



Micro-Blog: Sharing and Querying Content Through Mobile Phones and Social Participation

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Motivation

- **Sensor Networks**
 - **Inexpensive**
 - **Gather data over large area**
 - **Mobile phones**
- **“Virtual Information Telescope”**
 - **Goal: High-resolution view of the world**



Micro-Blog

- **Microblog**
 - **Blog: pictures, audio, text, sensor data**
 - **Time**
 - **Location**
- **Query**
 - **Human Response**
 - **Questions**
 - **Automatically Sensed**
 - **WiFi spots, accelerometer data**



Applications

- **Tourism**
 - Internet map
 - Query for parking, WiFi, restaurant reviews etc.
- **Micro-News**
 - Bloggers are the journalists
 - Automatically sensed news



Localization Service

- **Selects appropriate localization scheme**
 - Accuracy Requirements
 - Energy Requirements
- **Phones periodically update Micro-Blog server with location**
 - Used for query targeting
 - Push updates to subscribers



Energy-Aware Localization

- **Uses Place Lab for WiFi localization**
- **Stop moving**
 - WiFi fingerprint doesn't change
 - Get GPS data once to use for blogging
- **Moving**
 - Linearly interpolate with GPS/WiFi to estimate distance moved
 - Get GPS data after threshold is passed
 - Works for WiFi/GSM as well



Energy Awareness

- **Use GPS when creating microblogs**
 - Accuracy important
- **Use GSM/WiFi for location reporting**
 - Energy Efficient
 - Tolerates inaccuracy
- **Don't upload microblogs when energy is low**
 - Wait until later



Incentives

- **Social Networks**
 - Friends don't need incentives
 - Discourages public communication
 - Bad idea
- **“Give and Take”**
 - Query credits
 - Cheating
 - New accounts
 - Can detect some cheaters
 - Bad idea



Privacy

- **Lots of location information stored**
- **Three Modes**
 - **Private: Only User**
 - **Social: User's Friends**
 - **Public: Anyone**
- **Trust Micro-Blog service**
- **Obfuscation of location**



Spam

- **Limit queries per user**
 - From social network
 - From public
- **Doesn't solve the problem**
 - Limit can be used up by spam queries



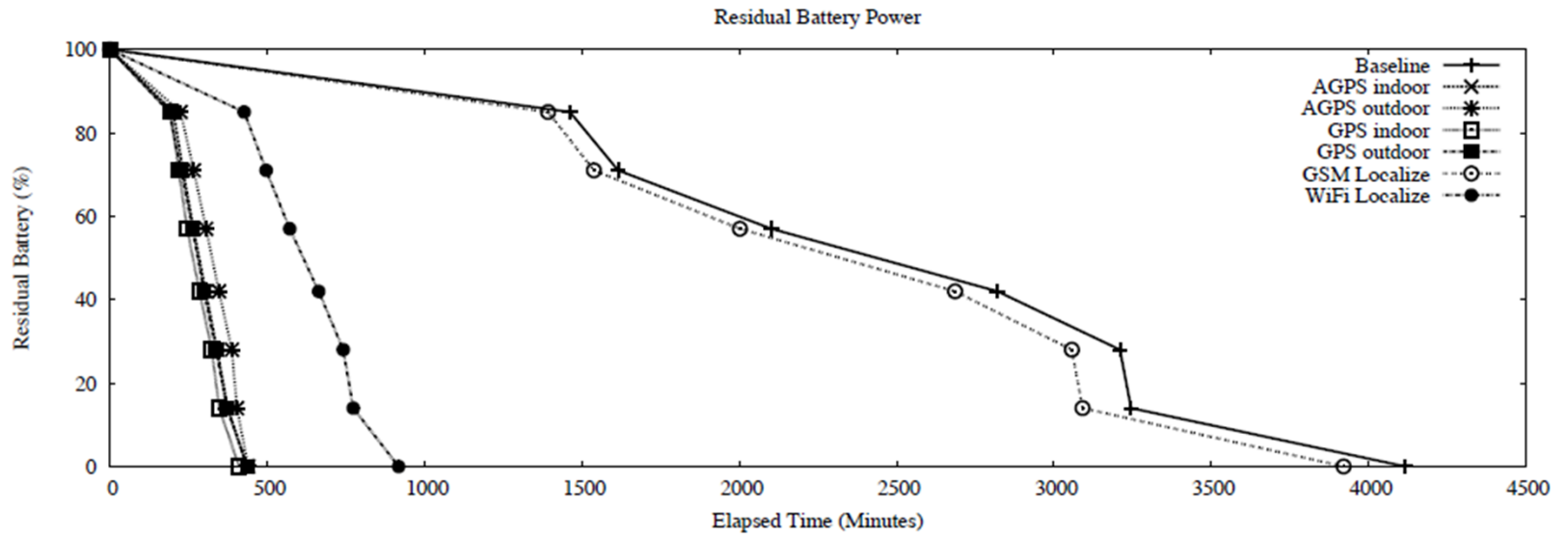
Content Inaccuracy

- **Reputation system**
 - Users can be rated
 - Don't publish blogs by people with low ratings
- **Can help with spam too**
 - If you spam, your rating goes down

