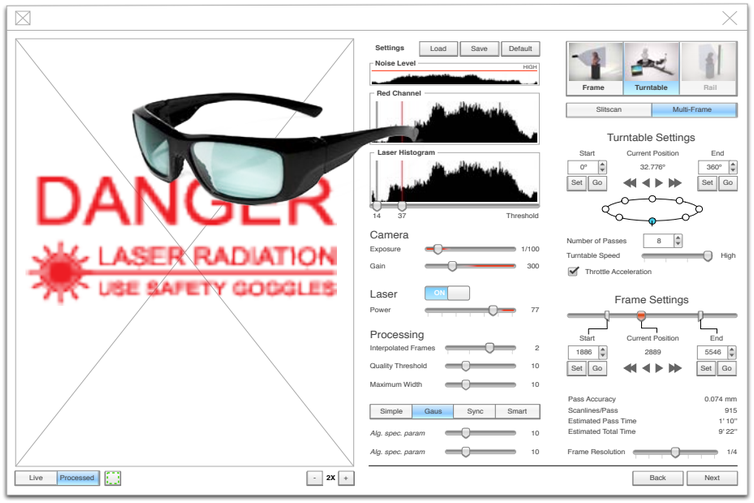
Laser 3D Scanner

3/3

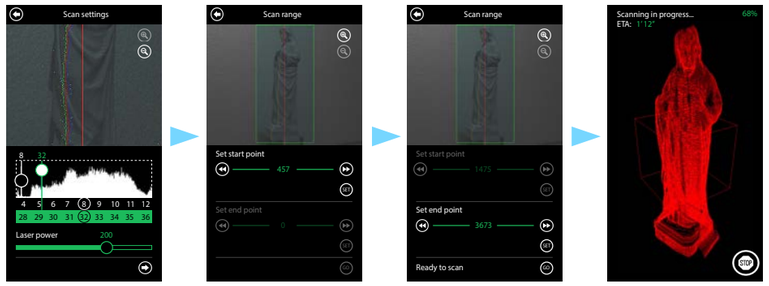
Safety first

This safety measure interrupts scanner operator only if they are not already wearing laser safety goggles.
When Laser Power output is set to more than 5mW, the red warning sign is shown over the preview window. Because safety goggles do now allow red light to pass through, the operator wearing them will not see the warning sign at all and can continue working uninterrupted.



Point&Shoot 3D Scanner Concept

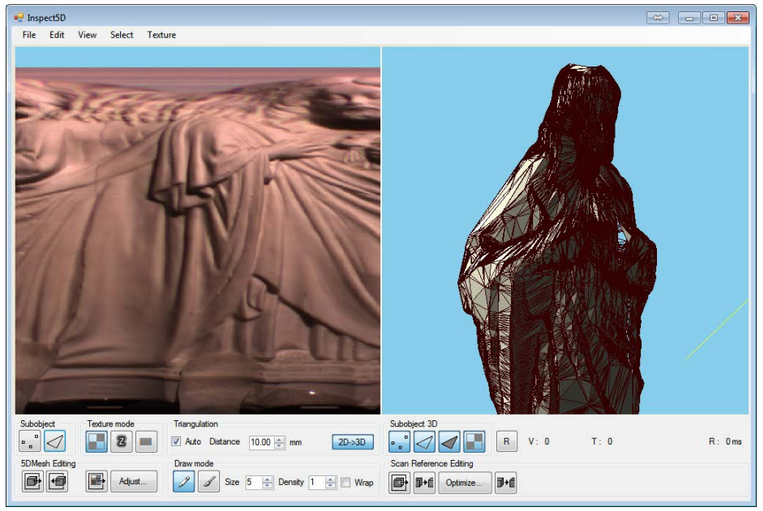
In **2011** I was contracted to **simplify and improve** previous version of the laser scanner for for smaller objects but quicker scanning while using consumer electronics to further **reduce costs** of the device and potentially **expand target market**. Main requirement was to use touchscreen as the interface and maximal reduction of complexity of the scanning process.
I created a concept based on usage of high-speed compact camera, Windows based touchscreen tablet and current understanding of upcoming Windows 8 "Metro" interface.



Inspect5D Software

Editing data from 3D scanning software

- Created tools and workflows for editing 3D scans
- Developed a full set of 3d modeling tools for meshing 3d point cloud and optimizing 3d scan data
- Developed the software in Visual Studio, C#, WinForms
- Visualization with OpenGL using OpenTK Library
- Wrote 90% of code



The huge benefit of building custom 3D scanner over buying commercial scanning system was having all additional data for each acquired 3d point that would be otherwise discarded. Many years working as 3D modeler were very useful when building this software as it was **intended for 3D artists**. Knowing which intermediary steps of the mesh cleaning workflow were not available in other similar software, I could optimize experience and toolset at the right places. No matter how good the decimation software is, an experienced 3d artist can **optimize 3d scan even better** and even further reduce number of polygons which was very important for 3d engines and computer hardware of that time.

By having all additional data for each 3d point, software allowed working within 2.5D camera space to **draw optimized mesh directly over** millions of polygons of **scan data**.

The left-panel of the program shows either scanned Texture or calculated ZDepth, while the right-panel showed automatically triangulated resulting 3d object.

Workflow in Inspect5D:

https://www.youtube.com/watch?v=xkCaSo6ROC0

Relief Draw Software

- Developed a new method and software for creating 3d bas reliefs from photographs

Starting from previously completed Inspect5D software, I have developed a different software for converting photographs for to reliefs by manually choosing Z-Depth for each placed point. In the cases where there is no underlaying 3d scan data, the Z-depth is chosen manually with the left hand on a keyboard.

With the left hand on a keyboard user can choose Z-Depth, and with a mouse in right hand places vertices. Z-Depth can be chosen with keys from 1 to 9, which correspond to different depth-levels. Additional levels are achieved using letters between the numbers. For example, the key “T” lies between numbers 5 and 6, so it has a depth of 5.5 units. LMB places vertex and RMB removes it.
The user must have the sense for the space to use the software, but it was intended for in-house use by 3D artists. Triangulation is automatic and in real-time. The object can be exported as .OBJ with mapped UV coordinates and applied projected texture map.

Workflow in Relief Draw:

