PRIVACY BY DESIGN FOR BIOMETRIC AUTHENTICATION SOLUTIONS

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MARS Project
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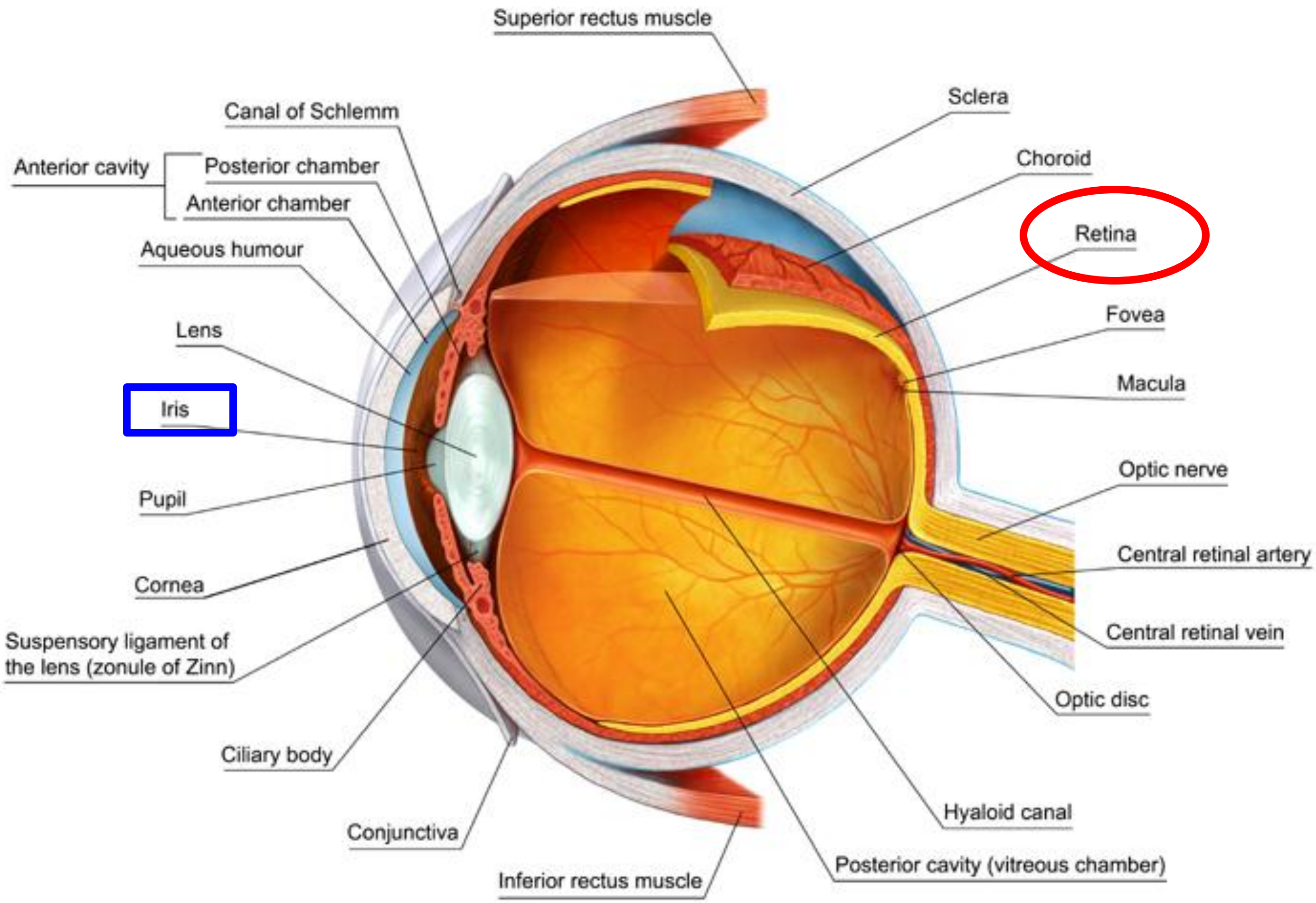
The MARS Project

