# Sample Dataset

Description and Detailed Protocol

User's Reference Document

2/10/2016

# ALGOSNAP

# Sample Dataset

### The Data Collection Platform

The sample dataset was collected using the CrowdSignals Platform by AlgoSnap. The CrowdSignals Platform was created to enable researchers and developers in Industry and Academia collect the data they need to solve critical problems in a fraction of the time. The CrowdSignals Platform is in alpha and has not yet been released to the general public. We are presently evolving the platform in collaboration with key partners. If you are interested in having early access please contact us at info@AlgoSnap.com

### The Sample Dataset Overview

The sample dataset consists of data collected by two participants wearing a smartwatch on the dominant wrist and a smartphone placed inside the right-front pant pocket. Each session was recorded continuously over about 2.5 hours from 20 sensors while the participants labeled examples of eight activities. This dataset does not represent completely naturalistic behavior as the participants were following a data collection script.

### Ethics and Privacy

The data was collected from participants using best practices for ethics and privacy. Please refer to document *"AlgoSnap CrowdSignals Ethics and IRB Reference.pdf"* for detailed information on AlgoSnap's ethical data collection practices.

### The Dataset Format

The data is provided in two formats: (1) A set of files in the Avro format (see https://avro.apache.org) compressed using the GZIP utility and (2) a set of files in the comma separated format CSV supported by Excel and many other editors.

### The Devices

The sample dataset was collected from four different devices. Table 1 presents a description of the different devices used in the data collection.

| Device | Description |
|---|---|
| Sony 3 Smartwatch | Sony Smartwatch 3 5736, running Android wear version 1.1.1.1929530, Google Play Services 8.4.89, and Android OS 5.1.1 |
| Google Nexus 5 Smartphone | LG Smartphone running Android version 6.0.1, Build number MMB29K |
| Samsung Gear Smartwatch | Samsung Gear Live E7A0, running Android wear version 1.3.0.2160025, Google Play Services 8.4.89, Android OS 5.1.1 |
| Samsung S5 Active Smartphone | Samsung-SM-G870A running Android version 5.0, Build Number LRX21T.G870AUCU2BOF3 |

**Table 1: List of Devices Used in the Data Collection**

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## The Sensors

The sample dataset consists on the data recorded from 20 sensors. Table 2 presents the list of sensors from which data was recorded during the data collection. For a detailed description on the format of the data recorded from each sensor, please refer to the document "*AlgoSnap Sensor Data Types Description.pdf*"

| Device Type | Sensor Type | Sampling Parameters |
|---|---|---|
| Smartwatch | Accelerometer | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartwatch | Gyroscope | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartwatch | Magnetometer | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartwatch | Heart Rate (participant one only) | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartwatch | Battery | Listening cycle: 30 seconds on, 60 seconds off |
| Smartphone | SensorMetadata | One reading on start-up |
| Smartphone | Accelerometer | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartphone | Gyroscope | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartphone | Magnetometer | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartphone | Light | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartphone | Pressure | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartphone | Proximity | Sensor delay: SensorManager.SENSOR_DELAY_FASTEST |
| Smartphone | Battery | Listening cycle: 30 seconds on, 60 seconds off |
| Smartphone | Bluetooth | Listening cycle: 90 seconds on, 30 seconds off |
| Smartphone | GSM (Participant one only) | Listening cycle: 1 seconds on, 10 seconds off |
| Smartphone | WLAN | Listening cycle: 30 seconds on, 10 seconds off |
| Smartphone | Location | Always on, minimum 10 seconds between updates, 1 m min distance |
| Smartphone | PhoneState | Always on, listening for changes |
| Smartphone | Connectivity | Always on, listening for changes |
| Smartphone | Screen | Always on, listening for changes |
| Smartphone | SMS (Participant one only) | Always on, listening for new message events |
| Smartphone | IntervalLabel | Labels are explicitly initiated by participants |
| Smartphone | Audio | Note: audio data collected but not released. Inquire for access to it. |

**Table 2: List of Sensors Turned On During the Data Collection**

## The Labels

The participants recorded data continuously for about 2.5 hours while they performed and labeled a set of eight activities. Table 3 presents the activities labeled during the data collection and a description of these activities. Later sections will contain more detail on more specific information for each of the recorded sessions.

| Label | Description |
|---|---|
| On Table | Smartphone and Smartwatch placed on a table sitting undisturbed. |
| Eating | Eating soup with a spoon. |
| Washing Hands | Washing hands in the public restroom. |
| Sitting | Sitting on a bench or chair |
| Standing | Standing |
| Walking | Walking |
| Running | Running |
| Driving | Driving in various types of traffic. |

**Table 3: List of Activities Labeled During the Data Collection**

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# Participant One: Session Details

### Overview:
The data was collected from one male participant who collected data continuously for about 2.5 hours while wearing a Samsung Gear Live smartwatch on his dominant wrist (right) and carrying a Samsung S5 Active smartphone in his right-front pants pocket. He wore a sweater, a polyester jacket, pants made of sweat material, and casual, slip-on shoes. The data collection started at a café in Issaquah, WA and ended at another nearby café after several walks, a drive, and a visit to a grocery.