https://www.youtube.com/watch?v=9Jj0DRrwOuc

Portfolio by Milos Paripovic I mail@milosparipovic.com

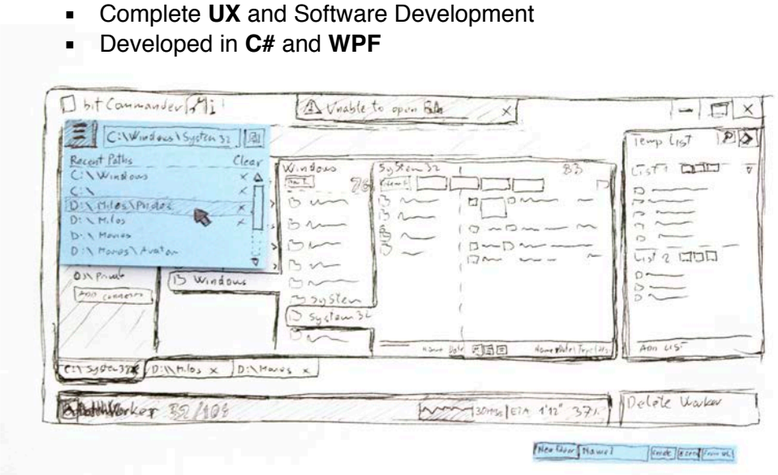
bitCommander

File Manager Software

1/3

Personal project motivated by my passion for organizing and optimizing

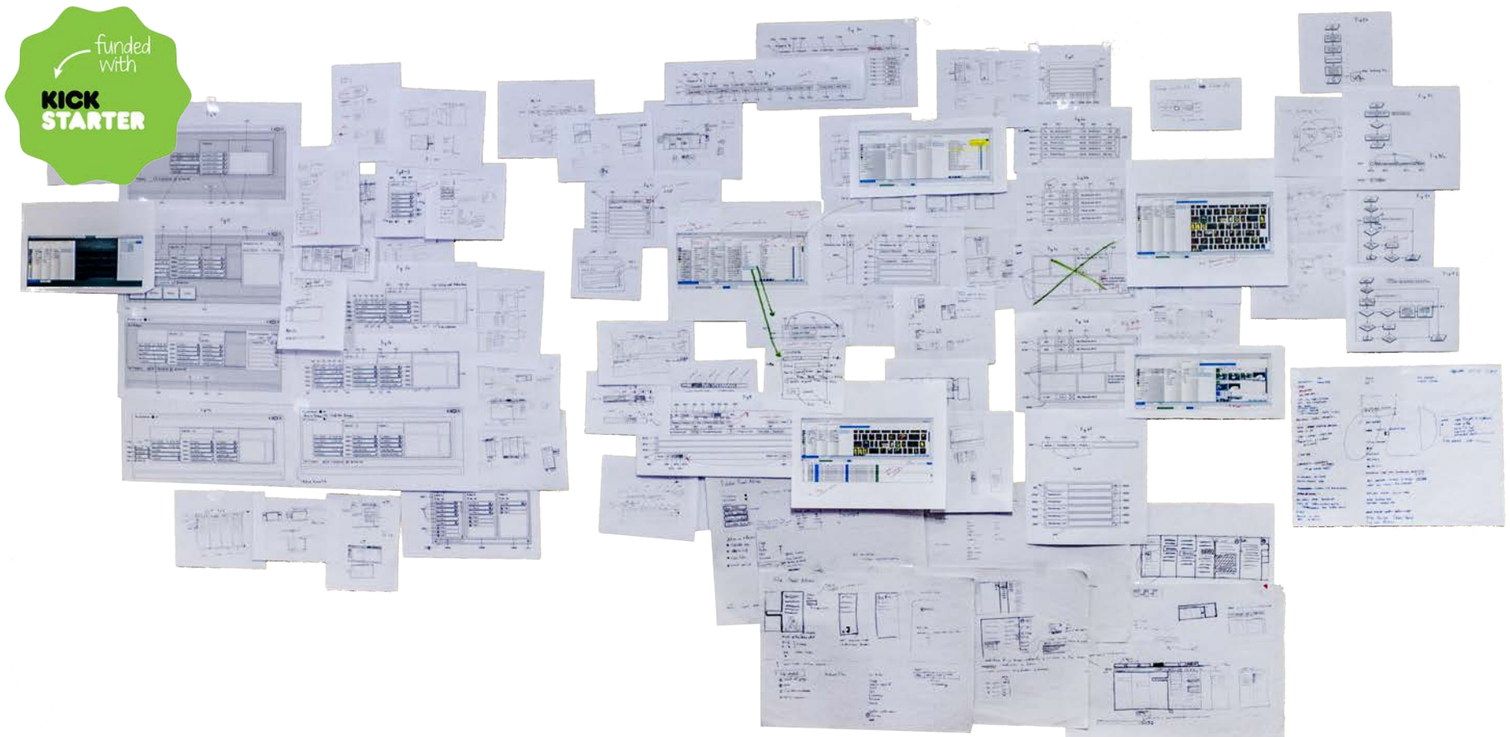
- Complete **UX** and Software Development
- Developed in **C#** and **WPF**

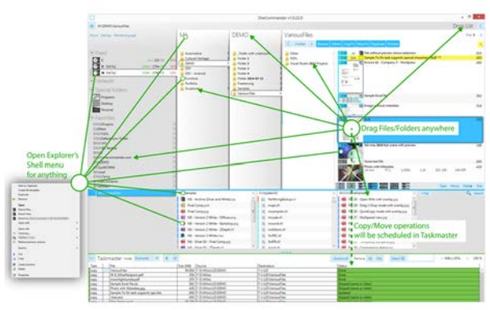


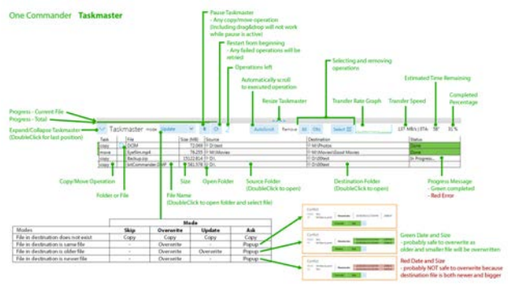
When I started this project I simply wanted to bring Miller Columns view from OS X Finder to Windows environment, but then I decided to do more and try to improve functionality, interface, and the whole experience of navigating and manipulating file system. To come even further I decided to imagine that every element of user experience in file browsers available today was wrong. That had led me to decision not to hesitate to even make something **opposite to current UI practices** as long as number of pros outweighs number of cons.

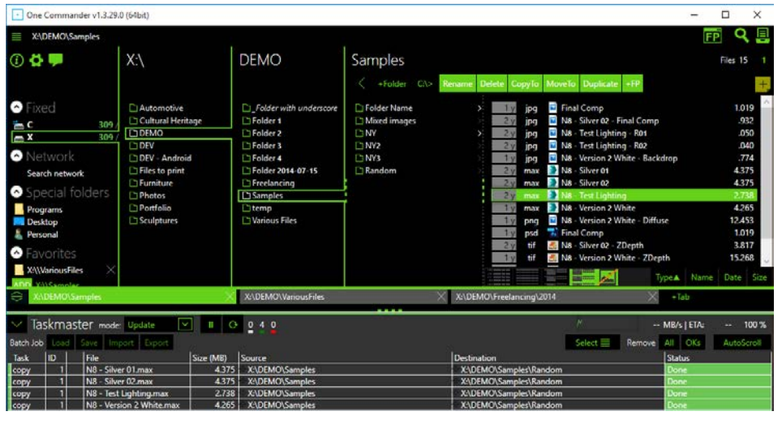
The main goals:

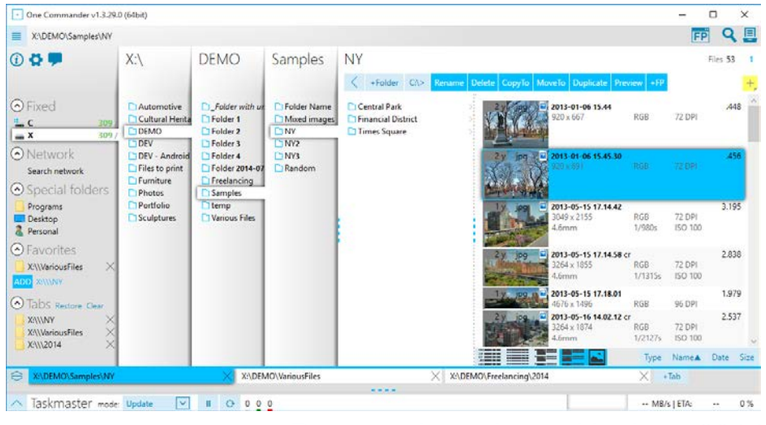
- Create simple interface with **clear relationships** between interface elements
- Show at **glance information** user needs **90%** of the time
- **Reduce cognitive effort** to understand the data
- **Reduce number of steps** to complete all actions









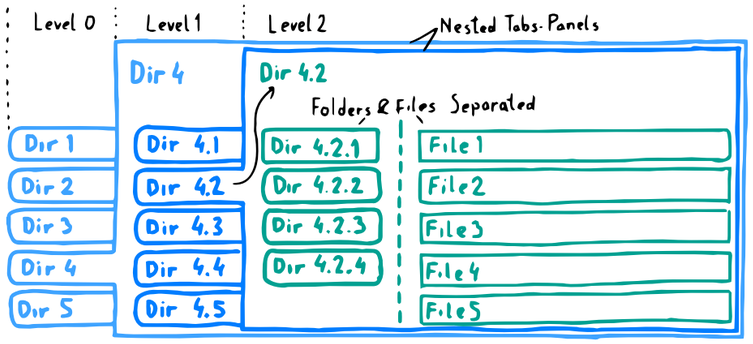


Beta version released in June 2014

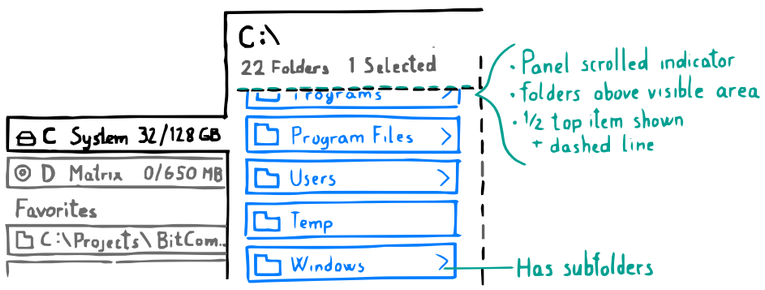
Portfolio by Milos Paripovic | mail@milosparipovic.com

I have found that Millers' columns from OS X Finder was much more convenient approach for navigating complex drive structures compared to Tree-View, but it still needed improvements.

Instead of Finder's folder lists with vague visual relationships between opened folder and its content, in the bitCommander folder structure is organized in the **system of nested tabs and panels** so that the folder hierarchy is clearly visible and relationship between a folder and its parent is clear. Each folder is represented as a tab in its parent's panel.



Files and folders are not in the same list, as in OS X Finder. This leads to **separation of folder navigation and file manipulation**. Since now the folders list and files list are independently scrollable, the number of presented files is not hindered in case of large number of subfolders sharing the same parent folder. User might also want to keep folders sorted alphabetically and sort files by date, for example.



Since scrollbars are not visually suitable for tabs, they are not shown. To represent that the list is scrolled and that there are folders above visible area, the **top-most visible folder-tab is halfway vertically offset** and cropped by the top edge of the tab container. Scrollbars appear if users hovers the panel with a stylus since users in this case have no other mean of scrolling.

