Monoxalyze

On Verifying the Provenance of Mobile, Human-Centric Data

Joshua Adkins and Prabal Dutta

Growth of Human Health and Fitness Data Collection

Healthcare is 17% of GDP in the US

- WorldBank

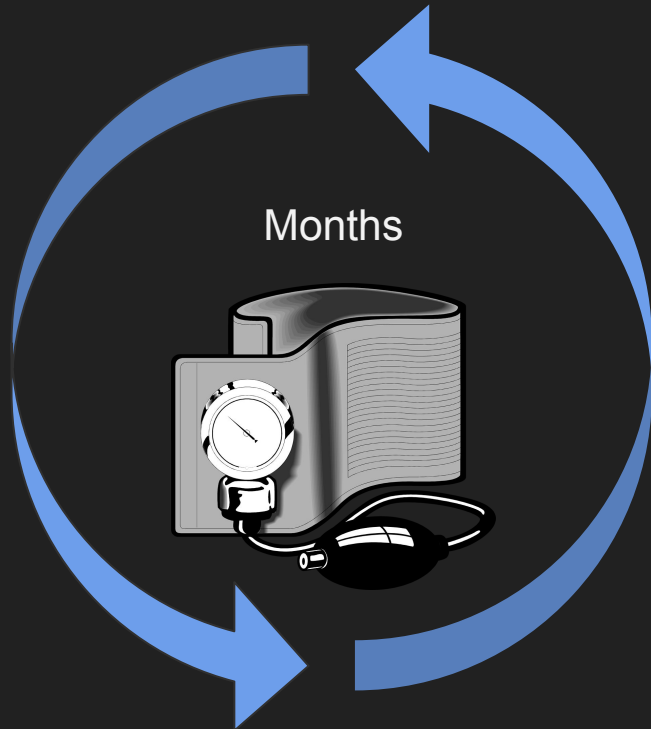"IoT has potential for transformative change in human health"

-McKinsey Global Institute

"By the end of the decade, this data-rich personalized analysis of our health will become the norm"

- Jeroen Tas, Philips Healthcare CEO

Mobile Health Data Improves Feedback Time

Months

Mobile Health Data Improves Feedback Time

Months

Days
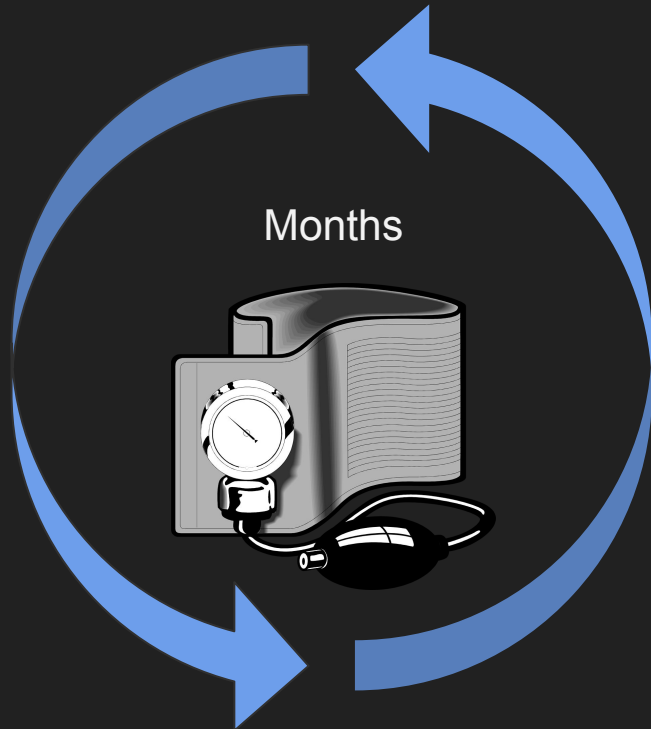
Positive Incentive for Doctors and Nurses

