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## Augmented Reality HMD with a Transparent Video Display and a Beam splitter Reflected Projection

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## Augmented Reality HMD with a Transparent Video Display and a Beam splitter Reflected Projection.

### ABSTRACT

This paper describes a method to combine an angled transparent video display with a projection which will reflect off an angled beam splitter to produce an effectively larger field of view. The transparent display is angled at forty-five degrees. The beam splitter glass is also angled at forty-five degrees and is attached to the transparent video display via a transparent material plate. An overhead video display will project its projection onto the beam splitter glass after being focused by a convex lens. This focused projection will reflect off the beam splitter glass and will be projected towards the user. In this configuration the user of this head mounted device will be able to experience a central focused field of view and the perception of the surrounding peripheral field of view.

### KEYWORDS

- Augmented reality
- Transparent video display
- Overhead video display

### BACKGROUND

Nowadays, augmented reality head mounted devices come in many different form factors. Generally, the smaller form factor devices tend to have a smaller field of view and the larger form factor devices tend to have a larger field of view. It is challenging yet highly desirable to have smaller form factor head mounted devices with a larger field of view.

## DESCRIPTION

This paper describes a method to combine an angled transparent video display with a projection which will reflect off an angled beam splitter to produce an effectively larger field of view. The transparent display is angled at forty-five degrees. The beam splitter glass is also angled at forty-five degrees and is attached to the transparent video display via a transparent material plate. An overhead video display will project its projection onto the beam splitter glass after being focused by a convex lens. This focused projection will reflect off the beam splitter glass and will be projected towards the user. In this configuration the user of this head mounted device will be able to experience a central focused field of view and the perception of the surrounding peripheral field of view. This configuration includes two transparent video displays, two small overhead video screens, two overhead convex lenses, two beam splitter glasses and two transparent material plates. The following diagrams will illustrate the main configuration of the head mounted device. The core mechanism of combining the two transparent video displays which provides the perception of the surrounding peripheral vision with the two overhead projections which will provide the central vision is demonstrated in the View combining virtual reality headset (Abeysekera 2021).

Diagram one: the right-side view.