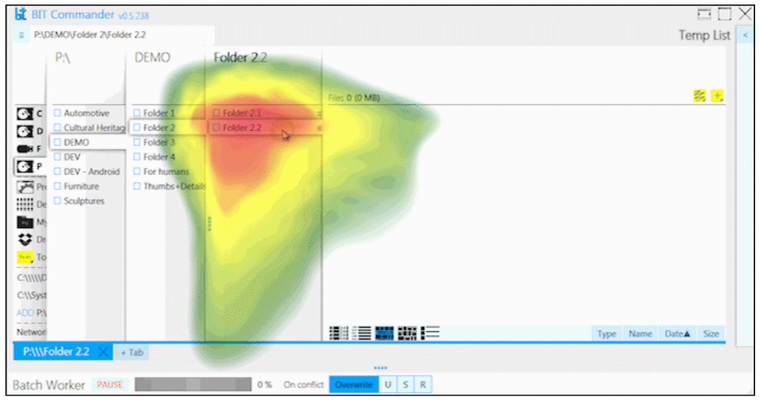
Main UI

Main UI is separated into two areas:
1. Parent Folders area
2. Current folder area

The area taken by the current folder remains fixed during navigating folder structure.

Folder-Panels in the Parent Folders area are are **aligned right**. Clicking on a folder, its child-folders are expanded as a new Folder-Panel in the same place while all parent panels slide to the left.

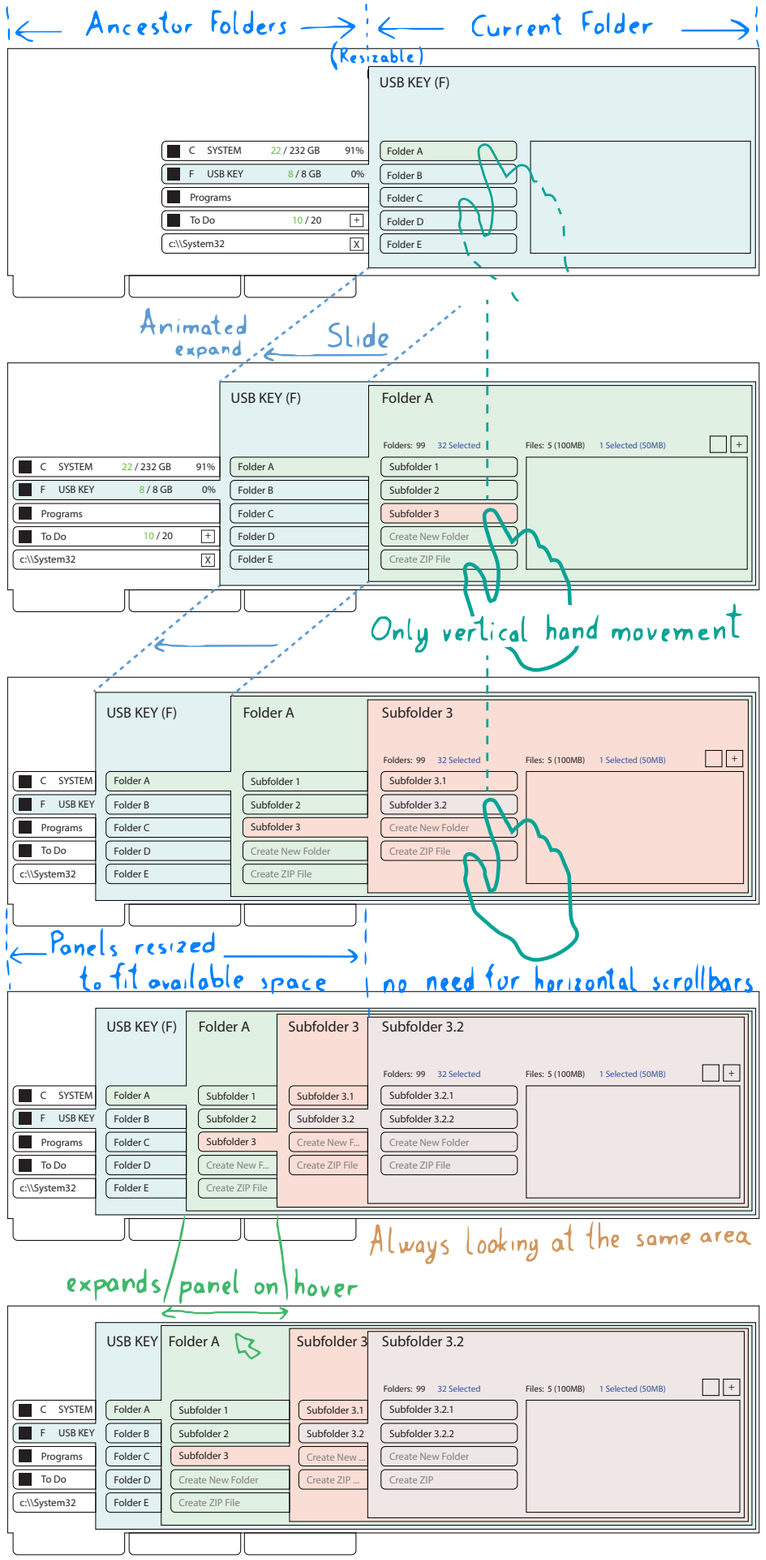
This way user always **looks at the same place** until the destination folder is found.



This also makes it convenient for **touchscreen** users as there is **no need to move the hand** horizontally while navigating.

Using OS X Finder with a mouse requires using horizontal scrollbar a lot. To prevent this in bitCommander all ancestor folder levels remain visible by automatically resizing width of each Folder-Panel to fit available space (image on the right).

If there are too many Folder-Panels and Folder-Tabs become too narrow, a Folder-Panel hovered by mouse cursor will expand automatically after an initial delay.



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Human-friendly file representations
in bitCommander

3/3

Filenames

For various reasons filename spaces are sometimes replaced with underscores or the names are shortened by removing spaces and capitalizing each word for readability. To make filenames in these instances more readable the filenames are optionally stripped of helper characters for display.

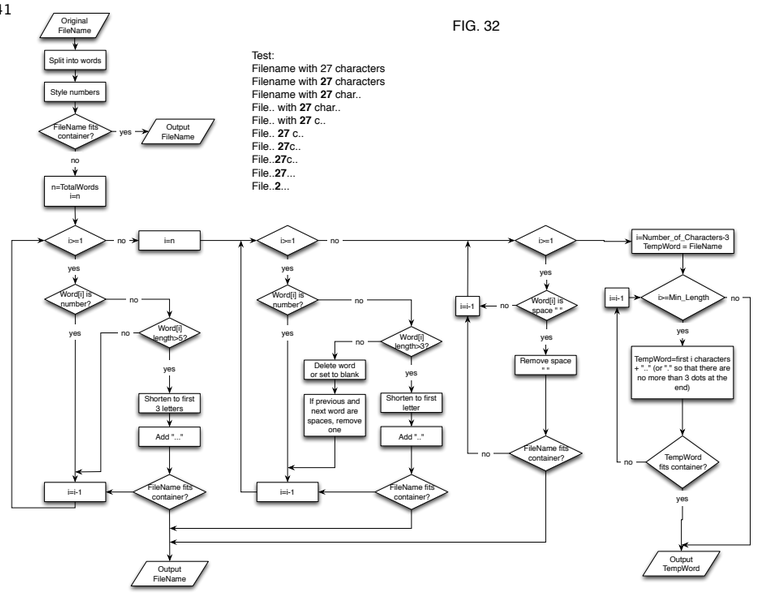
Autodesk_3dsMAX 2016 → Autodesk 3ds MAX **2016**

Numbers in filenames are its most important part for organizing data. Problem is that file managers treat them as any other character. I have created algorithms that rank parts of filename containing numbers higher than other words and are **preserved in shortening**.
In addition, numbers are in **boldface** so that they are easily distinguishable which is helpful for versioning.

I have developed **several filename shortening algorithms** that do not simply add ellipsis at the end or the middle of a filename, but instead **shorten or hide individual words** while **keeping numbers** visible.

Original	Autodesk 3ds MAX 2016 Ultimate
Windows Explorer	Autodesk 3ds Max 20…
OS X Finder	Autodesk 3d…Ultimate
bitCommander	Auto.. 3ds MAX **2016** U.

FIG. 32



File Date

Understanding absolute dates depends on person's location. To simply compare two dates, **YMD** or Big-Endian date format used in China requires the **least cognitive effort**, followed by most popular **DMY** format in the rest of the world, especially for longer timespans. Middle-Endian or **MDY** used almost exclusively in USA is the hardest for cognitive processing. This makes it even more difficult as we **think in logarithmic scale**. We all still prefer relative dates, especially for shorter timespans.