Healthcare Professionals

- Trained

- Positive Incentive

Positive/Neutral Incentive for Device Users

Healthcare Professionals

- Trained

- Positive Incentive

Device Users

- Untrained

- Positive/Neutral

Claim: Malicious Device Users Exist

Healthcare Professionals

- Trained

- Positive Incentive

Device Users

- Untrained

- Positive/Neutral

Malicious Device Users

- Untrained

- Attempting to provide incorrect data

Providing Compensation for Compliance

- Health insurance discounts for meeting fitness goals
- Paying pregnant mothers to stop smoking during pregnancy
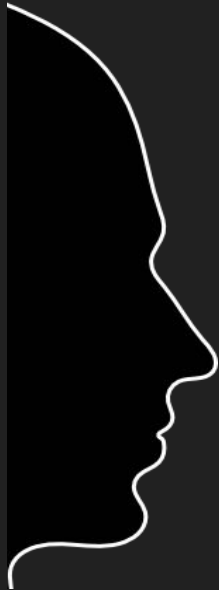 - Requires daily exhaled breath measurements to ensure compliance

Monoxalyze Smoking Cessation Compliance System
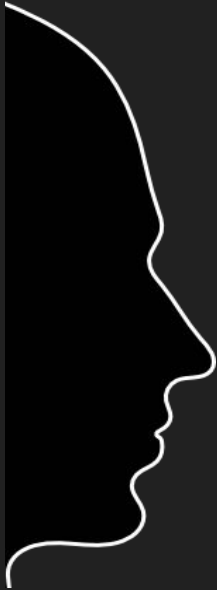
Monoxalyze Smoking Cessation Compliance System
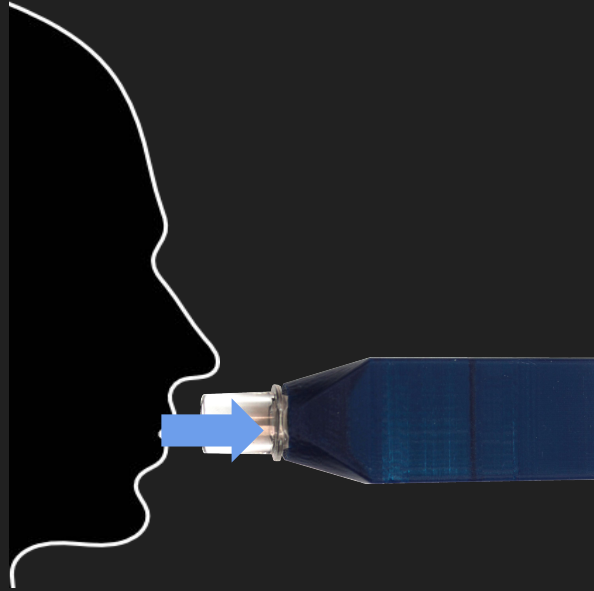

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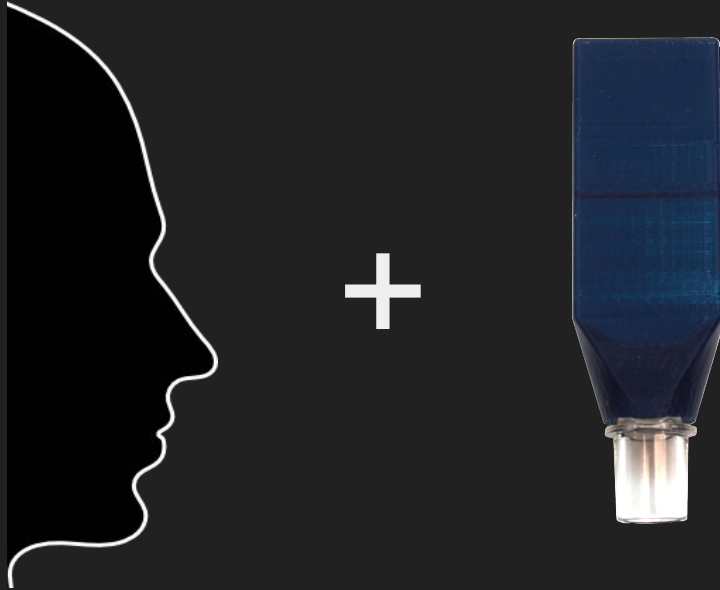
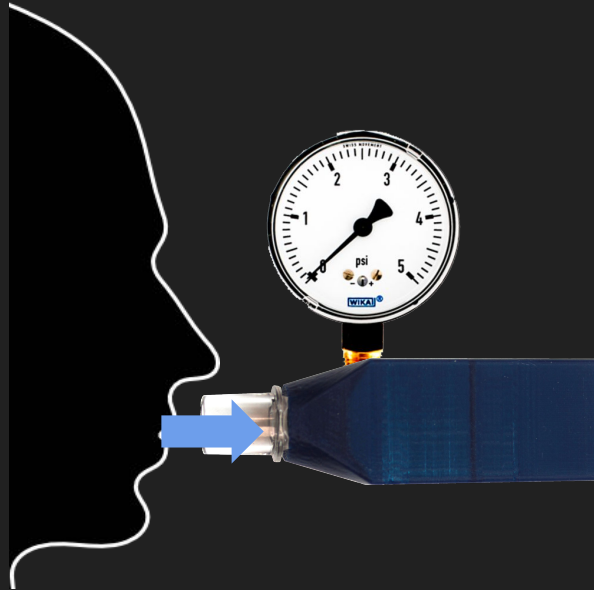# Monoxalyze Smoking Cessation Compliance System

