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Installation instructions for AR technology based home assistance assembly

ABSTRACT

From the perspective of user experience, in-depth discussion of AR technology and RTA furniture product installation integration opportunities, as a way to solve the user's problems in the installation of furniture products, to give users a better installation experience.

BACKGROUND

Reason for RTA assembly with AR

Consumers, particularly young people, are very interested in ready-to-assemble (RTA) furniture products because of their affordability, portability, and customizability. 83% of young people have bought various RTA furniture items. However, the study found that nearly 44% of UK adults lacked the necessary skills to finish the installation. It's interesting to note that 14% of people aged 18 to 34 depend on their fathers' hands.

Businesses and designers, like IKEA, work to optimise the product structures and assembly instructions, but some users are still unable to finish the assembly without difficulty. Therefore, a new RTA furniture installation guidance system must be established in place of the conventional installation instructions.

With the development of digital technology, Augmented Reality (AR) is beginning to be integrated into people's lives. Can the integration of AR technology and furniture installation instructions be enough to solve the problems people encounter when installing RTA furniture?

Studies of AR and RTA installations

Technical Advantage
The addition of AR technology allows the description to be extended from a two-dimensional plane to a three-dimensional space, and can interact with real parts, so that the user can observe the assembly instructions from a different perspective, which is helpful for the user's understanding.

Situational perception
AR technology enables 'manuals' to perceive their surroundings through the camera, offering the possibility of strengthening and enriching the connection between the user, manual and part.

Usability evaluation
Several studies, in terms of efficiency, satisfaction and ease of use, have verified the USABILITY of the application of AR technology in the field of installation, especially in the field of industrial assembly, with fewer studies integrating it with the field of home installation.

Information instruction
• Usability of different interaction forms in assembly instructions.
• Algorithms for generating assembly instructions

How to do this project

An in-depth exploration of the opportunities for integrating AR technology with the installation of RTA furniture products from a user experience perspective and establishing the informational feature of the installation instructions.

STUDY MERHODOLOGY

01 User Research

• **Pre-interview**-Understanding the specific problems users encountered in using existing RTA furniture products in the way of installation instructions and mining user needs to discover design points.

02 Prototype Design

• **Interview analysis**-Establishment of the basic functions of the new system

• **Process design**-Two-way interactive installation process between the user and the manual

• **Information design**-Establishing AR directive features ('What', 'When' and 'Where')
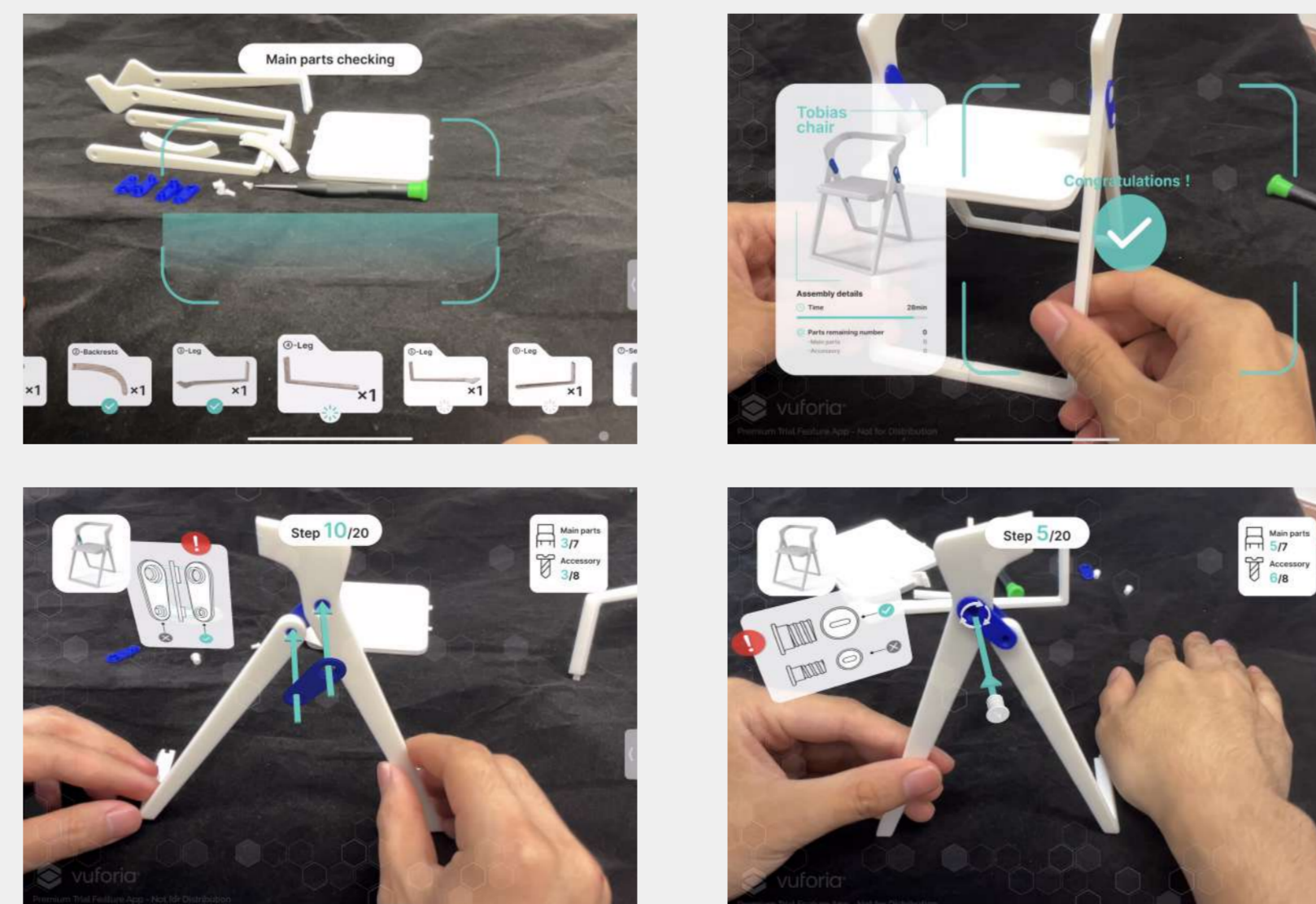
03 Usability Test