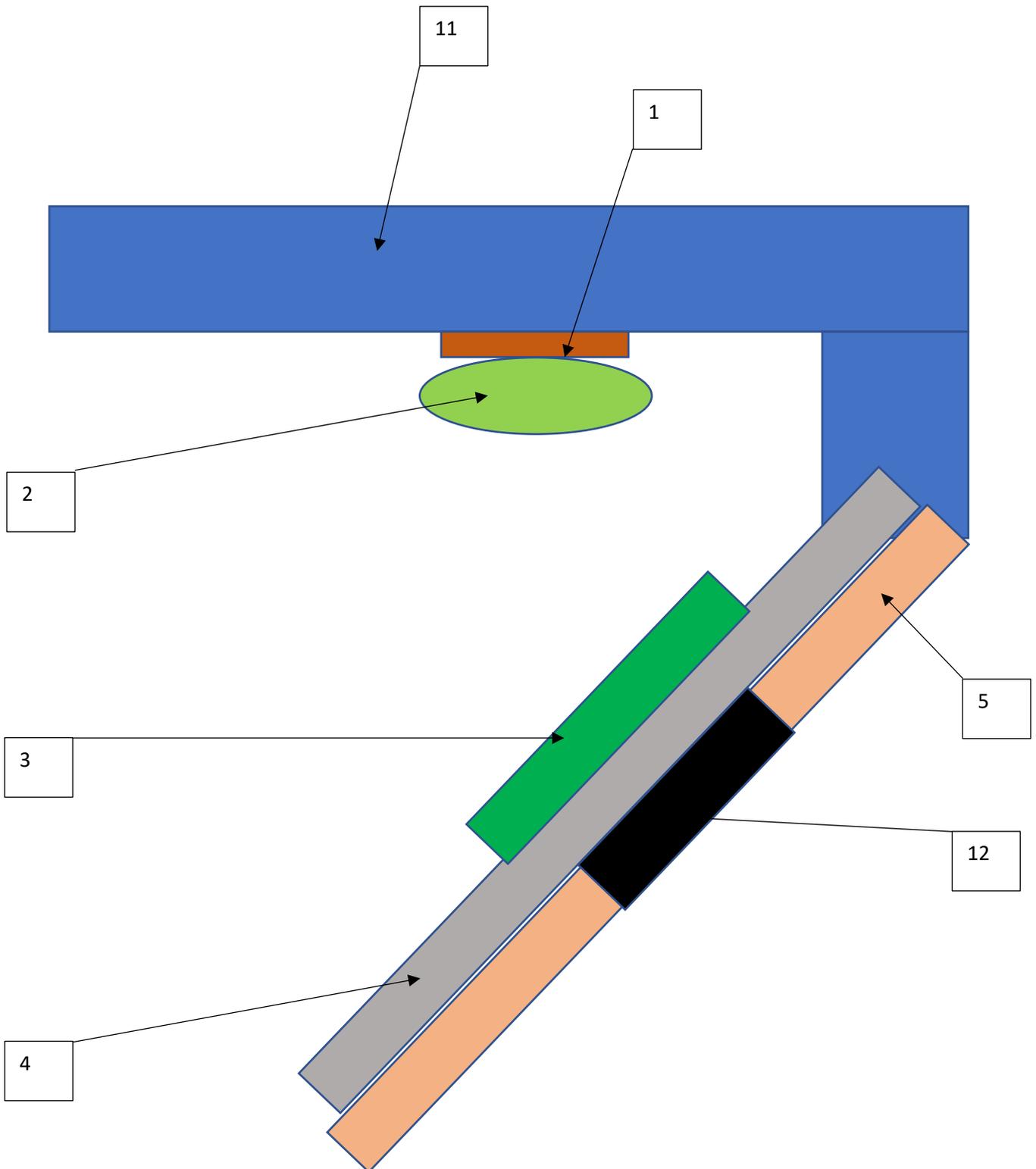