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Failure to Exhale

Failure to Exhale

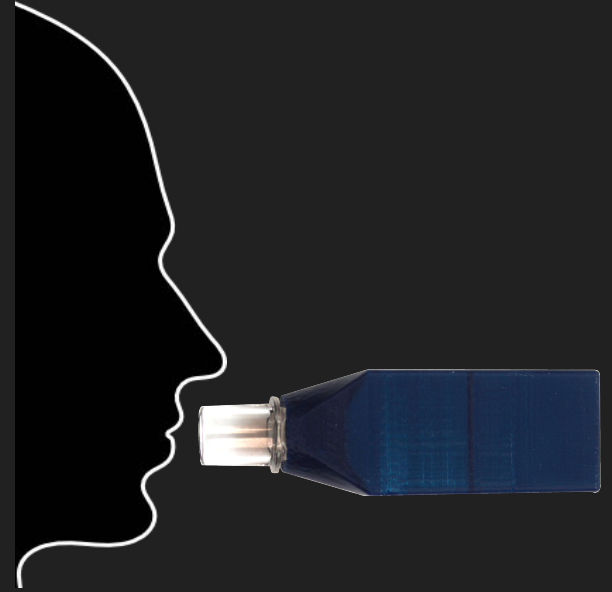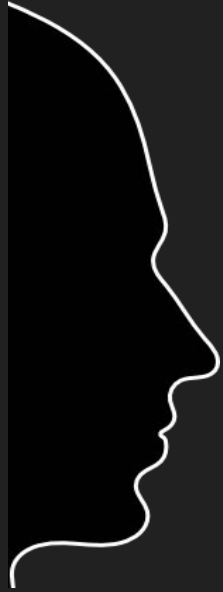