Design and Evaluation of Nanotechnology Based Speed of a Moving Object to Diagnose Tunnel Vision

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This straightforward idea is used in this study to calculate the moving objects' distance. We offer a mathematical justification for using this variation in the perceived speed with distance to calculate the separation between numerous far-off objects travelling at a fixed speed. Simple measurements of the distances of moving cars on the road, ships in the ocean, aeroplanes in the sky, and astronomical objects in space can all benefit from an understanding of this idea. Moreover, utilising the same principle, a point-of-care-testing (POCT) apparatus based on virtual motion pictures has been created, enabling the measurement of a viewer's tunnel vision angle of view. The patient undergoing testing is expected to follow the virtual moving object as it moves from one side of the screen to the other while it is generated by the virtual motion picture arrangement. With the help of a hand-held on-off stopwatch, the patient can "start" and "end" tracking the movement of the virtual object by marking its appearance on one side of the screen and its disappearance on the other. With the aid of the suggested POCT gadget, patients with tunnel vision, retinitis pigmentosa, or hypovolemia can have their angle of vision determined based on how they react to the virtual moving item on the screen.

Keywords: Nano technology, sensing system, Health.

1. Introduction

Dynamic measurement of a moving object's distance with time is a crucial task in many different domains, such as astronomy, construction engineering, navigation, and surveillance [1]. To assess the distance between the objects, the slope of the phase offset is associated with the frequency in this way. Nevertheless, the majority of these methods rely on the detection of the electromagnetic wave's reflected signal, which has drawbacks such as scattering, background noise, signal loss, fabrication complexity, and expense. The need of the hour is undoubtedly for a more affordable and straightforward way to measure time varying large distances between the observer and objects. In this direction, we present a technique that uses the idea of the observed speed of a moving item to calculate the distance between an observer and a moving object [2]. The apparent speed of an object moving at a genuine speed seems to

decrease as the item's distance from the observer increases. We use this straightforward idea to calculate the moving objects' distance [9]. We offer a mathematical justification for using this change in the observed speed with distance to calculate the separation between numerous far-off objects. The suggested idea may have implications for the easy measuring of the separation between, among other things, moving spacecraft, automobiles, aircraft, and ships [11].

The same idea has been used in the design and development of a virtual motion image-based point-of-care-testing (POCT) device, which measures the angle of vision of patients with tunnel vision [3]. In this context, it's crucial to highlight that the excessive use of display technologies like computers, cellphones, and televisions has made routine eye health monitoring crucial to modern living [6]. Even among middle-aged and younger adults, certain eye conditions like tunnel vision have become prevalent [13]. A person with this disease begins to see things from a smaller perspective. But because there aren't enough facilities for routine monitoring, the condition is typically discovered when it develops chronic [4].

The rest of the paper is organized as follows: Section 2 provides the classification scheme for the survey; Section 3 provides an overview of proposed architecture. Section 4 provides a summary and comparison of the results of the various papers discussed in this taxonomy. Finally, Section 5 concludes the paper.

2. Literature Review

All of the previously stated strategies, however, have drawbacks, including more installation and operating costs, the need for medical specialists, the immobility of the equipment, and intricate data processing. With this in mind, we present here a technique for determining a patient's angle of view using the principle of observed speed of a moving object for the POCT of the tunnel vision [5]. The patient undergoing testing is expected to follow the virtual moving object on the screen as it moves from one side of the device to the other when the virtual motion picture arrangement creates it. The patient has an on-off stopwatch that allows him or her to "start" tracking the movement of the virtual object when it appears on one side of the screen and to stop when it disappears on the other. With the use of the suggested POCT device, the angle of vision of patients with tunnel vision, retinitis pigmentosa, or hypovolemia can be determined based on the patient's reaction to the virtual moving item on the screen. [12].

3. Materials and Methods

Material

To conduct the studies, a 13 megapixel Redmi 5A digital camera was utilised. The programmes ImageJ, IrfanView, and Adobe Photoshop were utilised to examine the recorded pictures and movies. We purchased double-sided tapes from nearby suppliers.

Methods

To carry out the previously mentioned studies, digital cameras were used. To comprehend the idea of the visual planes, which establish the observed measurement of an object, an

experiment was conducted. In this experiment, the angle between the camera axis and the object, or camera-angle (a), was examined in several photographs of a rectangular item. In this instance, photographs of a rectangular item (about 46 cm by 28 cm) were captured by tilting the camera at various angles, as illustrated in Figure 1's image (d). After that, the photos were post-processed to examine the outcomes [7-10].