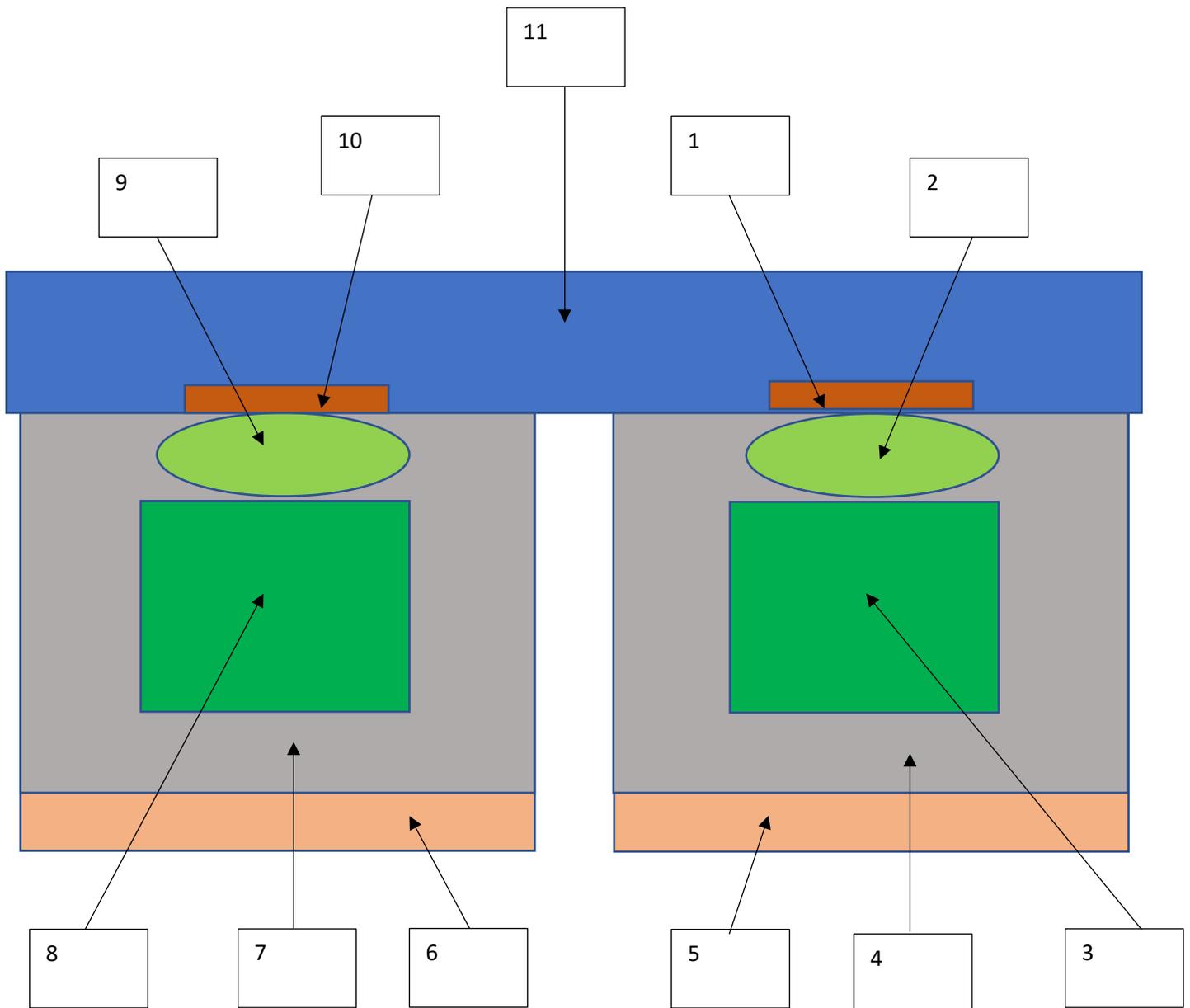