For that reason One Commander **shows relative dates - file age**. If file was modified less than 24 hours ago, file age shows **how many hours and minutes ago** the file was modified. It the file was modified less than two months ago, file age shows **how many days** passed. Up to a year ago, file age shows **number of months** that have passed. I have also implemented **color coding** of the file age to even more ease the cognitive processing and placing file on a timeline.

File Size

Instead of mixing file size scales as OS X Finder does, I decided to keep file size **base in MB**.

In one of the experimental versions I **variate font weight** for GB/MB/KB parts of the file size number.

To make it even more visually distinguishable between <1MB file and <10MB file (ex: 9.567 and 0.567), I am **dropping the zero** from the date representation.

Windows Explorer	OS X Finder	bitCommander
456 KB	465 KB	.465
3,876 KB	3.9 MB	**3.**465
2,234,876 KB	2.2 GB	**2** 234.876

Kickstarter

MVP was presented on Kickstarter in December 2013, the the community confirmed the need for usability improvement bitCommander offered by financing the first beta version.

funded with KICK STARTER

Kickstarter page: www.kickstarter.com/projects/953554185/bitcommander

MVP features demonstration : https://vimeo.com/81612927

Official page: http://onecommander.com

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Portfolio Website

Case Study

1/3

Portfolio websites rarely provide value to an accidental visitor and their **invested effort** to figure out the interface often **outweighs the potential benefit**.

The goal was to create a **fun** personal website to present some of my creative work from the recent **10+ years** and at the same time test a few IxD ideas. The website **does not contain UX** projects as site is intended for general audience. To **lower the cognitive effort** I experimented with various aspects of my understanding of human perception, behavior and psychology in general.

There is a problem with navigation of many websites: For each complete page reload, the user's **state of mind** changes as they **loose visual anchor points** that keep site browsing a **connected experience.**
While thinking of ways to overcome this, and connect layers of site architecture I read a research by psychologists John T. Cacioppo, Joseph R. Priester and Gary G. Bernston on the effect how **pushing and pulling an object affects its perception**.

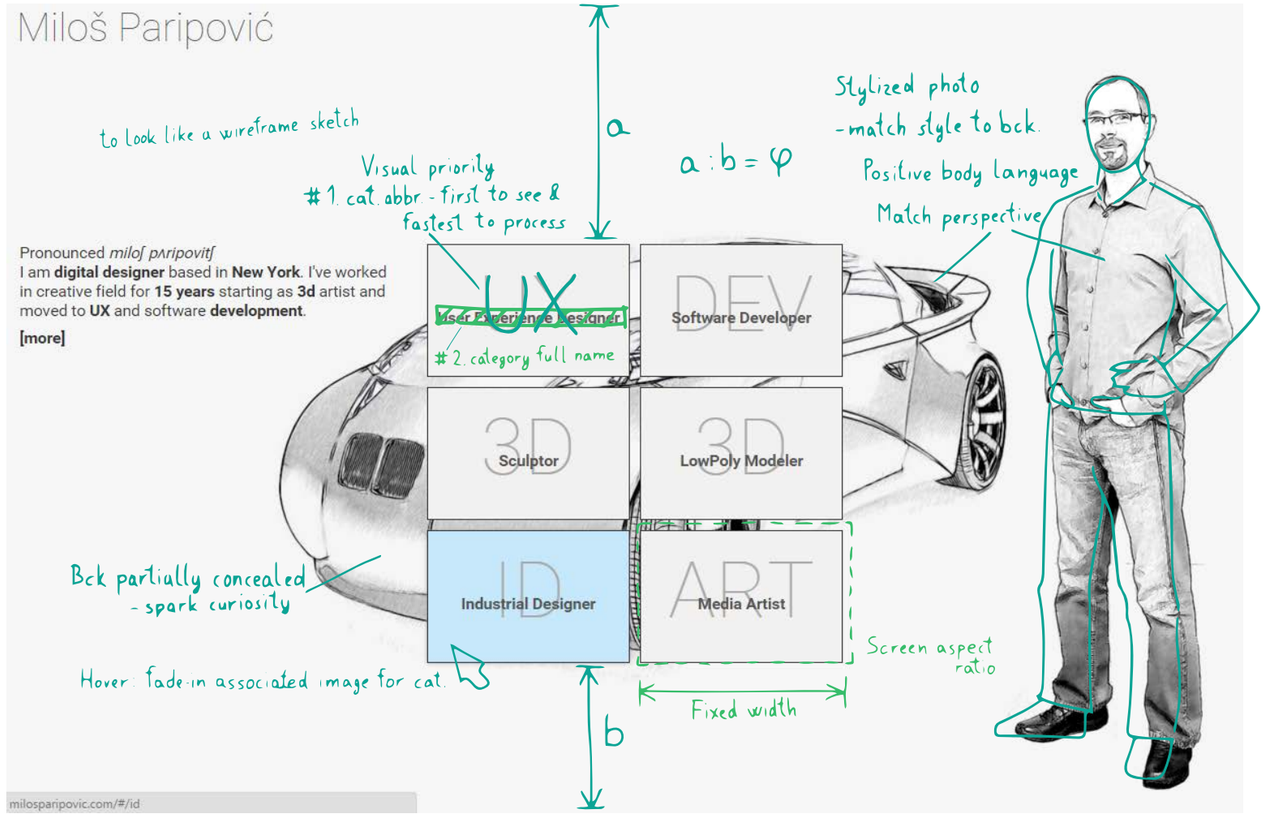
"Analyses revealed that the ideographs to which subjects were exposed during flexion were related more positively that the ideographs to which subjects were exposed during extensions"
http://bit.ly/1n6UGu9

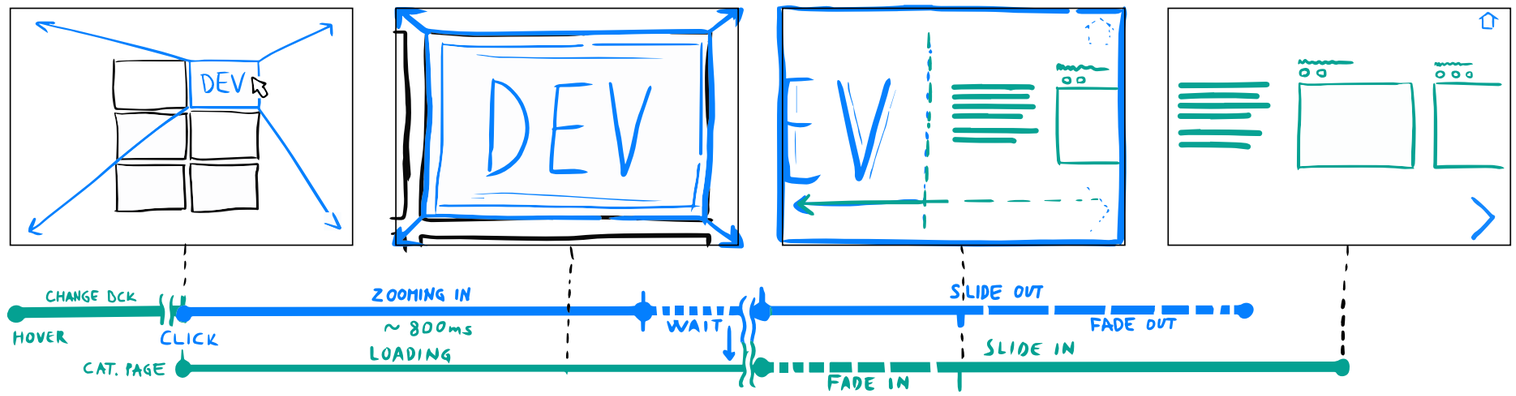
The idea was born to use positively characterized pulling effect to transition from Homepage to Category Page, and further to each single project within. I have found that Zoomooz.js plugin (MIT) perfectly fits my requirements. I decided to make an **SPA** learning **AngularJS** to prevent page reloading.

Interaction
On category card/button *hover*, an associated and already preloaded background image is faded-in, showing a glimpse of the content behind it.

On *click*, "the camera" **pulls toward** the clicked category card. Since the card has aspect ratio of the whole page, it fills the screen perfectly. This 800ms zoom-in animation, besides **seamless transition**, serves the additional purpose of giving browser **time to load Category Page in the background**.

After the camera zooms-in completely on the clicked category card, now fully loaded Category Page slides-in while pushing card's title text off-screen (being implemented).





Category introductory text is displayed as the first item in horizontal list. The secondary purpose to the introduction is giving a browser additional time to load the rest of category thumbnails.

Category introductory text has been set to fit close to **optimal ~66 characters per line**.

UX category card click has the opposite action: **zoom-out** to an site UX comp which is set as a hidden layer above homepage screen and encompassing it. This is being in addition another metaphor of UX position in the site design.

