Graduate Candidate	Roman Blum
Examiner	Prof. Dr. Thomas Bocek
Co-Examiner	Thomas Kälin, Noser Engineering AG, Root D4, LU
Subject Area	Software and Systems
Project Partner	Massimo Russo, ELCA Informatik AG, Zürich, ZH

Roman
Blum

Developing an ARKit-based Eye Tracking Framework

Control your iOS apps, hands-free

ETKit uses Apple's ARKit, which is used to track the position and orientation of both face and eyes in real-time.
Own presentment

Using the TrueDepth front-facing camera only, a gaze position on the screen is estimated.
Own presentment

Introduction: ARKit is a framework developed by Apple for creating Augmented Reality (AR) apps. It is capable of tracking the position and orientation of both the face and eyes in real-time. It is also the backbone that enables Face ID for facial recognition to securely authenticate using the TrueDepth front-facing camera, available on iPhone X and later and iPad Pro models with the A12X Bionic chip.

Approach / Technology: For this thesis, the eye tracking framework ETKit is developed. It is based on Swift and ARKit builds the foundation to estimate the position where a person is looking at on the screen. Different mechanisms to estimate the position are evaluated and the advantages and disadvantages discussed. In addition, framework design is introduced, eye tracking techniques analyzed and key components for the framework presented.

Result: ETKit's extensive set of core components enables developers to build eye tracking apps for iOS devices. It lets developers track the position inside views, select buttons, rows, and items by gaze, trigger actions by looking at the boundaries of the screen, perform a specific task with a sequence of facial expressions, or conduct and analyze eye tracking tests using heat maps to gain powerful insights. Furthermore, the reference app "Gazaar" was implemented. It relies on eye tracking input to navigate and is intended for developers to understand how ETKit can be utilized, according to a working example.

ETKit makes building eye tracking apps quicker and easier. Conduct UI tests, perform actions by looking at screen edges and corners, or simply browse the web with your eyes.
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