# Context-Aware Incentives for Trustworthy Crowdsensing via Mobile Social Networks

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http://nextconlab.academy/projects/satc.html

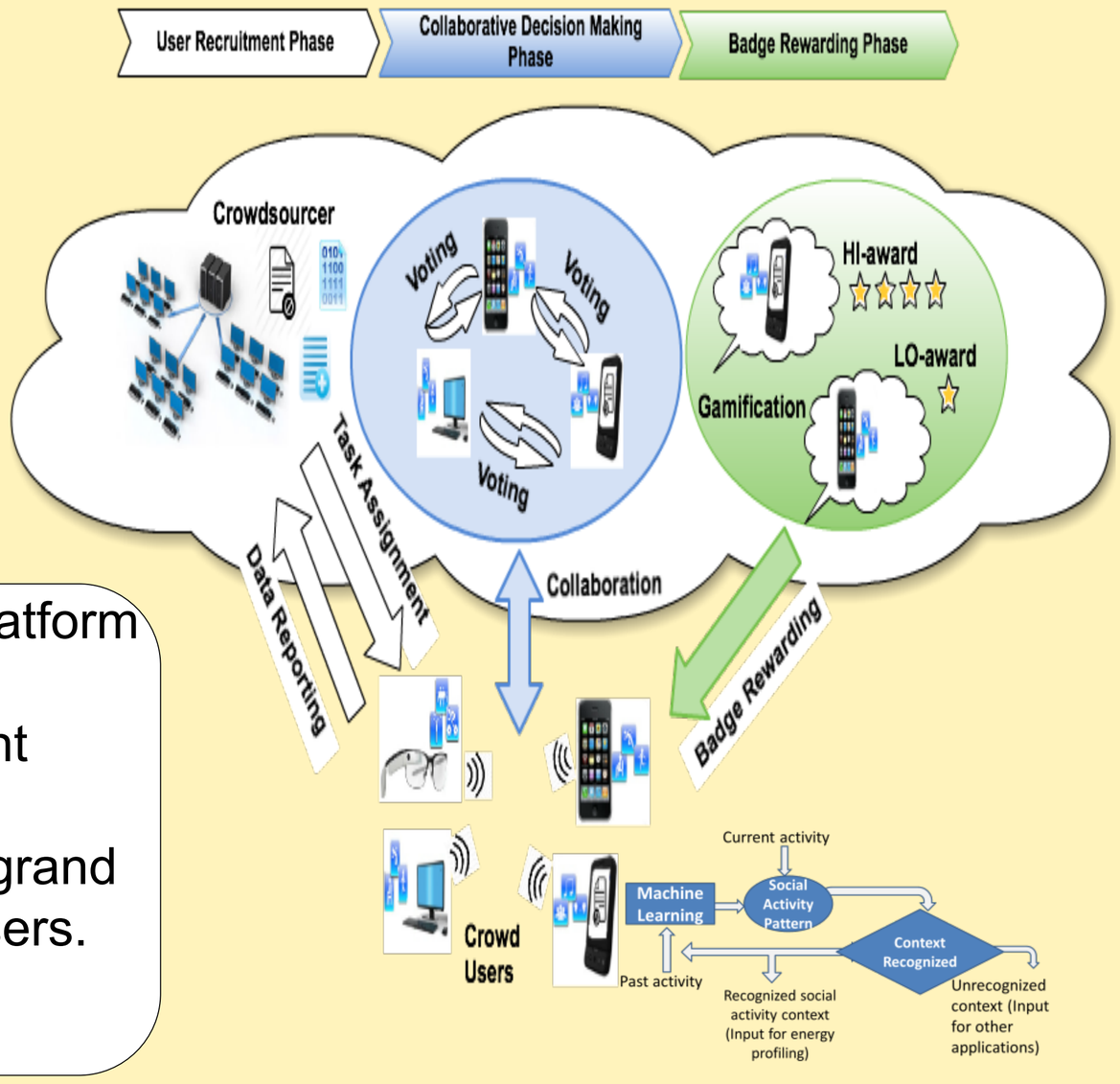
## Project Overview

The objective of this project is to address two important aspects in trustworthy crowdsensing systems:

- Energy-efficient data collection
- Context-aware incentives.

