Bus Usage Monitoring Through Wifi Probing

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Reference:

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Persona:
- Who is the target user?
  - UCSC transit operations manager

What she wants to know?
- How will this make her job easier?
- What are the operational costs?
- How easily can this system be integrated?
- Unnecessary changes
- High maintenance

What she doesn’t want:
- Unnecessary changes
- High maintenance

Design Objectives:
- Inexpensive
  - $100 per sensor unit, <$50 to operate annually
- Reliable
  - Weather proof, minimal maintenance
- Non-intrusive
  - Does not draw attention
- Accurate
  - Density measurements within 8% of actual
- Anonymous
  - Maximize collection & eliminate storage of PII

Wifi Probing & Privacy:
- Passenger devices are constantly probing for Wi-Fi
- We can match the unique identifier in those signals (MAC address) with the signal’s strength (RSSI)
- Data is aggregated before transmission so private data is never stored.
- Data collected from Wi-Fi transmitters lead to an accurate estimation of population density on buses

On-Bus Design:
- Power Supply: The microcontroller may be powered through an automobile accessory power or through a battery
- Microcontroller: The Raspberry Pi receives data from the adapter and sends population data via Wi-Fi to the database
- Nearby Phones: Probe
- Server: Abstract Design
- User: Database

Front-End

Passenger Count

Time

Need: more buses operating during peak hours

Goal: Deploy enough buses during peak hours

Back-End

Additional Information

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