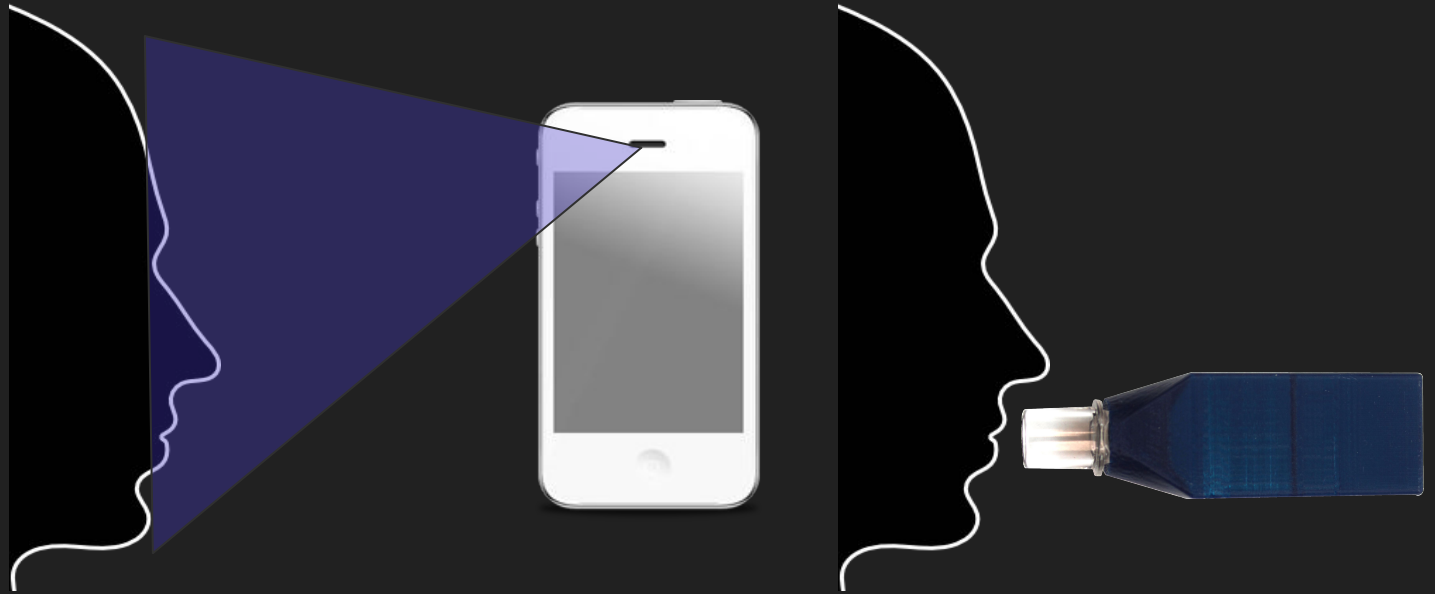# Exhalation Verification with Pressure Sensor
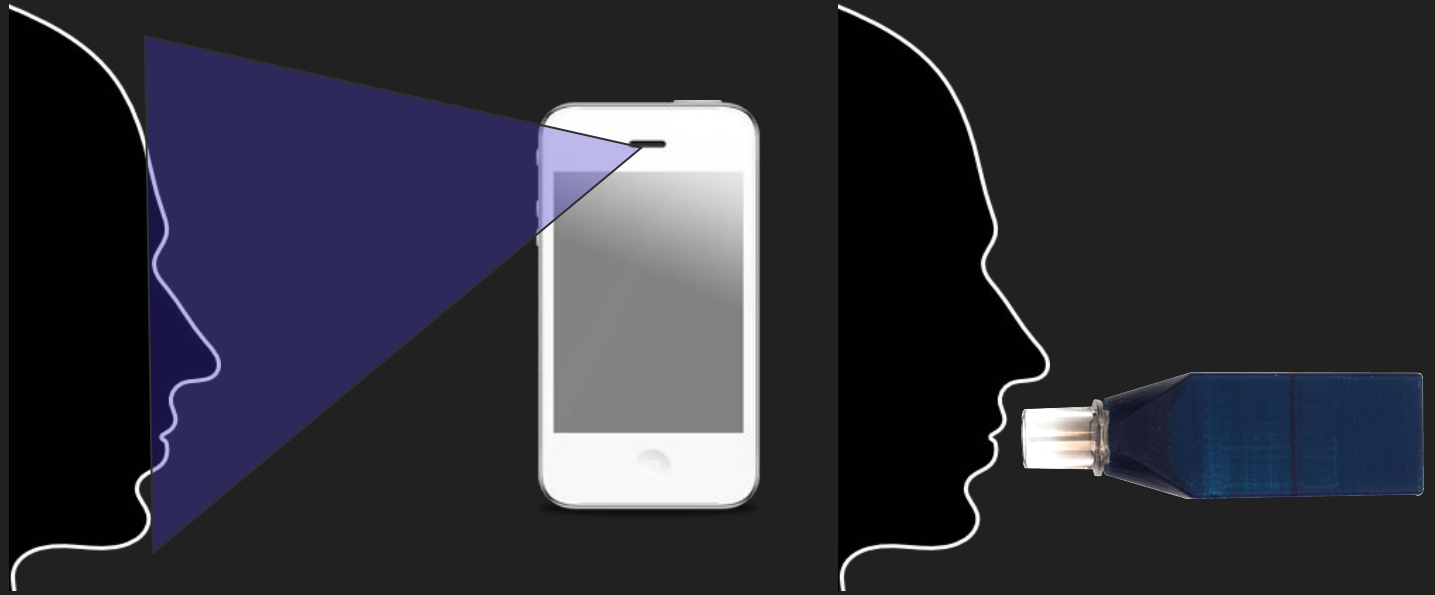
Have a Non-smoker Exhale