### The Participant
The data was collected from a 36 year old male participants with a height of 5'6" feet and a body weight of 150 pounds.

### The Labeling Process
The participant used a smartphone Android app to label the start and end times associated with each activity performed. Consequently, the smartphone was manipulated at the beginning and end of each activity which introduced a "motion" artifact that sometimes is not consistent with the activity (e.g. devices "On Table" resting). Consequently, the labels need to be manually modified to remove these labeling artifacts and this is something that has not been done in this dataset.

### Differences with Participant Two Session
The participant one data collection session *does* include smartwatch heart rate data as well as GSM, SMS and location data.

### Data Collection Protocol
Table 4 describes the data collection protocol followed by participant one. Sections labeled "Transition" were not labeled and are included as notes for researchers analyzing the data.

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| Label | Date | Start Time | End Time | Notes |
|-------|------|-----------|----------|-------|
| On Table | 02/08/2016 | 10:28:52 | 10:32:46 | Smartwatch and smartphone devices sitting undisturbed on a table in a café. When labeling start and stop times, smartphone had to be used since the labeling GUI was on an Android app. |
| On Table | 02/08/2016 | 10:33:13 | 10:36:18 | |
| On Table | 02/08/2016 | 10:36:48 | 10:40:13 | |
| Sitting | 02/08/2016 | 10:41:34 | 10:44:52 | Sitting on a table bench in a café. Smartphone was placed in right pants pocket with a different orientation for each label and efforts were made to collect a variety of sitting positions (hands, feet, fidgeting slightly, etc). |
| Sitting | 02/08/2016 | 10:46:11 | 10:51:10 | |
| Sitting | 02/08/2016 | 10:51:31 | 10:54:37 | |
| Washing Hands | 02/08/2016 | 10:57:49 | 10:58:36 | Washing hands and then drying hands in the restroom of a café. Faucet had a handle that needed to be pulled up to release the water. Participant was standing. |
| Walking | 02/08/2016 | 10:59:39 | 11:04:55 | Walking in the somewhat busy parking lot of a shopping plaza, near an interstate highway. |
| Standing | 02/08/2016 | 11:05:37 | 11:09:42 | Standing on the corner of a sidewalk at a busy parking lot in a shopping plaza. |
| Walking | 02/08/2016 | 11:09:51 | 11:13:52 | Walking in the somewhat busy parking lot of a shopping plaza, near an interstate highway. |
| Driving | 02/08/2016 | 11:14:41 | 11:18:24 | Driving around the busy parking lot of a shopping plaza. The windows were shut and the radio was off. |
| Driving | 02/08/2016 | 11:18:28 | 11:21:47 | Driving from the busy parking lot of the shopping plaza, through busy suburban traffic to the parking lot of a supermarket. The windows were shut and the radio was off. |
| Walking | 02/08/2016 | 11:22:17 | 11:25:14 | Walking from the parking lot of the supermarket into the supermarket, and around the inside of the supermarket. |
| Washing Hands | 02/08/2016 | 11:25:29 | 11:26:20 | Washing hands and then drying hands in the restroom of a supermarket. Faucet had a handle that needed to be pulled up to release the water. Participant was standing. |
| Washing Hands | 02/08/2016 | 11:26:33 | 11:27:31 | |
| Standing | 02/08/2016 | 11:29:43 | 11:30:33 | Standing in line at the supermarket check-out. |
| Eating | 02/08/2016 | 11:31:23 | 11:34:06 | Eating soup with the dominant hand (right hand) using a spoon and soup located in a bowl. There were only eating and no drinking events. Participant was sitting on a stool inside the supermarket while eating. |
| Eating | 02/08/2016 | 11:34:30 | 11:38:10 | |
| Eating | 02/08/2016 | 11:38:32 | 11:41:10 | |
| Driving | 02/08/2016 | 11:44:02 | 11:53:27 | Driving from the supermarket parking lot, through busy suburban traffic to an interstate highway, then on the highway a few miles to an exit to more suburban traffic and a parking lot to another shopping plaza. |
| Standing | 02/08/2016 | 11:56:13 | 11:57:59 | Standing on the corner of a street with semi-busy suburban traffic. |
| Walking | 02/08/2016 | 11:58:05 | 12:02:45 | Walking on a sidewalk next to a street with semi-busy suburban traffic. |
| Standing | 02/08/2016 | 12:03:17 | 12:06:14 | Standing at an empty and quiet bus stop in a bus station. |
| Running | 02/08/2016 | 12:07:50 | 12:12:52 | Running up a sidewalk and around a few blocks near streets with semi-busy traffic. |
| Walking | 02/08/2016 | 12:23:05 | 12:25:43 | Walking through a parking lot and across a semi-busy street to a café. |

