P1752 Working Group Meeting

Sponsored by IEEE Engineering in Medicine & Biology (EMB) Standards Committee

Please mark your attendance at: https://tinyurl.com/yc3oxg6q (see chat window)

- 26 February 2019
- Teleconference
This document shows attendance from previous calls [https://tinyurl.com/yc3oxg6q](https://tinyurl.com/yc3oxg6q) (link in the chat window of join.me). If you attended the call, please verify that your name is listed
- If not, email simona@openmhealth.org

Put your name and affiliation in the chat window for attendance today.
- If your name is not listed, or if you are joining only via phone, please email simona@openmhealth.org with “P1752 WG call” as subject

Attendance is important for determining voting rights, so please remember to “check in”

Voting rights are granted according to the P&P after attending two consecutive calls and by explicit request to the Secretary
IEEE Patent Policy
Participants have a duty to inform the IEEE

- Participants shall inform the IEEE (or cause the IEEE to be informed) of the identity of each holder of any potential Essential Patent Claims of which they are personally aware if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents.

- Participants should inform the IEEE (or cause the IEEE to be informed) of the identity of any other holders of potential Essential Patent Claims.

Early identification of holders of potential Essential Patent Claims is encouraged.
Ways to inform IEEE

• Cause an LOA to be submitted to the IEEE-SA (patcom@ieee.org); or
• Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or
• Speak up now and respond to this Call for Potentially Essential Patents

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair.
Other guidelines for IEEE WG meetings

- All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.
  - Don’t discuss the interpretation, validity, or essentiality of patents/patent claims.
  - Don’t discuss specific license rates, terms, or conditions.
    - Relative costs of different technical approaches that include relative costs of patent licensing terms may be discussed in standards development meetings.
    - Technical considerations remain the primary focus
  - Don’t discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.
  - Don’t discuss the status or substance of ongoing or threatened litigation.
  - Don’t be silent if inappropriate topics are discussed ... do formally object.

Patent-related information

The patent policy and the procedures used to execute that policy are documented in the:


Material about the patent policy is available at http://standards.ieee.org/about/sasb/patcom/materials.html

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org
Determination of Quorum

https://tinyurl.com/yc3oxg6q
Approval of Agenda

1. Attendance
2. Call for Patents
3. Approval of agenda and of prior minutes (if quorum present)
4. Updates from subgroups
5. Discussion: upcoming activities
6. Other business
Approval of Prior Minutes

(none today)
Update:
Physical Activity and Mobility (PA&M) Schema Subgroup
Physical Activity & Mobility (PAM) Sub-group

1. Developed PA schema
   • Refining names of properties
   • Example data
2. Developing summary/descriptive statistics schema
   • Discussed statistical information
   • How to reference this in existing Schema
3. Thinking of next Schema
   • Sensor Schema
4. Next Meeting: Thursday Feb 28, 2019 (11am to 11:45am Eastern Time)
Update:
Sleep Schema Subgroup
Sleep Schema Subgroup Update

Status

Quantitative sleep measure task group:
---Completed drafting the schemas and provide sample data (Major Milestone)
---Sleep subgroup has started to review the schema

Qualitative sleep measure task group:
---Started drafting the schemas for the shortlisted surveys

Next Steps

Quantitative sleep measure task group:
---Modify the schemas based on the review comments from the entire sleep group

Qualitative sleep measure task group:
---Complete drafting the schemas (need more people to sign up)
Discussion:
Presentation by Jakob Bardram
(Copenhagen Center for Health Technology)
CACHET Research Platform (CARP) & Open mHeath

Jakob E. Bardram
director, professor, MSc, PhD
Professor in computer science
Technical University of Denmark
Adjunct professor in public health
University of Copenhagen
Digital Phenotyping

Continuous and unobtrusive measurement and inference of health, behavior, and other parameters from wearable and mobile technology.