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Portfolio Website

2/3

Category Gallery Page

- Complete **UX** and Development
- SPA, AngularJS, jQuery, CSS, HTML, 3ds Max, Zoomoz

Challenge: Information Architecture is simple and consist of home, layer of categories and individual projects, but each category has completely different type of projects, shapes of thumbnails, number of images and amount of text. Even though visitors will be most likely interested in only one category, I had to find **common visual language and interaction paradigm** for the sake of user experience and code maintenance.

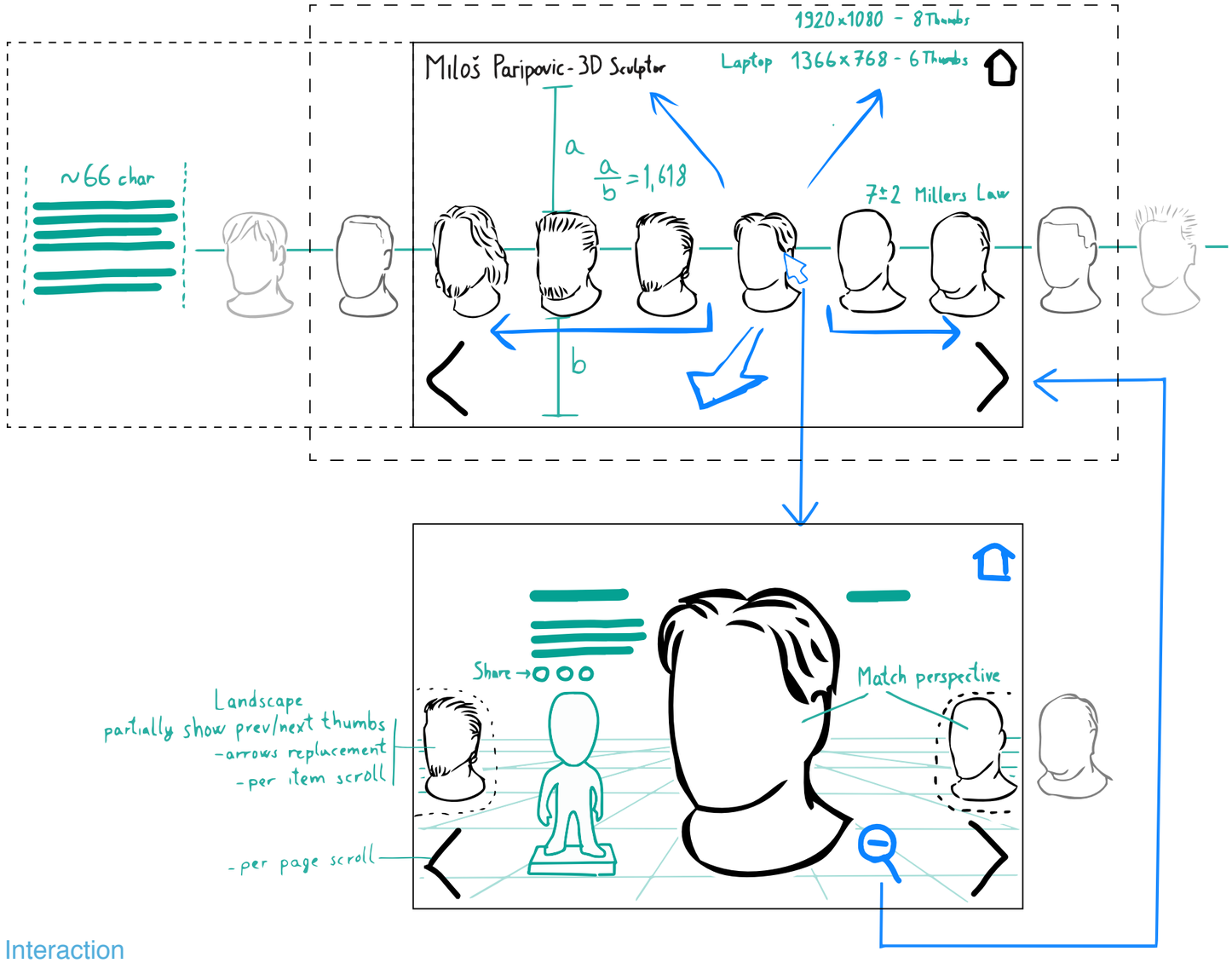
In the real world we are used to navigating within a singular 3D space. We are not navigating directly using immediate sensory input but within our mental representation (**semiosphere**) of our surroundings. We do something similar within out virtual world.

My starting assumption is that when a user is presented with a list of images, their brain has to create a semiosphere, or their internal 3d representation of each individual image before finding relations between objects within and interpreting the scene. Evolutionary we are used to have only one semiosphere, and the situation with multiple images requires proportionally increased mental effort. I have decided to place projects in a single 3d space so it would require one semiosphere.

I started with a simple jQuery plugin from the old personal Wordpress website that listed image thumbnails in a horizontal array. Taking into consideration limits of humans capacity for processing information, known as **Miller's "law"**, that states that we can process **7 ± 2** pieces of information at one time, I have decided to safely limit the number of projects/objects on screen within those numbers. That resulted in having 8 objects per screen on most popular 1920x1080 desktop resolution, or 6 objects on most popular laptop resolution of 1366x768.

Clicked thumbnail was supposed to enlarge in place filling the screen and pushing other objects apart. This posed another challenge to **keep perspective illusion** from breaking. Zooming interaction had to be set in a way that object does not appear to be simply enlarging, but to **seem as coming forward** - benefitting from perception of pulling towards the user.

After trying various settings in a 3d software (**3ds Max**), I have found satisfactory camera settings where distant thumbnail-sized 3d objects and the closer - enlarged object seemed as a **part of the same 3d space** even after rendering them to images. I have incorporated **Golden Ratio** of 1.618 so that final 2d composition would look balanced, and I rendered everything.



Interaction

Click on a thumbnail centers it on screen and brings it closer to the viewer. This effect is created by enlarging it from the **common perspective Vanishing Point** and offsetting thumbnail's Y position at the same time. The partial breaking of perspective illusion due to dealing with 2D images was alleviated slightly by horizontal motion of the whole canvas.

Loading higher resolution image of the clicked thumbnail starts as soon as the object is clicked so on a fast connection there is enough 500ms time of "bringing forward" animation to fully load larger image on a decent bandwidth and unnoticeably replace low resolution thumbnail.
At that moment an associated page overlay with project information and additional images is dynamically loaded and faded-in.

The enlarged image is sized to fill the screen making sure that the previous and the next gallery thumbnails are partially visibility so they can be directly used in form of previous/next buttons.

After the image is enlarged, the zoom-out button is faded-in and is positioned in the main interaction area at the bottom of the screen; at the same height as scroll arrows

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Portfolio Website

3/3

Category Page Navigation

Corners of the screen are reserved for main navigation where user can rely on already learned muscle memory and which are also the **most convenient interaction area for tablet users**.

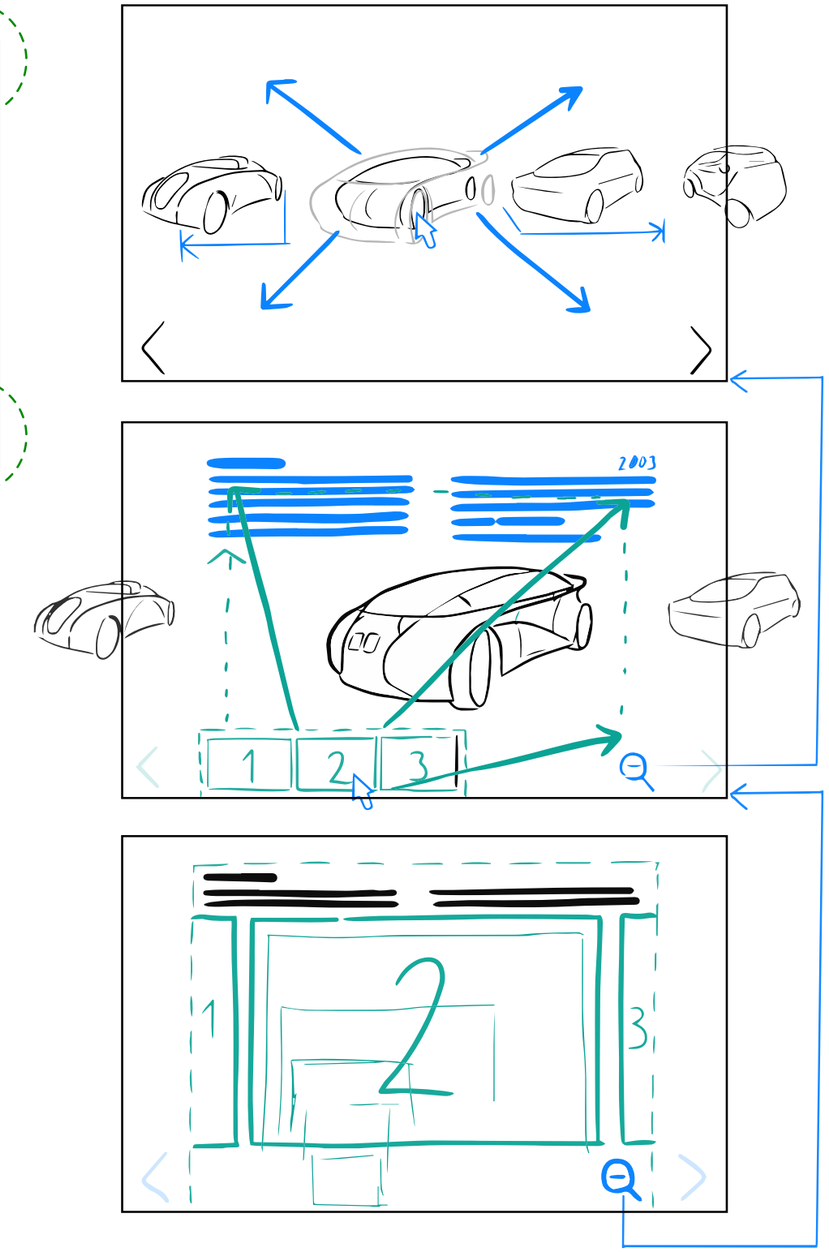
Home button is on the top right corner where most users are used to find close button, and it serves a similar purpose. It is visible only when user is not on home screen.