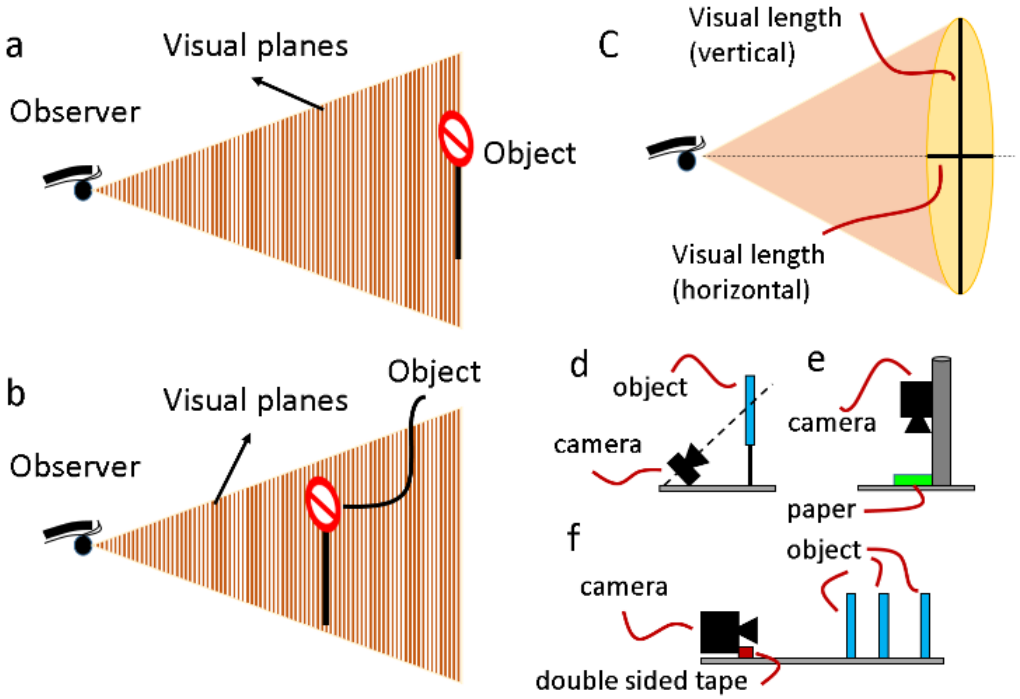

Figure 1: The concept of visual planes.

4. Results and Discussions

The previously described idea can also be utilised in the medical diagnosis of tunnel vision, which is a result of many illnesses such as hypovolemia or retinitis pigmentosa. Patients with the aforementioned disorders experience a contraction of their field of vision.

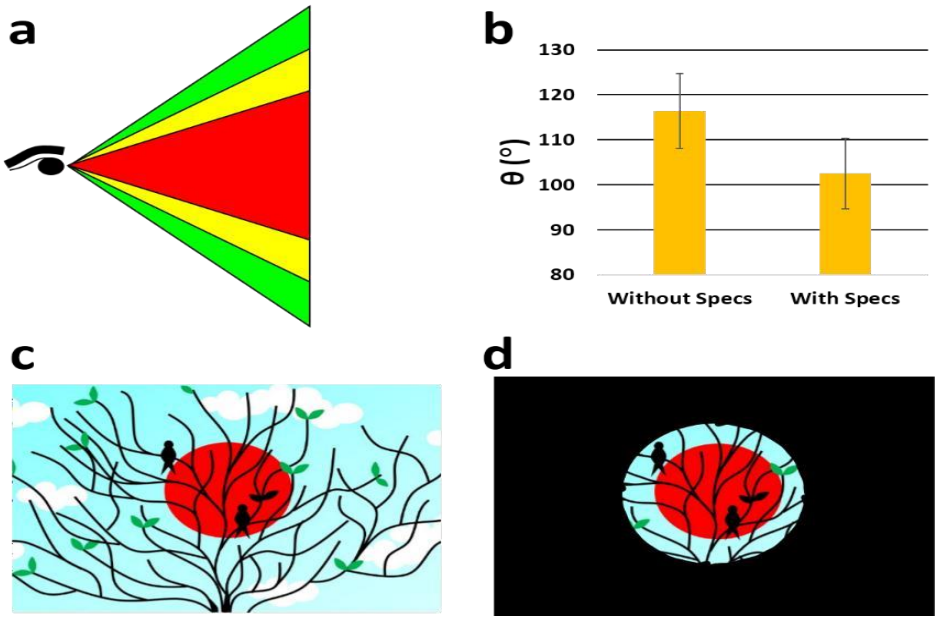

Figure 2: The measurement of angle of view using the proposed methodology

The angle of view measurement using the suggested methods is displayed in Figure 2. The angle of view contraction notion is illustrated in image (a), where green denotes normal, yellow denotes a border, and red denotes the start of the disorder. The measured angle of vision of a person using and not wearing glasses is displayed in image (b). In this experiment, the person watched a video on a screen while timing the playback. Wearing power glasses usually causes a person to lose some of their eyesight because the lenses impede their field of vision. Using images (c) and (d) to demonstrate the effects of tunnel vision and normal vision, respectively, the biological significance of angle of view measurement is explained. Therefore, the suggested approach may be helpful in identifying conditions related to tunnel vision. A proof-of-concept prototype for measuring the angle of view for the POCT of eye illnesses related to tunnel vision is depicted in Figure 3. The time measurement unit and display make up the device. As seen in the image (a), the headset has a display and a belt to adjust the headset while a portable stopwatch records the time. Two eyepieces are available for viewing videos on the display. As a result, the moment the patient's eyes are fitted with the headset and a moving item appears in the display to pass through side by side, the patient activates the stopwatch.