• **Eye tracking test**-Find the Area Of Interest (AOI)

• **SUS & Interview**-Validate system processes and AR command availability

PROTOTYPE DESIGN

System process
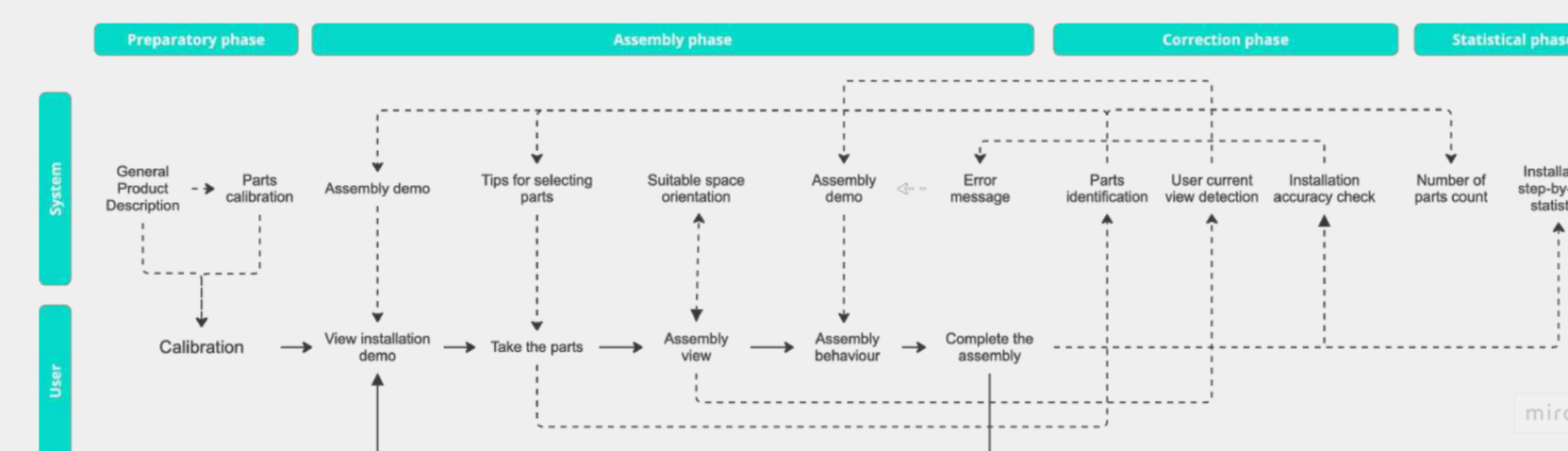
Interface display

TESTING & EVALUATION

01 SUS score

Visibility			Comprehensible			Satisfaction				
86	77	63	86	89	83	89	91	83	97	
81			86			90				84
75										

Overall, the system has a usability score of 84, which is at the 'acceptable' level. However, in 'Visibility', the user effect value for attention to information is anomalous. Through the INTERVIEW, the users paid very little or no attention to individual auxiliary information.

02 Heat map

The heat map reveals that users pay more attention to 3D information than 2D information, and dynamic information than static information. The user's region of interest is mainly in the midline of the field of view, especially the centre, which can also be described as the 3D space surrounding the real interacting object and its surroundings.

The ranking of the influence of different information features on user attention is as follows: Eye midline/not > 2D/3D > Dynamic/static

RESEARCH RESULTS

01 Findings

• Changes in the relationship between users, parts, and instructions: one-way linear relationships are transformed into two-way interactive relationships.

• Interweaving Instructions and User Behaviour to construct a new system of assembly instructions

• Although users are more interested in picture information, some text descriptions should be added as appropriate for better user understanding

• The user's attention centre focuses on the midline of the field of view, especially the centre of the field of view, or on the real target object and its surroundings.

02 Conclusion and Development

Although the study built a new description system from user needs and featured the installation information in terms of 'What', 'Where' and 'When', it basically solves the user's previous challenges.

In the form of testing, AR glasses are required and the information should be designed to incorporate the user's physiological features, such as the field of view range in the user's visual system.