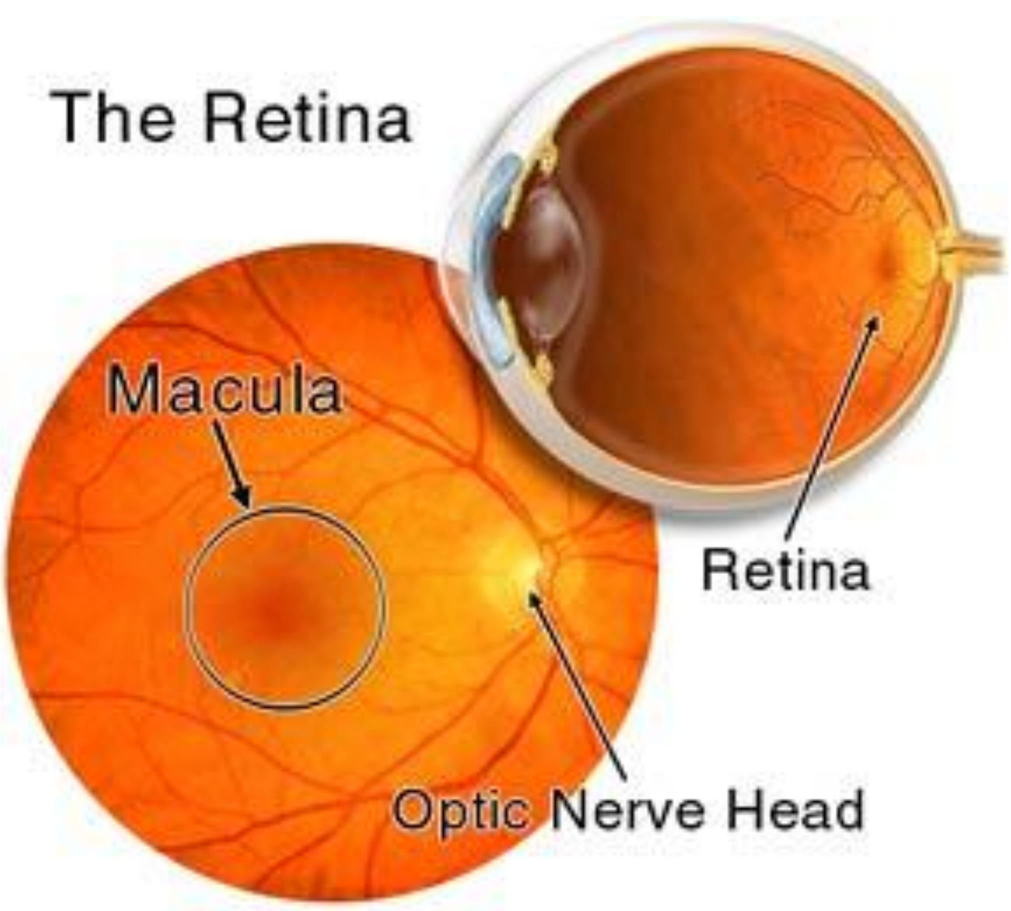
- MARS = Mobile Authentication via Retina Scanner
- Main goal: Preparing the grounds for a mobile retina scanner technology with **privacy by design** features
- Funded by the German Federal Ministry of Education and Research (Civil Security Research Programme)
- Project duration: 01/2012 until 12/214
- Interdisciplinary research project (11 partners)

What‘s a retina (scan)?

