Technology Commercialization Opportunity

System and Method for Eye Tracking – Multiple Iris Features

Technology Description

Contemporary eye trackers collect images of the users' eyes and compute gaze based on successive estimates of eye position. Modern systems either fit explicit (2D or 3D) mathematical models to features extracted from the images, or rely on neural-network architectures and extensive labeled training sets to build appearance-based gaze-estimation systems. In either case, gaze position is estimated based on a per-frame basis, and gaze velocity (used to identify gaze events such as *fixations, saccades*, and *pursuit*) is computed as the derivative of the position over time. The noise inherent in the determination of gaze position is amplified in the derivative computation, making the classification of gaze events more difficult and error-prone.

We have developed an alternative approach to gaze tracking that significantly enhances the precision, reducing the noise and increasing the accuracy of event classification. By changing the fundamental measurement from *eye position* to *eye velocity*, we obtain large performance improvements for two reasons. First, the determination of velocity is performed with a large population of features (iris textures) instead of one or two (pupil center and/or corneal reflection). Second, because the initial measure is velocity, gaze position is computed by integrating velocity over time, an operation that reduces variance due to noise rather than increasing it, as is the case in traditional methods.

Keywords: Eye tracking, gaze detection, iris detection, motion detection, high-precision gaze tracking.

Technology Readiness

The Enhancing Perceived Image Quality at Capture using Gaze Detection technology is presently at this level of readiness:

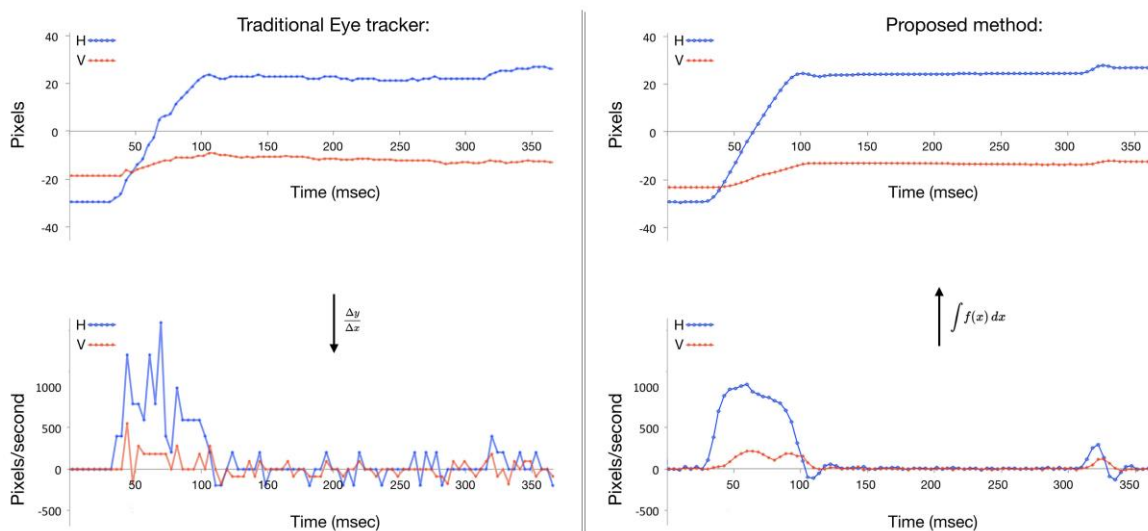| Idea	Concept	Prototype	Alpha Version	Beta Version	Released

The inventors of the System and Method for Eye Tracking technology will work with licensees to develop and implement it in products.

Intellectual Property

US2017/034756, IPC No. G06K 9/00 (2006.01)

Intellectual Property Management Office

Rochester Institute of Technology – Intellectual Property Management Office
145 Lomb Memorial Drive (87-2469) Rochester, NY 14623

Applications:

Any application that can benefit from decreased noise, increased precision, and enhanced event detection can take advantage of the superior performance of this technology. In the figure below, the left column shows the position (top row) and velocity (bottom row) signals from a traditional video-based eye tracker. While the 5° saccadic eye movement is clearly visible at ~50 msec, the noise in the velocity signal (computed by differentiating the position signal) makes it difficult to identify the onset, offset, and peak-velocity point of the saccade. There might be a microsaccade at ~325 msec, though the noise in the velocity signal would make it difficult to detect in the horizontal signal and impossible in the vertical signal. The right column shows the results of the proposed method applied to the same video record. The velocity signal (lower right), calculated directly from the multiple iris features, clearly shows the time of onset, offset, and peak-velocity for the 5° saccade, and the microsaccade is easily localized in both horizontal and vertical records. The proposed method is inherently low noise, but the position signal (top right) is even lower noise due to the noise-reduction properties of the integration computations used to derive position from the raw velocity signal.

Target Customers

- Eye tracker manufacturers
- VR/AR display manufacturers
- Human-computer interface companies

Opportunity

RIT's Intellectual Property Management Office (IPMO) is interested in working with those parties who are qualified and interested in the commercialization of this System and Method for Eye Tracking intellectual property. Arrangement types include licensing the application to existing organizations or new organizations that have expertise in the field or related fields.

Contact

Those interested in learning more about this opportunity should contact:

Mr. William E. Bond, Director of Intellectual Property Management at RIT (585) 475-2986

bill.bond@rit.edu

Please refer to ID 2016-019

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