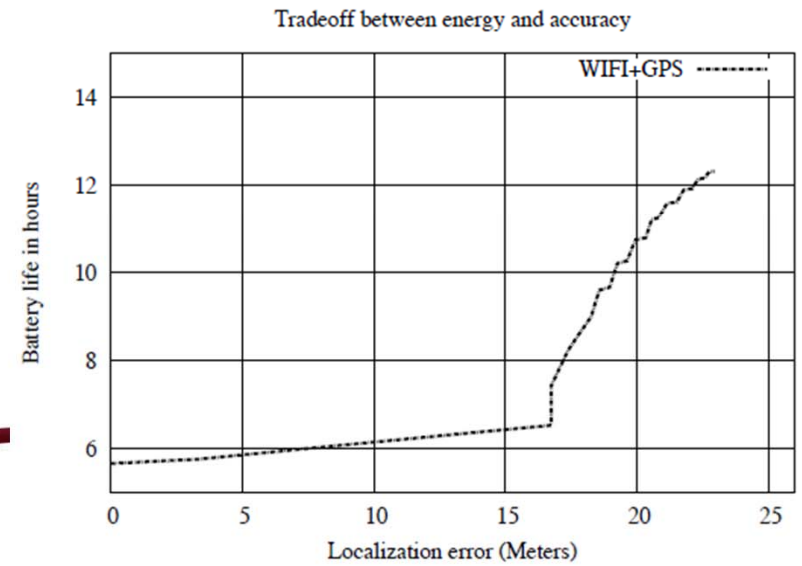
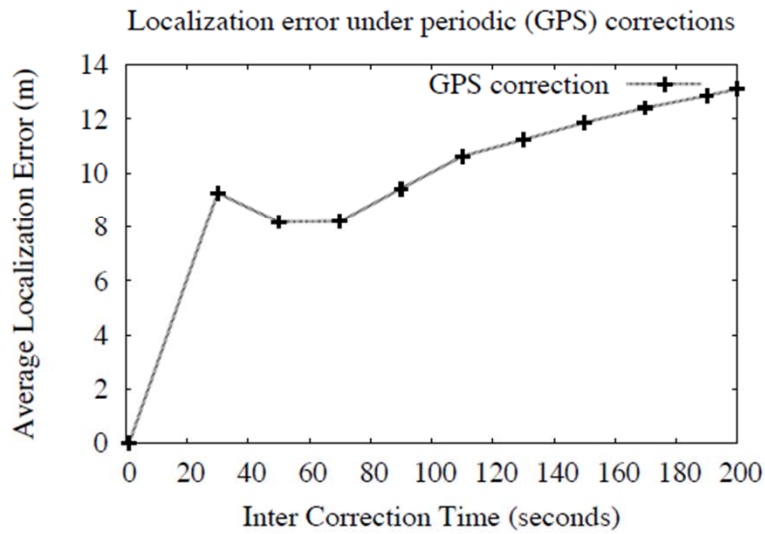


Evaluation

- **Battery Life vs. Accuracy**
- **GPS-WiFi**
 - WiFi with periodic GPS correction
- **WiFi-GSM**
 - GSM with periodic WiFi correction
 - Best balance of battery and accuracy
 - Default setting in Micro-Blog



	GPS	WiFi	GSM
Approx. Life	7.8 hours	20 hours	63 hours
Approx. Error	8m	25m	600m





Case Study

- **Blog in free time**
- **Most blogs are private**
 - No meaning to outsiders
- **Text vs. Voice**
 - Voice is too personal to share online
- **Evenings are the best times**
 - Could be hard to query at certain times



Contributions and Related Work

- **Design challenges not unique to Micro-Blog**
- **Automatic query response**
 - Traffic congestion
- **Lifelog (Nokia)**
 - Timeline of activities
 - Multimedia



Future Work

- **Accelerometers for localization**
 - Improved accuracy for low energy cost
- **Removing bad content**
- **Social network integration**
 - Twitter, Facebook already widely used
 - One application for blogging
 - Essential
- **Share GPS data**
 - One phone can provide location information to nearby phones
- **Security**
 - Everyone's location is being stored on one server
 - Huge security risk



Questions?