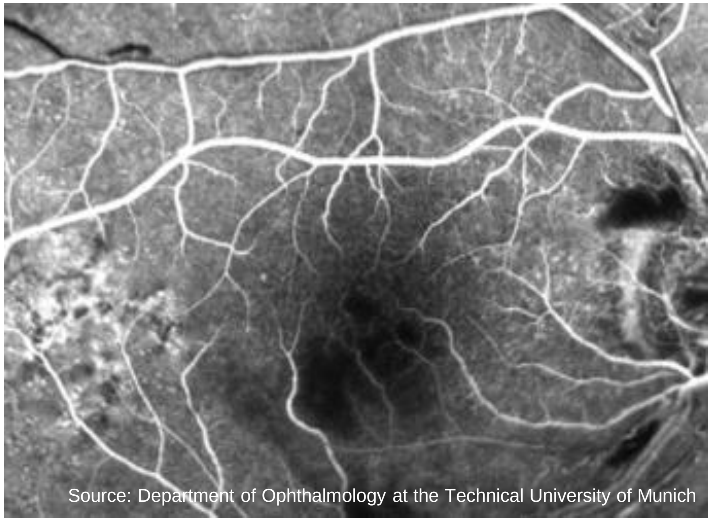
Location of the retina



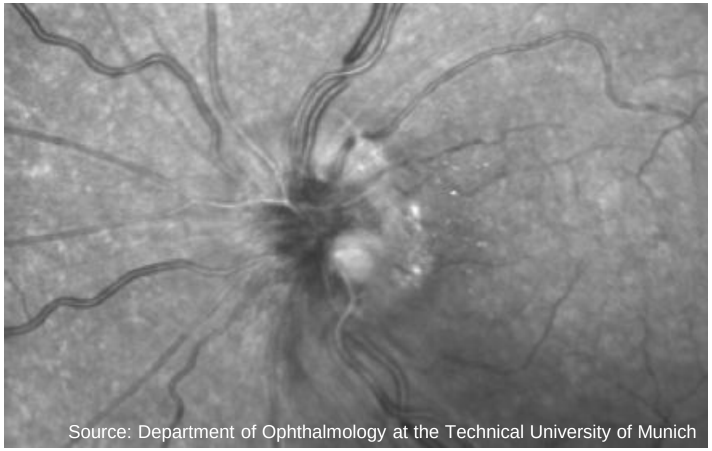
Different imaging techniques



Source: http://www.stlukeseye.com/anatomy/retina.html



Source: Department of Ophthalmology at the Technical University of Munich



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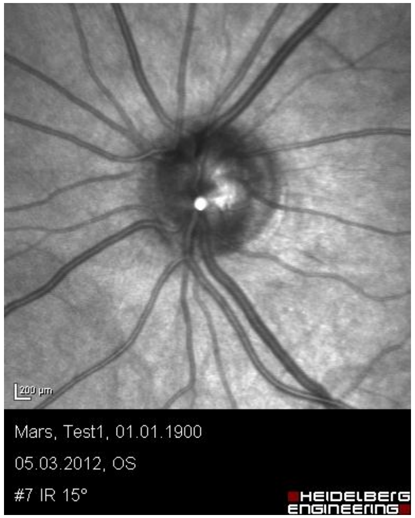
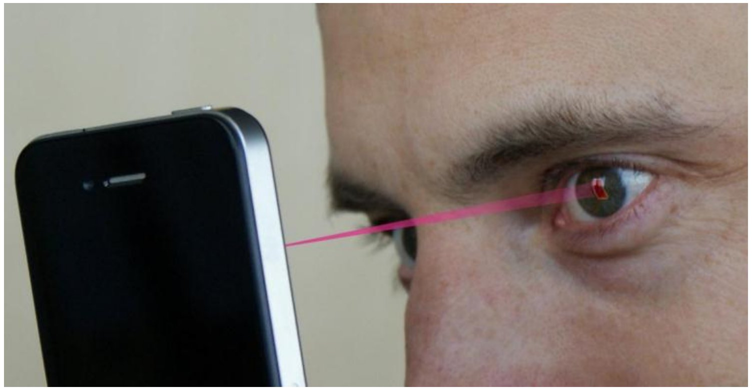
The MARS technology

- Authentication through the retina’s unique structure of blood vessels
- Miniaturisation and the integration of the technology into mobile devices





- Fields of applications:
  - Online-banking
  - Access control in security contexts
  - …

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Scan process

- First scan (enrolment)
  - Infrared laser scan (unperceivable)
  - Image and template creation
  - Template stored locally or on service provider’s server
- Further scans (authentication)
  - Infrared laser scan with mobile device
  - Matching of the scan’s image against the template either on the mobile device or by the service provider
  - Communication (scan image/control template or authentication results) with the service provider

What has **TA** and **privacy** to do with that?

Technology assessment and user acceptance

- Medical evaluation (Medical eye specialists from TU Munich)
- Privacy considerations
  - Informational privacy: Legal analysis of retina scans with the focus on data protection (Centre for Applied Law (ZAR) at the Karlsruhe Institute for Technology)
  - Bodily privacy
  - Privacy Impact Assessment
- Economic evaluation
- User acceptance
  - Ergonomics and added security value
  - Focus groups

Main challenges towards privacy

- Surplus data
  - Retinal data can contain highly sensitive information such as health data (e.g. hints to diabetes, hypertension or drug abuse)
  - Dual use
- System architecture
  - Centralised vs. decentralised storage and processing of biometric data
  - Communication of more (images) or less (templates) sensitive data over public networks
- Retina as an internal biometric feature
  - The body as an extremely intimate sphere
  - Scanning perceived as an intrusion into the body

Privacy by design approaches

- Use of an **internal** biometric feature (needs co-operation)
- Design of scan engine (images contain less sensitive information)
- Immediate deletion of the retinal image (raw data)
  - No communication or storage of raw data (especially not on third party computers)
  - “De-specialisation” of the retinal data --> limiting legal requirements for data protection
- Maximum decentralised architecture
  - Reference template under the control of the user
  - Use of encapsulated and tamper-proof hardware
- BUT: elements need to be balanced against other requirements (e.g. burden of proof)

Initial conclusions

- Privacy by design is possible!
- Not necessarily a trade-off between privacy and security
- Interdisciplinary research is challenging but crucial
- Vigilance towards only fostering additional legitimacy

Outlook

- Acceptance research
  - Ergonomics and added security value
  - Focus groups
- Economic evaluation
- Data Protection and Privacy Impact Assessment