Have a Non-smoker Exhale

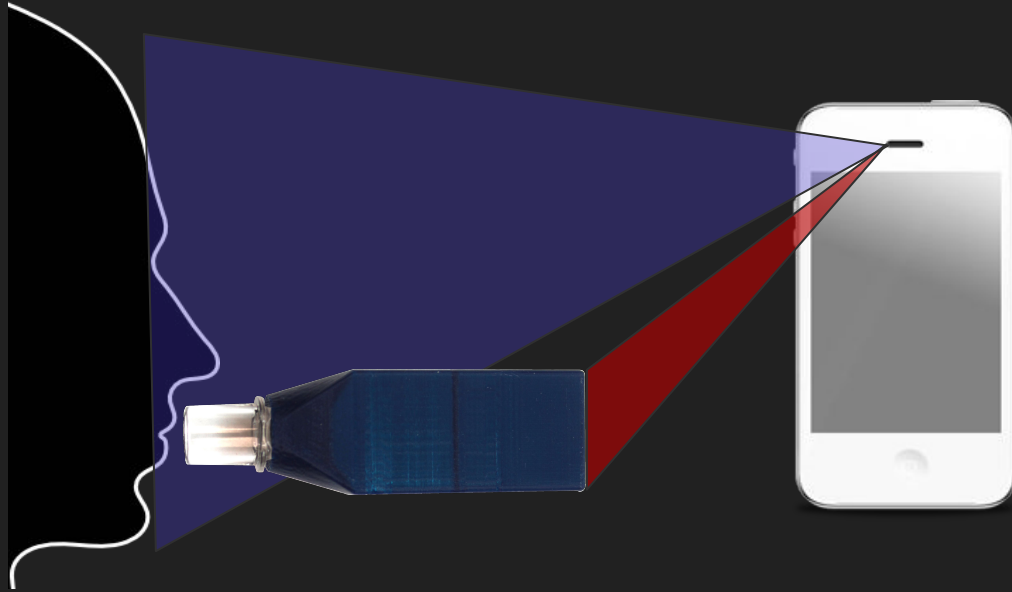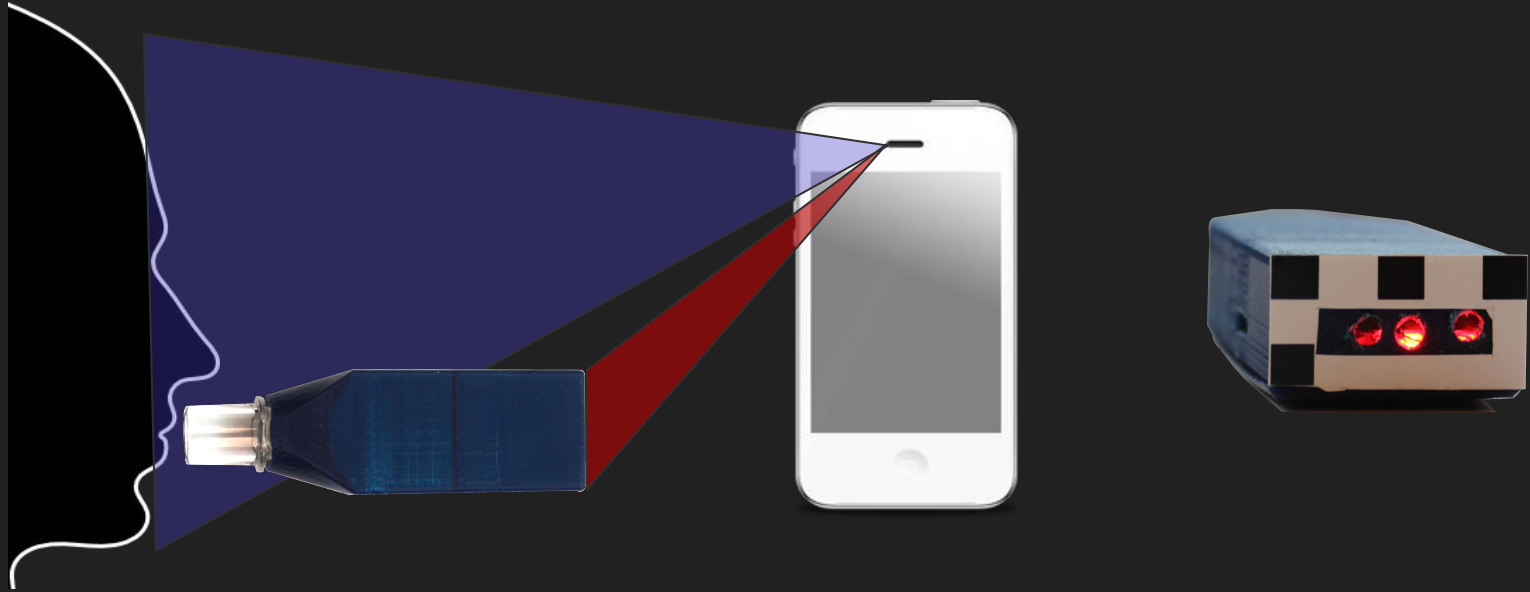# Verify Identity with Facial Recognition
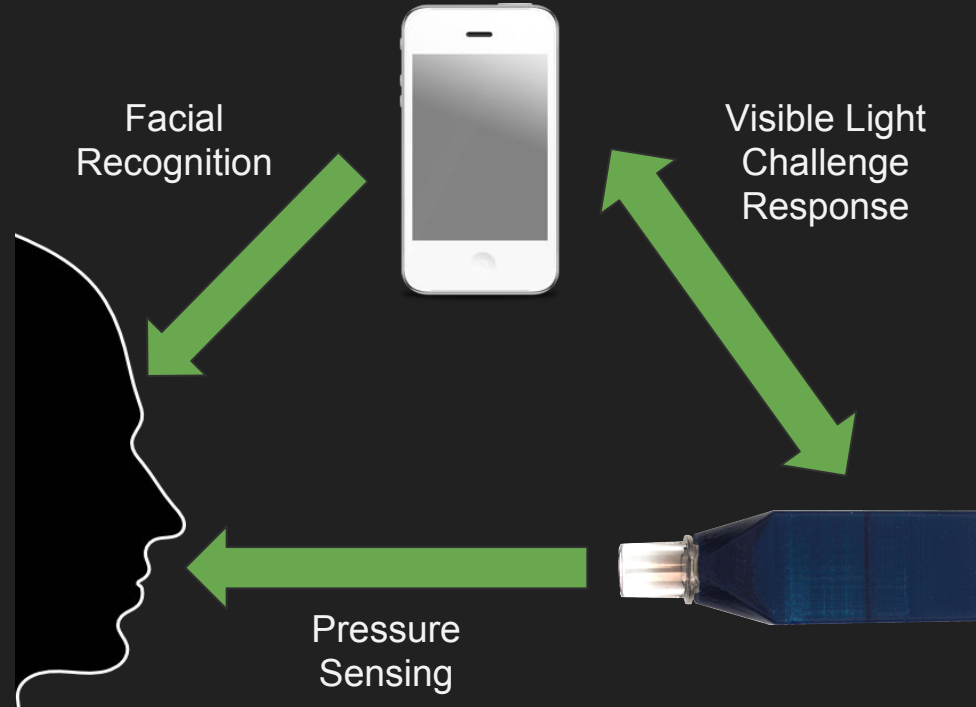
Non-smoker Exhale and Point Phone at your Face

Verify Device Location with Visible Light Communication

Visible Light Challenge Response

Transitive Trust between User, Device, and Phone

Facial Recognition

Visible Light Challenge Response

Pressure Sensing

Limitations

- This will never stop every possible attack
  - Many attacks can be stopped through semi-random testing
- Does not account for 'sophisticated' users
  - More traditional computer security measures required
  - Encryption
  - Trusted phone application

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