

Privacy-Enhanced Data-Driven Health Monitoring for Smart and Connected Senior Communities

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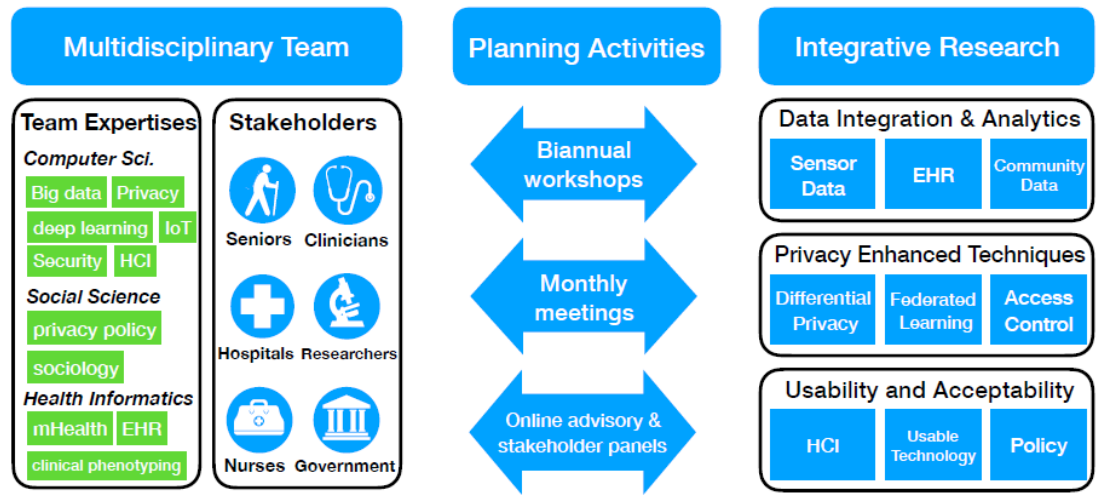
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Project Overview

Visual Schematic



Project Vision

- **Multidisciplinary team building:** academic researchers and community stakeholders
- **Planning activities:** workshops and online panels
- **Integrative research:**
 - Data Integration and Analysis: integrate and analyze various sources of data.
 - Privacy-Enhancing Technologies: address privacy concerns and regulation compliance in US and Japan.
 - Usability and acceptability: understand social and cultural differences between US and Japan.



Project Overview

Use-Inspired Research

- Target communities:
 - US: Atlanta area agency of aging
 - Japan: Kyoto Department of Health and Welfare
- Case studies:
 - Sleep monitoring
 - Amyotrophic lateral sclerosis (ALS) and dementia care
- Additional challenges:
 - Nursing home residents vs. in-home residents
 - Support for isolated seniors during covid or other pandemic situations
 - Inequities that create health disparities

PG Activities

- Engagement workshops
 - Kickoff workshop 12/2020
 - Midterm workshop 5/2021
 - End-of-project workshop 1/2022
- Refining research concepts
 - Privacy-Preserving Data Collection and Analysis for Health Monitoring
 - User Survey on the Acceptability of Personal Data Collection for Senior Citizens
- Identification of case studies
 - Team building
 - Disease/condition, types/sources of data, test site



Project Update

- Kickoff workshop with researchers and community stakeholders
 - Across two days: 12/14 and 12/22 8-10am EST
 - 17 participants (US: 11, Japan: 6) including researchers (CS, sociology, BMI, medicine), clinicians, government/aging agency administrators.
 - Learned about related efforts, discussed opportunities and challenges (technology, social science and community deployment gaps).
 - Identified potential themes for further discussion and collaboration, pilot projects (case studies) for preliminary studies, and additional collaborators and stakeholders
- Research concepts: Privacy-Preserving Data Collection and Analysis for Health Monitoring
 - Policy-aware location privacy (ESORICS'20)
 - High-utility federated learning with the shuffle model (AAAI'21)
 - Communication efficient federated generalized tensor factorization for collaborative health data analysis (WWW'21)
- Research concepts: Understanding User Acceptability and cultural and social differences in US and Japan
 - Initial survey with Nagahama 0th Prevention Cohort
 - Preliminary survey in planning for both US and Japan for summer 2021
- Identification of case studies:
 - Sleep monitoring and ALS/dementia care;
 - types/sources of data, test site



Project Evolution

- Identified case studies: sleep monitoring and ALS/dementia care
- Learned that the challenges and needs are different for nursing home residents and in-home residents. Additional support for isolated in-home seniors is needed during covid or other pandemic situations. We will focus on in-home setting for our research concepts and survey studies to better understand the challenges in depth.
- Learned that inequities in accessibility to technology and other socioeconomical factors may create or deepen health disparities. We will attempt to understand how different cultural/regional/social factors impact the acceptability of the technology and health outcomes (e.g. urban vs. rural, race).