MONARCA

- Bipolar disorder (manic-depressive)
- EU STREP project | 2010-2014 | 13 partners
- Copenhagen team
  - The Copenhagen Clinic for Affective Disorder, Rigshospitalet, Psychiatric Center Copenhagen,
  - The Pervasive Interaction Technology Laboratory (PIT Lab), IT University of Copenhagen

- MONARCA system
  - Self-assessment
    - mood | sleep | stress | medicine | ...
  - Auto-assessment
    - physical activity | mobility | social activity | phone usage
  - Feedback
    - visualizations | medication | actions-to-take | triggers | early-warning-signs | impact factors
  - Mood forecast
    - predict mood for next 5 days
CARP – CACHET Research Platform

Standardization
• part of open international standards
• FHIR, IEEE 1752, ORK, ORS, ...

Sharing
• multi-study platform
• analysis of data across multiple studies

Privacy & Security
• enabling privacy & security as part of platform (GDPR)
• secure local hosting @DTU Computerome

Multi-project platform used in
• REAFEL
• BHRP
• PhyPsy Trial
• ...
CARP Architecture

Data Sources
- Medical Sensors
- Wearable Devices
- Mobile Sensing
- Application Sensing

CACHET Research Platform
- Authentication Service
- Data Storage Service
- Study Service
- User Manager Service
- Data Processing Service
- ...

Applications
- Mobile Apps
- Desktop Apps
- Web Apps
Open mHealth

- mHealth is emerging as a patchwork of incompatible applications serving narrow, albeit valuable, needs, and thus could benefit from more coordinated development.

- Open architecture
  - standardized data formats
  - standardized interfaces
  - standardized components

mHealth architecture: Stovepipe versus Open. The narrow waist of the open hourglass will include at least health-specific syntactic and semantic data standards; patient identity standards; core data processing functions such as feature extraction and analytics; and data stores that allow for selective, patient-controlled sharing. Standards should be common with broader health IT standards whenever possible.
Status

• Standardized Data Formats
  • using OMH schemas “as-is”
  • contributing where needed

• Standardized Interfaces
  • CARP backend supports the OMH DSU API
  • ... but had to extend to our own API (multiple-study support)

• Standardized Components
  • OMH schema support in Flutter
  • (looking into Shimmer)
Type of mHealth Apps / Data

• Psychiatry
  • Cognitive assessment
  • Mood sampling (e.g. PHQ9)
  • Activity
  • ...

• Cardiovascular
  • BP, HR, HRV, ...
  • ECG, RR,
  • O2
  • physical activity

• Diabetes
  • blood glucose

• Generic
  • location
  • weight, height, ...
  • step count
  • met / cal
  • temperature
  • medication
  • surveys
Flutter allows you to build beautiful native apps on iOS and Android from a single codebase.
mHealth Sensing in Flutter

• CARP Mobile Sensing
  • framework
  • sensing packages (e.g. ECG)
  • app

• CARP Backend
  • firebase, CARP, ..

• Open mHealth schemas
  • in Flutter

• Research Package
  • Research Kit in Flutter
  • (like Research Stack for Android)
CARP Mobile Sensing in Flutter

This repo holds the source code for the CACHET Research Platform (CARP) Mobile Sensing Flutter software. It contains the source code for CACHET first-party (i.e., developed by the core CACHET team) frameworks, packages, and apps.

In addition, the CARP team maintain a set of Flutter plugins (mainly) for sensing purposes. Flutter plugins enable access to platform-specific APIs. For more information about plugins, and how to use them, see the Flutter Packages description.

These plugins are also available on pub.

Software Components

These are the available CARP Mobile Sensing Flutter components in this repository.