User testing sessions revealed **two problems**:

1. Some users were **not familiar with Home pictogram** and it's purpose but they successfully used Page Title/Name in the top left corner after failing to see back button anywhere. The "x" button in the place of home button besides not contextually fitting also confused users to what it would do. The idea to fade-in Back Arrow before name was dismissed for aesthetic reason and possible confusion with similar page scrolling arrow in bottom left corner.
2. Some users simply did **not notice the change** when home button faded-in on category page opening. This led to decision to keep home pictogram and color it in bolder color and in addition animating it on page opening. Change proved to be satisfactory.

Arrows at the bottom of the screen are provided for **page-by-page scrolling**. On click the last thumbnail that is not fully visible would become the first one on scroll. Since page does not use OS scrollbars, the arrows on the same location don't require learning new navigation.

Industrial Designer Category Page



Industrial Designer page uses the same principle as 3D Sculptor page but thumbnails are in landscape format. The difference is that each project's page has several paragraphs of text and one of more images which needed to be enlarged on click.

Text Block - Since images are horizontal, the text block can still fit the space above the image even on laptop screen. The text block has a semitransparent background in the same color as the page background for the case that the user has smaller screen and text overlaps with the image. There is a "hide text" button provided in the case that too much area of the image is covered.

Gallery within Gallery

I have realized that for some projects it would make sense to add additional renderings that I already had. There was a challenge how to **incorporate gallery** of multiple images per project **without introducing new interactions**. I decided to use the **same zoom effect** I used for everything else.

On click, the whole block of gallery thumbnails is enlarged through animation within the bounds of opened project, and zoomed to the image that has been clicked.
The zoomed image is enlarged enough so that previous and next images within the project's gallery are partially visible and could be clicked. That eliminated the need for additional arrows for that purpose.

When a gallery image is enlarged, the **Zoom Out** button is **repurposed** to zoom the gallery out to the original size. At that point the original button purpose is restored.

The webpage is still work in progress and not everything described here has been yet implemented.

Find the **complete version of the Case Study** on
https://medium.com/@milosp/designing-portfolio-website-f6bd8d4f1db0#.k4d59lmee

http://**MilosParipovic**.com or http://**UxD²**.com

EverydayRAVictories

Micro-website / Social Network

1/2

- Complete **UX**
- User Flows and Wireframes in Omnigraffle

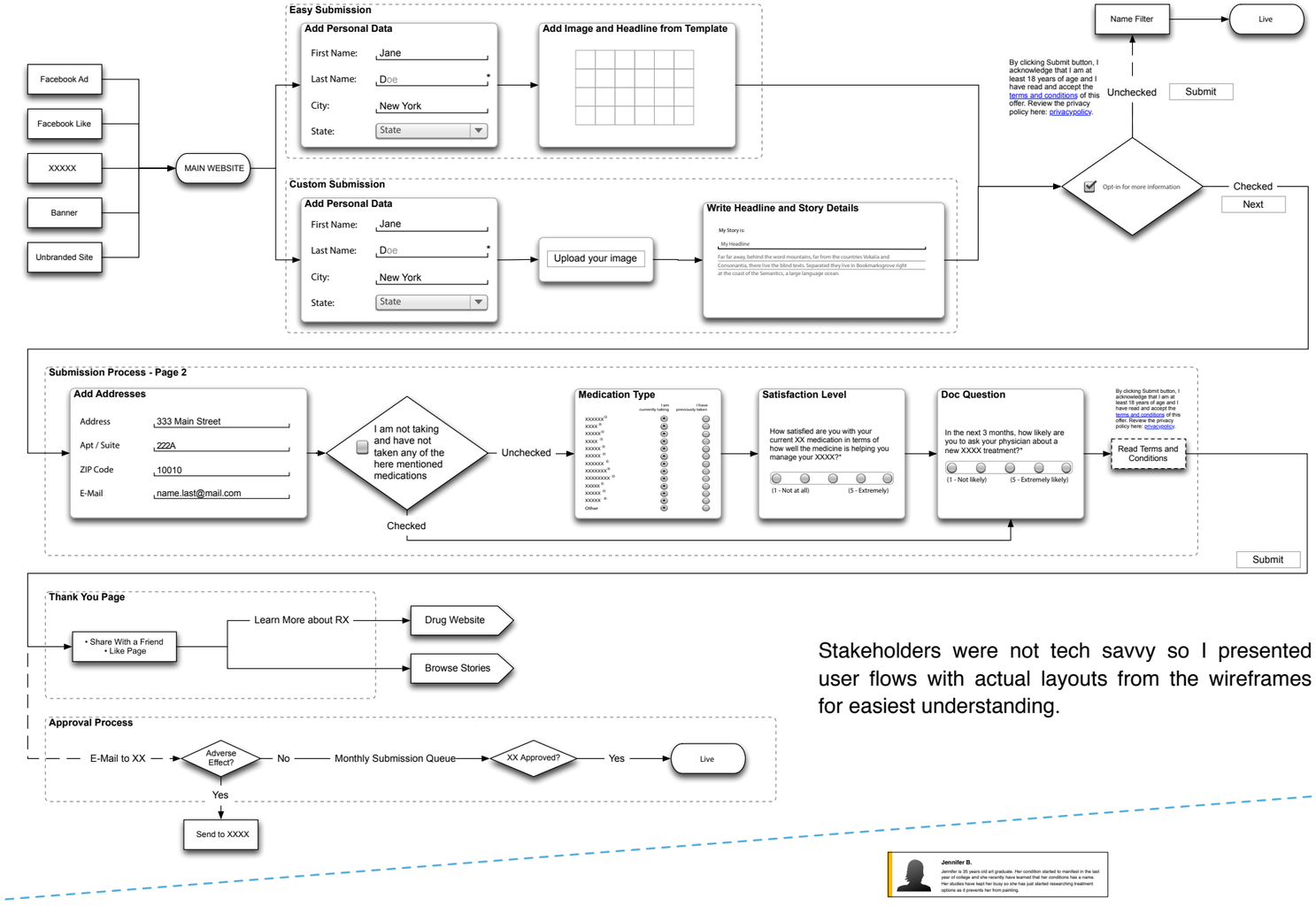
Client from pharmaceutical industry and a nonprofit organization have ordered creation of micro social network in order to **encourage participation in their drug survey**, collect adverse effects data and raise research funds. Users were supposed to be able to share their small victories against their common condition.

Prior this project, the pharmaceutical company had a single page, three screens long drug survey with a very low response rate. They have joined forces with non-profit organization to collaborate on an independent website which they would finance and which would drive donations to the non-profit. In return they would get survey participation data.

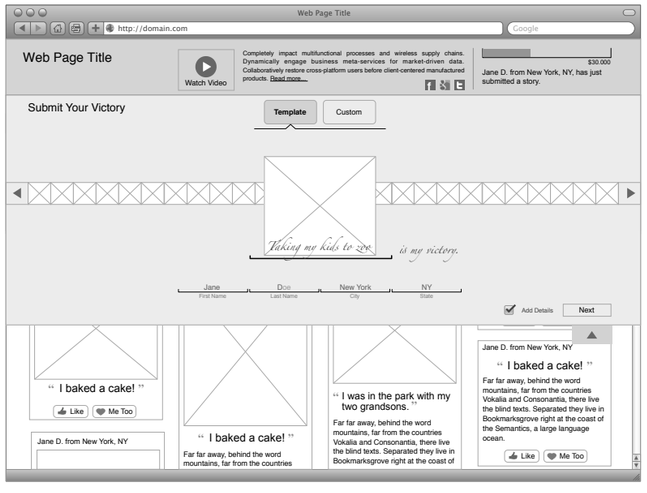
Even though **Pinterest style** story layout is in my opinion the least favorable for any data presentation for many reasons, the client insisted on it.