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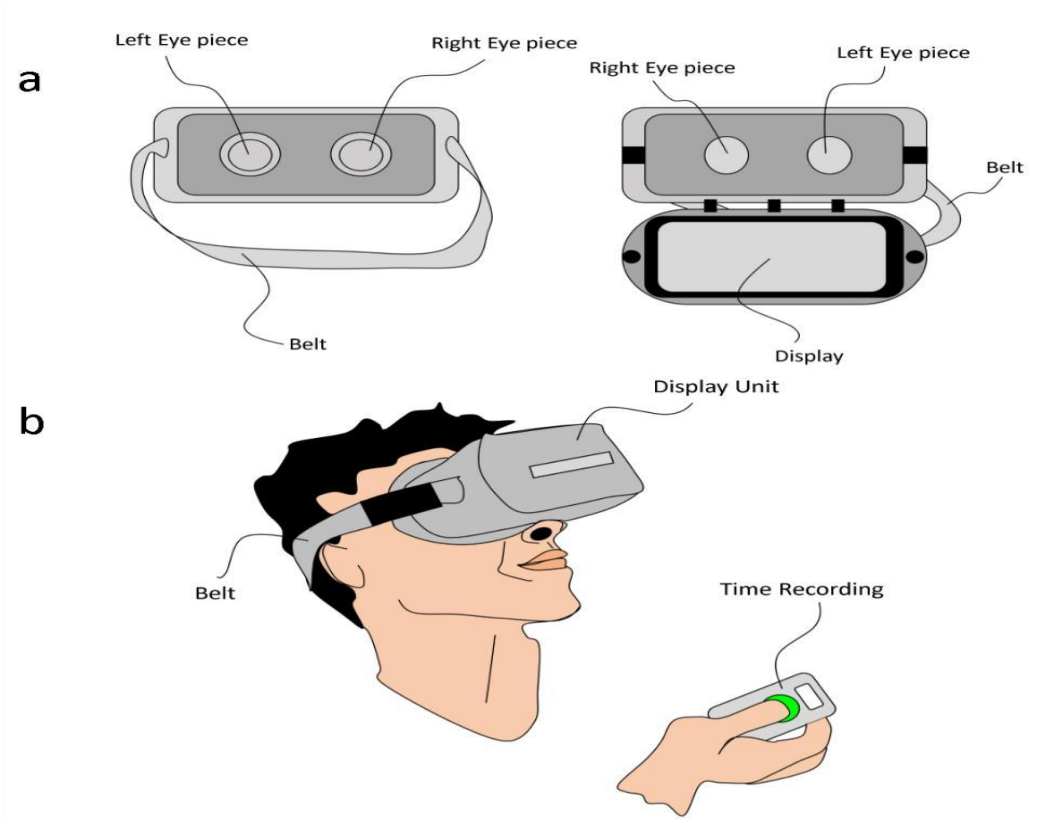

Figure 3: The interior of the headset.

Along with its use as a POCT device for tunnel vision detection, the results can be significant in the easy measuring of the distance of moving celestial objects in space, automobiles on the road, aeroplanes in the sky, or ships in the water.

5. Conclusion

The study also demonstrates that an object enters a new visual plane with a greater (lower) visual length and a smaller (bigger) appearance when it moves away from (to) or closer to) an observer. According to the same idea, two objects that are examined from an infinite distance appear to be a single point. This very fact can be used to correlate the viewer's angle of view. It is commonly known that a person's field of vision can be used as a diagnostic tool for a variety of conditions, including hypovolemia and tunnel vision caused by retinitis pigmentosa. A point-of-care-testing (POCT) gadget that utilises virtual motion pictures and is designed with the patient's angle of view in mind has been developed using the previously mentioned idea. A virtual moving item is projected onto a screen via a headset, and the test subject's job is to follow the object's movement from one side of the screen to the other. The patient has a stopwatch that they use to measure how quickly the virtual object moves from the moment it appears on one side of the screen to the other, when the exercise comes to a conclusion. With

the aid of the suggested POCT equipment, the angle of view of a patient with tunnel vision can be determined based on their response.

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