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<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Pub</th>
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<tbody>
<tr>
<td>Core</td>
<td>Basic components</td>
<td></td>
</tr>
<tr>
<td>carp_core</td>
<td>The core CARP domain model</td>
<td></td>
</tr>
<tr>
<td>carp_mobile_sensing</td>
<td>The main CARP Mobile Sensing Framework</td>
<td></td>
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<tr>
<td>Packages</td>
<td>Data sampling packages</td>
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<tr>
<td>carp_communication_package</td>
<td>Communication sampling package (phone, sms)</td>
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<td>Context sampling package (location, activity, weather)</td>
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<td>Audio sampling package (audio, noise)</td>
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<tr>
<td>Backends</td>
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<td>carp_webservices</td>
<td>Flutter API for CARP web services</td>
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<td>carp_backend</td>
<td>Support for uploading data to a CARP data backend as JSON data</td>
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<td>carp_firestore_backend</td>
<td>Support for uploading data to Firebase as both zipped files and JSON data</td>
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<td>Apps</td>
<td>Misc. mobile sensing apps</td>
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<tr>
<td>carp_mobile_sensing_app</td>
<td>The CARP Mobile Sensing app</td>
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</table>
CARP Mobile Sensing App

The CARP Mobile Sensing App provides an example on how to use the `carp_mobile_sensing` package. The app sets up a Study that starts a set of Probes and visualize the data. The UI of the app is shown below, showing (from left to right) the Study Visualization page, the Probe List page, and the Data Visualization page (the latter is not implemented yet).

The architecture of the app is illustrated below. It follows the BLoC architecture, which is recommended by the Flutter Team.
Open mHealth Schemas for Flutter

A Flutter implementation of the Open mHealth schemas. The original Java schemas are available on the Open mHealth GitHub.

Disclaimer: Note that not all OMH schemas are implemented yet. This is work in progress.

Usage

To use this plugin, add openmhealth_schemas as a dependency in your pubspec.yaml file.

Note that this plugin relies on json_serialization: ^1.0.0 which again rely on Dart 2.1. This mean that (at the time of writing) you should use the dev channel in Flutter. This can be set using the following Flutter command:

```bash
flutter channel dev
```

Example

The following example shows how to use the OMH Flutter classes to model OMH measures, convert these to JSON, and read them back from JSON.

Creating OMH Measures as Dart Objects

First, create an OMH BloodPressure measure similar to the OMH BloodPressure example.

```dart
BloodPressure bp = new BloodPressure(new SystolicBloodPressure(BloodPressureUnit.MM_OF_MERCURY, 160.0),
                                  new DiastolicBloodPressure(BloodPressureUnit.MM_OF_MERCURY, 60.0),
                                  positionDuringMeasurement: PositionDuringMeasurement.SITTING);
DateTime start = new DateTime(2016, 2, 5);
DateTime end = new DateTime(2016, 6, 5);
TimeInterval time = new TimeInterval(startDateTime: start, endDateTime: end);
bp.effectiveTimeFrame = new TimeFrame(timeInterval: time);
bp.descriptiveStatistic = DescriptiveStatistic.MAXIMUM;
```

This can now be converted to JSON.

```dart
final bp_json = JsonEncoder.withIndent(' ').convert(bp);
```

which should produce the following JSON

```json
{
  "effective_time_frame": {
    "time_interval": {
      "start_date_time": "2016-02-05T00:00:00Z",
      "end_date_time": "2016-06-05T00:00:00Z"
    }
  }
}
```
Status

**RELEASED**

- CARP Mobile sensing
  - core FW
  - packages for context, ...
  - backend / data support
  - example app
- OMH schemas for Flutter
  - but not all schemas are implemented (yet)

**IN PROGRESS**

- Sensing Package for
  - ECG
  - Blood Glucose sensors
- Automatic use of OMH schemas in CARP Sensing
  - right now this is manual config
- Research Package
  - ResearchKit for Flutter
- Integration to fitness trackers
  - using shimmer?
Future Work
Summary of Action Items
Future Meetings
Upcoming Meetings

• Main WG
  • March 12: 8 AM (Pacific) – ADviCE presentation

• Sleep subgroup
  • March 5, 2019 8:00am to 9:00 am (Pacific) [1/2 hour earlier]

• PA&M subgroup
  • February 28, 2018 11 to 11:45 am (Eastern)
Adjournment