Three key challenges are needed to be addressed:

- Incentives to overcome the human factor
- Preventing Sybil-like attacks
- Quantifying and ensuring data and user trustworthiness under battery limitations




**Requirements**

- Implicit collaboration between recruiter platform and participants ➔ Effective Incentives
- Trade-off between platform and participant utilities ➔Sensing costs and data values
- Trustworthiness and truthfulness pose a grand challenge in the presence of malicious users.
  ➔ Need for reputation systems

## Solution Methodology

•Collaborative and game theoretic decision making with gamification
•Vote-based reputation system to detect adversary behavior. Repeated Subgame Perfect Equilibrium (SPE) model to ensure truthful voting.

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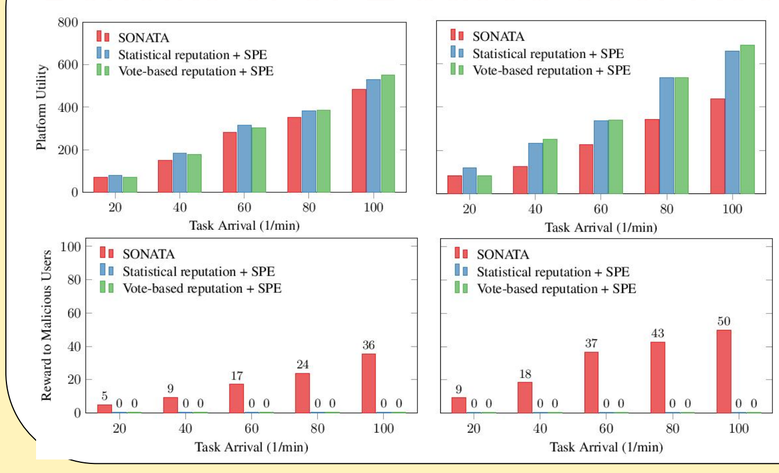
•Social activity of the users reveal battery usage profiles.
•Spatiotemporal knowledge abstraction for context generation and energy profiling.
•Sociability-based recruitment

Reverse auction-based user incentives for selection and rewarding.

### Distributed approaches for trustworthiness

- **SONATA: Social Network-Assisted Trustworthiness Assurance (Kantarci et al., 2016):** Integrates vote-based Sybil-defense mechanism into crowdsensing systems
- **Anchor-Assisted SONATA** (**Pouryazdan et al., 2016**) **:** Deploys trusted entities in the crowdsensing system
- **SPE-Based and Gamified Method (Pouryazdan et al., 2016):** Can be implemented over SONATA or statistical reputation-based framework

### Benefits of SPE-based User Recruitment




Ratio of malicious users in the population: 3% (left column) 5% (right column)

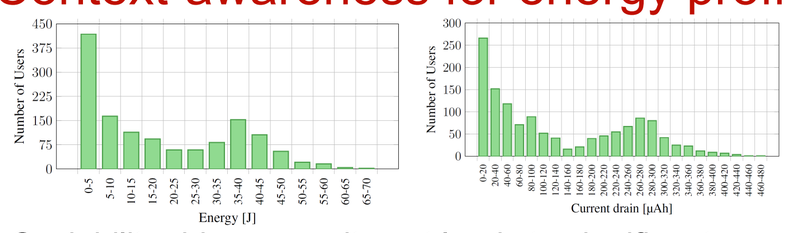
✓ SPE integration improves platform utility (value of data) and leaves adversaries out

### Context-awareness for energy profiling

Mobile apps are mostly used for social interaction.

Our **hypothesis**: If <u>users can be identified based on social contexts</u>, <u>those with higher social activity can be recruited frequently</u>, and the others can save energy. This can also be extended to sociability-based continuous authentication.

### Context-awareness for energy profiling




Sociability-driven recruitment leads to significant energy savings in sensing and communication (**Fiandrino et al, 2016).**

**Ongoing research: Sociability-driven continuous identification of malicious and regular users in crowdsensing systems.**

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The 3rd NSF Secure and Trustworthy Cyberspace Principal Investigator Meeting
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