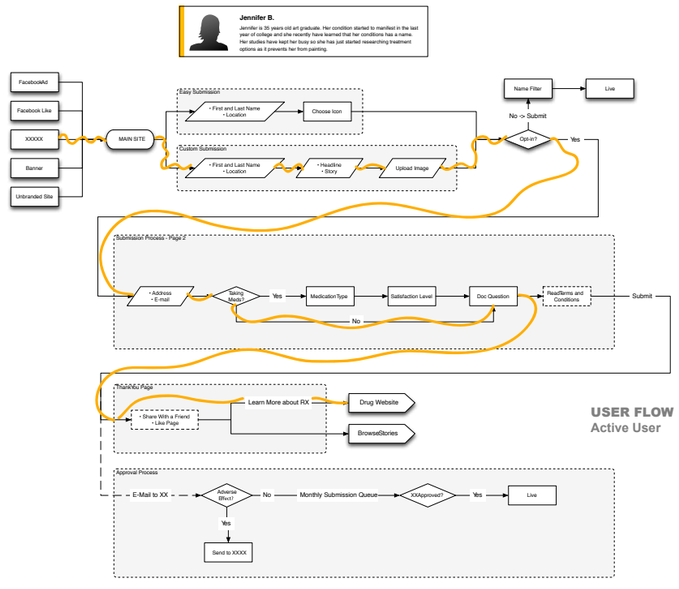
According to these requirements, existing survey and requested "Pinterest" look I have created user experience that would encourage greater participation.

As the drug survey was the reason for the website existence, I decided to make it a central point, part of the persistent header (collapsed to top on scroll) and **preloaded** with the page so there is zero wait time and the least chance to change user's determination to submit a story and complete the drug survey in the process. Since shorter surveys have more response rate, I redesigned the original survey to **seem shorter** by separating it into **two half-screen-sized steps**:
In **step 1** user invests time to write a story and enters basic information before proceeding to the next step.
In **step 2** user is awaited with drug related questions and the step relies of **psychological effect of "commitment bias"** or similar "Concorde Fallacy". Since they have already invested more time into writing the story than it would take to complete few more questions, my assumption was that out of the respect for their own time they would rather spend two more minutes completing the questions and finalizing submission instead of considering their time spent on previous step wasted. Three steps would probably force user to reconsider abandoning their first-step effort unaware of their comfortability with yet unknown questions on the third step and the amount of time required for completing it. Formulating the reasons this way client reconsidered their initial request to have three steps.



Stakeholders were not tech savvy so I presented user flows with actual layouts from the wireframes for easiest understanding.





Portfolio by Milos Paripovic I mail@milosparipovic.com

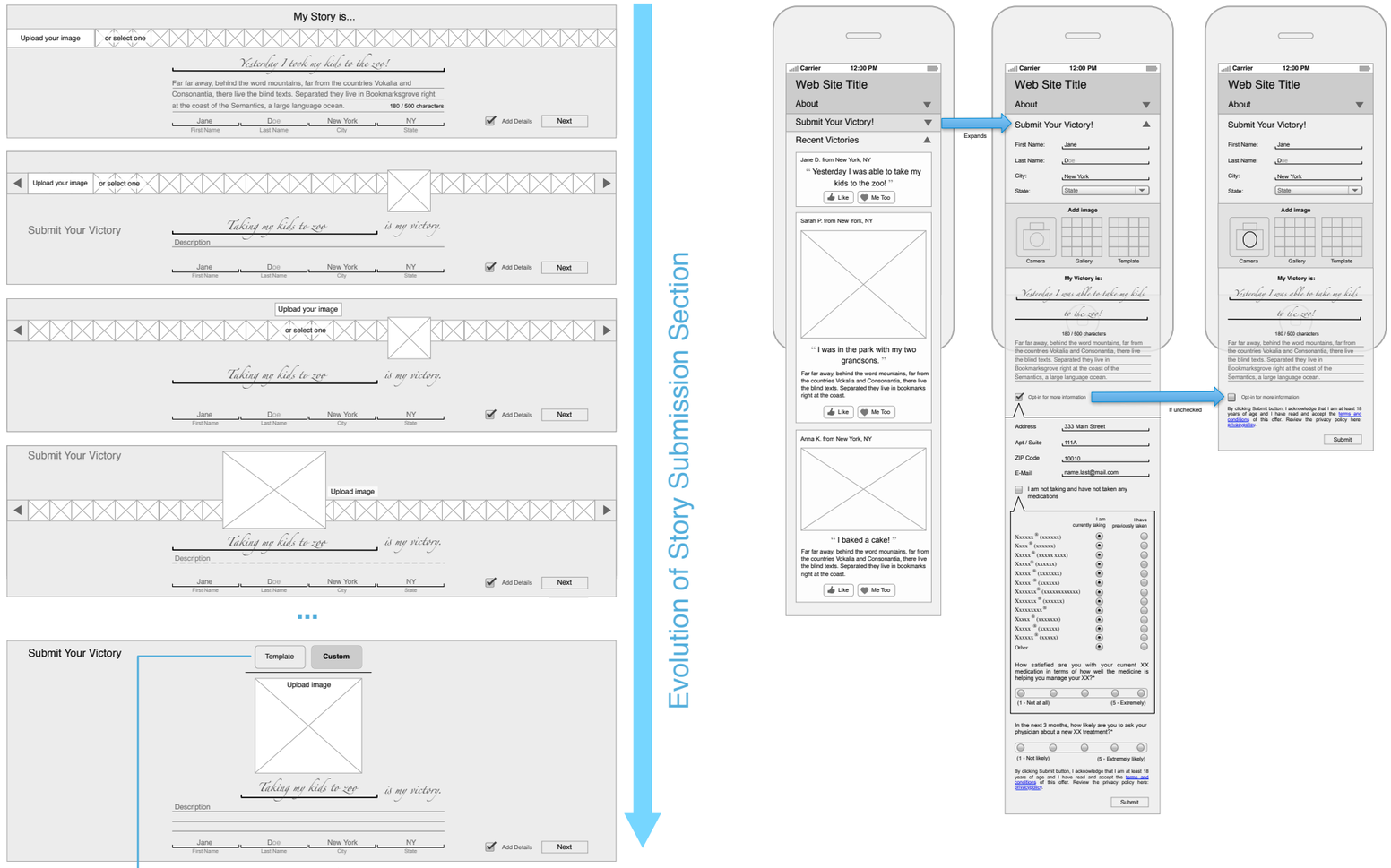
EverydayRAVictories

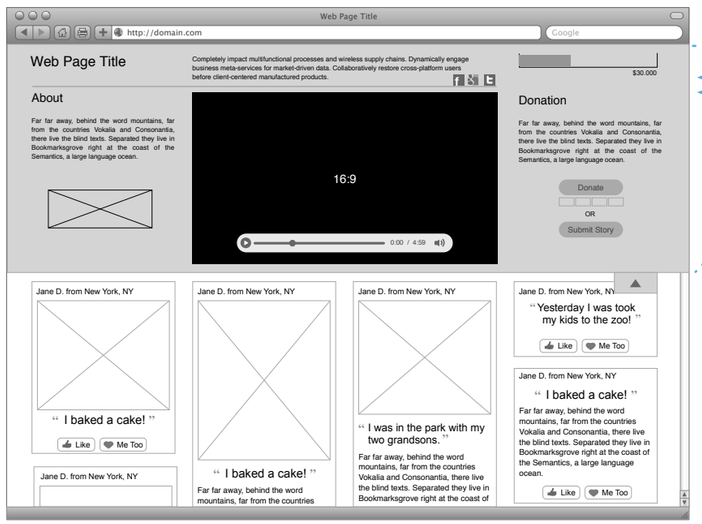
Quick wireframing and iterating

2/2

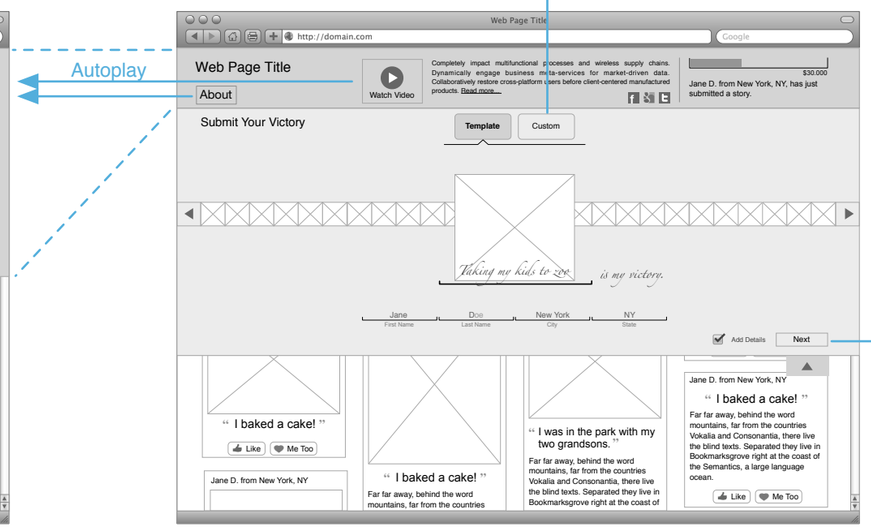
Iterations had to be quick as development team had a small timeframe before the next project: ~10 days for UX.