Diagram two: the rear view.



- The components of the main configuration of the head mounted display.

Component one:

The right overhead video display

Component two:

The right overhead focusing convex lens

Component three:

The right beam splitter glass angled at forty-five degrees

Component four:

The right transparent material plate angled at forty-five degrees

Component five:

The right transparent video display angled at forty-five degrees

Component six:

The left transparent video display angled at forty-five degrees

Component seven:

The left transparent material plate angled at forty-five degrees

Component eight:

The left beam splitter glass angled at forty-five degrees

Component nine:

The left overhead focusing convex lens

Component ten:

The left overhead video display

Component eleven:

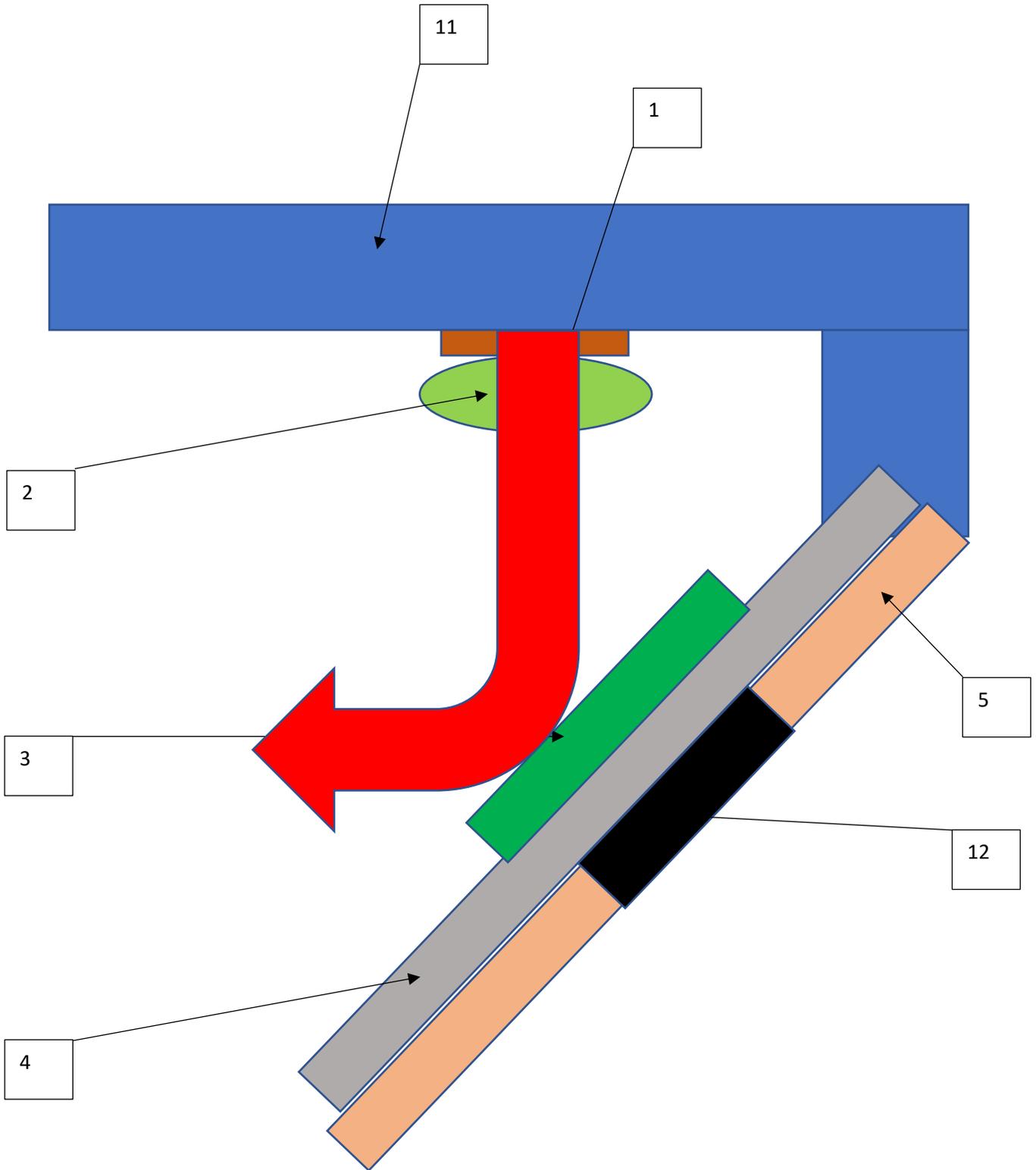
The structure which holds all the components together

Component twelve:

The right pixel not lit area

- The augmented reality head mounted device have two types of fields of views. They are described below.
  1. The central field of view
  2. The surrounding peripheral field of view
  
- Type one: The central field of view
  1. The two overhead video displays (labelled as components one and ten) display two video feeds which will be projected onto the two forty-five-degree angled beam splitters (labelled as components three and eight) after being focused by the two overhead convex lenses (labelled as components two and nine).
  2. The two projections of the two overhead video displays (labelled as components one and ten) after falling onto the two forty-five-degree angled beam splitters (labelled as components three and eight) will be reflected and will travel towards the user.
  3. In each of the two transparent video displays (labelled as components five and six), a central portion is configured to be of transparent color (no pixels lit). These central portions are equivalent to the surface areas of the two projections of the two overhead video displays (labelled as components one and ten) that will occupy the two beam splitter glasses (labelled as components three and eight).
  4. This central field of view configuration allows the user to experience a focused central field of view.

- The above-described configuration is given by the diagram below. The red bent arrow highlights the path of the overhead projection.



- Type two: The surrounding peripheral field of view

The two transparent video displays (labelled as components five and six) will project their video feeds (the video feeds surrounding the pixel not lit-transparent central areas mentioned in description three of the type one field of view) towards the user.

- The user of this augmented reality head mounted device configuration will be able to experience a central focused field of view with the perception of the surrounding peripheral field of view.

## REFERENCES

Abeysekera, punarjeewa, "View combining virtual reality headset", Technical Disclosure Commons, (June 18, 2021)  
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