Zero-effort Payments (ZEP)

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Disclaimer

• All work presented is part of computer science research conducted at Microsoft Research

• Microsoft Research’s role is to develop new ideas and technologies

• We cannot comment on when or if such technologies will make their way into Microsoft’s products
Imagine The Future of Commerce

• Imagine a world in which:
  – At Starbucks, they start making your favorite drink the moment you enter the store
  – Sales people will already know your purchase history, and the kind of clothes you are shopping for
  – You can return merchandise without showing receipt
  – You can check-in a hotel or on a plane without waiting in line
This Talk’s Goal

• In this talk, we show that the technology needed to turn this vision into reality is coming soon!
Main Problem: Customer Identification

• Mission: identify customer on the fly with zero-inconvenience

• General idea: Use unobtrusive biometrics
  • Biometrics: identification of humans by their characteristics or traits

• Our work: Apply customer identification to making payments at Microsoft cafeterias
  – Zero-effort Payments
Possible Biometrics

• Using fingerprints
  – Accurate, but invasive
  – Easy to commit hard-to-detect fraud
  – Not everyone has a fingerprint

• Using voice
  – Inaccurate
  – Requires users to keep a “long speech”

• Iris scanning
  – Accurate, but invasive
Face Recognition

• Benefits:
  – Accurate when used to select among few people
  – Non-invasive
  – Difficult to commit hard-to-detect fraud

• Cons:
  – Accuracy falls when selecting from many people
Why is Face Recognition Hard for Computers?

- Computers build face profiles based on many measurements.
- Face recognition is easy for humans.
- Unclear how humans detect faces.

Face recognition steps:

- Face detection: detect faces in a photo.
- Face matching: match the face to a candidate based on measurements of facial features.
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  - Face detection
  - Face matching
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Overcoming Accuracy Barriers

• Leverage wireless proximity technology found in today’s smartphones
  – Enables quick discovery of “nearby” devices

• e.g., Bluetooth Low Energy (BLE)
Combining the Best of Both Worlds

• Wireless proximity: works well to discover “nearby” people
• Face recognition: works well when selecting among few people
• Two steps:
  1. Use wireless proximity to discover the 20 people in a Starbucks store; eliminate everyone else
  2. Do face recognition on 20 people (not millions)
Final Solution in Practice

• Two steps + final human-based validation:
  – Wireless proximity
  – Face recognition
  – Add human-assistance for final confirmation
Video-based Demo
ZEP Workflow

Bluetooth/BLE continuous scanning → Face recognition → Human assistance → Payment

BLE devices → $50 webcam → Cashier → Customer
Opportunity for Better Receipts

• Once purchase transaction is final, ZEP sends an e-mail receipt:
  • Includes link to video showing the purchase
  • Mechanism used for disputes
Privacy Issues

• How will people react when cameras at every cash register?

• No legal precedent available
  • Unlike security, traffic cameras

• ZEP includes privacy protocol for turning off camera
Conclusions

• ZEP enables new opportunities for commerce by identifying customers quickly and seamlessly
  • Many opportunities for new scenarios

• Privacy issues *can* be handled and mitigated
Questions?

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