I made several versions of the whole process in order to speed up client's decision and also to save **UX** which was **potentially jeopardized** by client's request to move part of the submission process to their website. This way project manager was able clearly explain pros and cons of each approach.
Eventually, client was convinced to keep the submission process on the website itself.

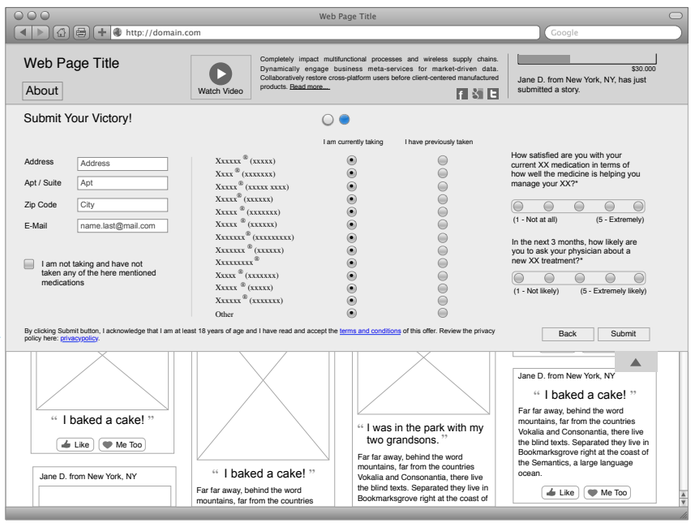




About Section expanded



Story Submission - Step 1



Story Submission - Step 2

Portfolio by Milos Paripovic I mail@milosparipovic.com

Eyefilm

Immersion in Virtual 3D Worlds

Part of my Mag.Art. Thesis Project on
Univ. of Applied Arts; Vienna; Austria; 2009

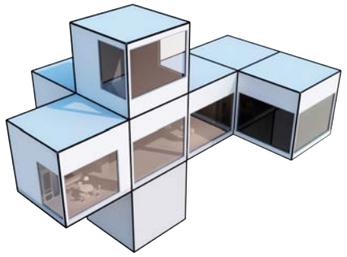
Eyefilm is the result of research on user interaction and spatial perception in virtual 3D environment. As an experiment to create **new level of immersion**, eye-tracking hardware and software was used to create unique **semiosphere** for one particular environment with a goal to offer an **illusion of interactivity in a film** as a medium.

- Eye-tracking research, complete production and post-production, 3d modeling and animation, lighting and rendering
- 3ds MAX, ZBrush, Vray rendering engine, ITU Gaze Tracker, After Effects

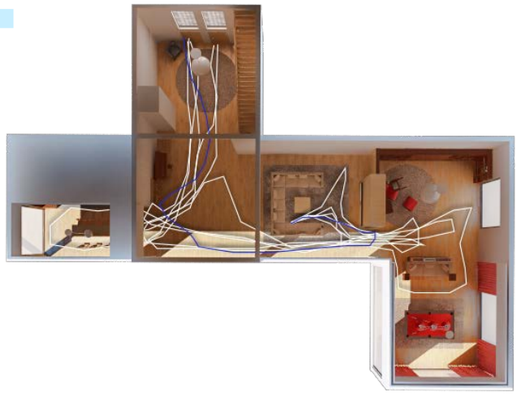
Research and Phases of Realization

1 House was designed as 4D Cube (Hypercube/Tesseract) where rooms create an infinite loop.

Interior was created in 3ds Max and presented as a FPS game to a group of test subjects. They could explore the house at will.

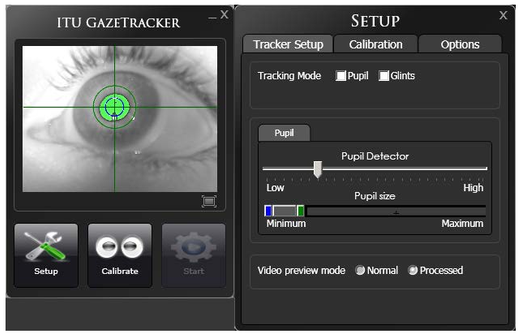


2 Their path was recorded with a script and later averaged to create final camera path.

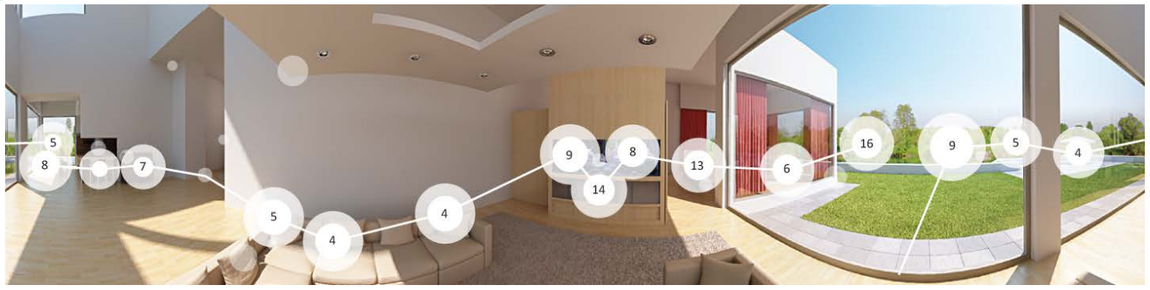


3 Final camera was rendered as video with wide angle view and lower quality settings. The video was shown to a second group of test subjects individually.

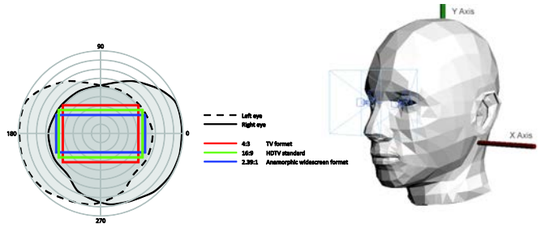
4 During the video watching their eye-movements were recorded with the eye-tracking equipment to determine test subjects' points of fixation.



5 Collected data was used to algorithmically create final saccadic camera motion.



Virtual camera imitates **saccades** and visual fixations, human field of view, trapezoidal distortion of vertical lines, **high dynamic range** of the eyes and larger depth of field. Rotation axes of camera is also adjusted to the **relative head axes**.



Since points of fixation were similar among subjects, final movie has the occasional **illusion as being interactive** by moving camera target to the most likely fixation point before the viewer actually fixates the point themselves.

Watch the film (3 minutes) at:

https://vimeo.com/34843832

Portfolio by Milos Paripovic I mail@milospariposic.com

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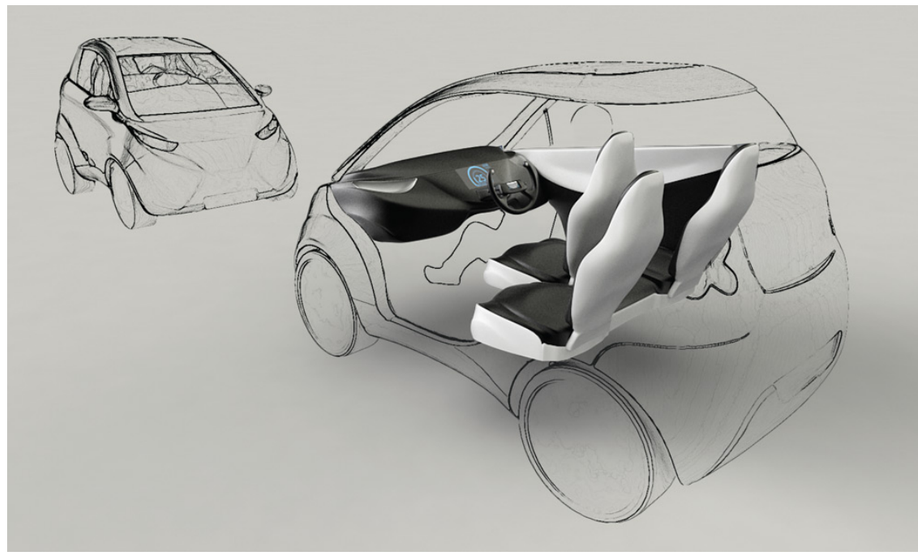

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