LIVELABS
Urban Lifestyle Innovation Platform

Real World Experiments

SMU LiveLabs is a city-scale research test-bed with progressive technologies for companies to run LARGE-SCALE consumer behavioral trials and experiments with novel mobile services on REAL people in REAL environments. Supported by the Singapore government and technology partners with total investment exceeding S$20m*, LiveLabs innovates in the areas of mobile computing, smartphone-based rich context sensing and real-time behavioural analytics capabilities via collaborative research with multinational technology giants. LiveLabs accelerates "market trials" of advanced broadband technologies by Telcos and wireless infrastructure companies. LiveLabs will involve the deployment of globally-unique large-scale (thousands of everyday consumers) lifestyle-centric research test-beds at multiple locations, including SMU's downtown campus, major shopping malls, Sentosa and Singapore Changi International Airport .

Offerings

1 **Globally Unique Test Facilities** - LiveLabs provides the opportunity to access globally unique real world indoor and outdoor instrumented test locations ideal for companies and organisations interested in developing and testing new approaches to uncover consumer and social insights.
Our technologies will:
1. Capture fine-grained individual and group context
2. Use real-time contextual triggers to interact with mobile users
3. Enable broadband wireless networks to adapt to rapid changes in network usage.

2 **Progressive Technology Development** – LiveLabs conducts research and development on:
1. User friendly mobile data collection and processing methods
2. Real time analytics
   (Scalable Analytics platforms for User location & activity, Group behaviour dynamics)
3. Proprietary mobile user interaction and experiment management systems
   (LiveLabs Intervention Engine)
4. Usage adaptive methods for optimising 4G mobile network environments

3 **Access to Ecosystem** – LiveLabs collaborates with various multinational technology companies, venue owners and other commercial partners to provide a comprehensive set of consumer touchpoints.

Locations & Applications

LiveLabs will instrument public spaces to serve the specific requirements of different industries. LiveLabs will build a participant base of 30,000 opt-in users from key public locations:

LiveLabs@SMU

Telco and Digital Media
- Quad-Play Offerings Targeted to Gen-Z Participants
- Rich IDM Delivery under Dynamic Indoor-Outdoor Hotspots

LiveLabs@Malls

Retail and Consumption
- Real-time Insight into In-Store+ Online Purchase and Visit Behavior
- Mall Visitor Experience Optimization

LiveLabs@ChangiAirport

Retail, Lifestyle & Tourism
- Crowd Behaviour & Movement Optimization
- Personalized information and promotions

LiveLabs@Sentosa

Tourism and Hospitality
- Crowd Behavior & Movement Optimization
- Personalized recommendations for attractions and F&B

LiveLabs will collaborate with interested venue owners to roll out more instrumented public spaces for testing.

http://livelabs.smu.edu.sg

Key Components

30,000 opt-in Consumers in Key Public Spaces
(SMU, Malls, Sentosa, Airport)

Advanced Wireless Broadband Networks + Mobile Devices

1. Provides adaptive, localized high-bandwidth for applications
2. Provides rich, real-time context for context-aware Apps, including fine-grained indoor location monitoring of mobile events
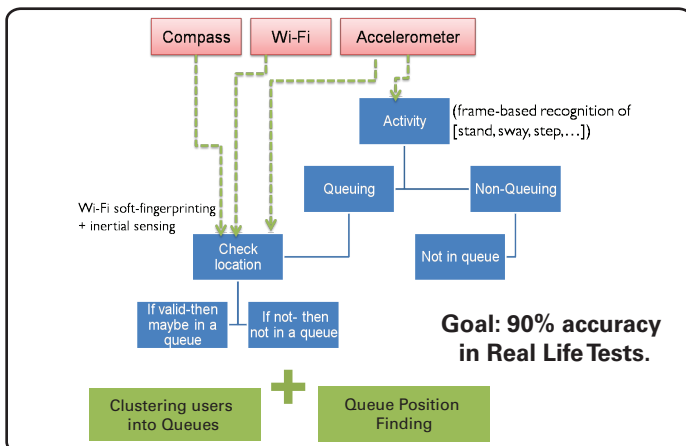
Relevant, Trusted Experimentation Service

1. Outsource participant selection, content delivery and results analysis.
2. Automates validating, deploying and monitoring of Mobile App user behavior - Detailed experiment specification language

Technology & Applications

LiveLabs has developed technologies in the following areas:

1 Group Analytics: Queue Detection

Compass | Wi-Fi | Accelerometer

Activity (frame-based recognition of [stand, sway, step,…])

Queuing / Non-Queuing

Wi-Fi soft-fingerprinting + inertial sensing

Check location

Not in queue

If valid-then maybe in a queue / If not- then not in a queue

Goal: 90% accuracy in Real Life Tests.

Clustering users into Queues + Queue Position Finding

2 Intervention Engine
Simple, but expressive, Web-based Interface for specifying Lifestyle Experiments/ Services

What location (e.g., SMU, 1st floor of Mall) does the participant need to be on

STATIC Demographic criteria (age, gender, occupation, etc.)

DYNAMIC Context Criteria (e.g.., person sitting down in the foodcourt)

Intervention—e.g., a pop-up "Notification" on screen with a discount coupon

3 Practical Indoor Localization

Optimizing indoor wireless networks

Location A (SMU) — (Empirically derived CDF of Location Error)

Location B (Mall) — (Empirically derived CDF of Location Error)

- Tracking continuous location of individuals within indoor locations using Wi-Fi 'fingerprinting', Inertial motion (accelerometer, compass) + barometer.
- Multiplatform systems (Android, iOS) empirically tested against real world challenges

4 Energy – Efficient Sensing of Activity

- Accelerometer (+ Gyroscope) to recognize micro activities
- Continuously adapt following parameters to save energy
  - Accelerometer sampling frequency
  - Classification Features (CF)

User1
A3R
Non-adaptive
No activity recog

Battery Remaining (% age)
Time

LiveLabs conducts all data collection activities and experiments in accordance with the prevailing Personal Data Protection laws of Singapore.

For enquiries on testing and collaborations, please send enquiries to livelabs@smu.edu.sg