**Table 4: Data Collection Protocol Followed by Participant One**

## The Sensors Metadata

Table 5 presents a list of the metadata of sensors embedded in the Samsung S5 Active Smartphone used by participant one.

| Sensor Name | Vendor | Sensor Type | FIFO max events | Max delay | Min delay | Max Range | Power | Resolution | Wake Up Sensor |
|---|---|---|---|---|---|---|---|---|---|
| MPU6500 Acceleration | Invensense | android.sensor.accelerometer | 150 | 200000 | 5000 | 19.6133 | 0.25 | 5.99E-04 | FALSE |
| MPU6500 Gyroscope | Invensense | android.sensor.gyroscope | 30 | 200000 | 5000 | 8.726646 | 6.1 | 2.66E-04 | FALSE |
| MPU6500 Uncalibrated Gyroscope | Invensense | android.sensor.gyroscope_uncalibrated | 0 | 200000 | 5000 | 8.726646 | 6.1 | 2.66E-04 | FALSE |
| AK09911C Magnetic field | Asahi Kasei Microdevices | android.sensor.magnetic_field | 0 | 200000 | 10000 | 2000 | 6 | 0.06 | FALSE |
| AK09911C Magnetic UnCalibrated | Asahi Kasei Microdevices | android.sensor.magnetic_field_uncalibrated | 0 | 200000 | 10000 | 1200 | 6 | 0.06 | FALSE |
| Barometer | STM | android.sensor.pressure | 50 | 180000 | 180000 | 1013.25 | 1 | 1 | FALSE |
| TMG399X Proximity | AMS; Inc. | android.sensor.proximity | 0 | 0 | 0 | 8 | 0.75 | 8 | TRUE |
| TMG399X RGB | AMS; Inc. | android.sensor.light | 0 | 200000 | 200000 | 60000 | 0.75 | 1 | FALSE |
| MPL Rotation Vector | Invensense | android.sensor.rotation_vector | 0 | 200000 | 10000 | 1 | 6 | 5.96E-08 | FALSE |
| MPL Game Rotation Vector | Invensense | android.sensor.game_rotation_vector | 334 | 200000 | 10000 | 1 | 6 | 5.96E-08 | FALSE |
| SAMSUNG Step Detector | Samsung Inc. | android.sensor.step_detector | 334 | 0 | 0 | 1 | 0.3 | 1 | FALSE |
| SAMSUNG Step Counter | Samsung Inc. | android.sensor.step_counter | 0 | 0 | 0 | 4.29E+09 | 0.3 | 1 | FALSE |
| SAMSUNG Significant Motion | Samsung Inc. | android.sensor.significant_motion | 0 | 0 | -1 | 1 | 0.3 | 1 | TRUE |
| HeartRate | MAXIM | android.sensor.heart_rate | 0 | 1000000 | 1000000 | 200 | 1 | 1 | FALSE |
| Screen Orientation | Samsung Electronics | | 0 | 0 | 0 | 255 | 0.25 | 255 | FALSE |
| Orientation | Samsung Electronics | android.sensor.orientation | 0 | 0 | 10000 | 360 | 6 | 0.00390625 | FALSE |
| Gravity | Samsung Electronics | android.sensor.gravity | 0 | 0 | 10000 | 19.6133 | 6 | 5.96E-08 | FALSE |
| Linear Acceleration | Samsung Electronics | android.sensor.linear_acceleration | 0 | 0 | 10000 | 19.6133 | 6 | 5.96E-08 | FALSE |

**Table 5: Metadata of Sensors in Samsung Smartphone Used by Participant One**

Table 6 presents a list of the metadata of sensors embedded in the Samsung Gear Live smartwatch used by participant one.

| Name | Vendor | Sensor Type | FIFO max events | Max delay | Min delay | Max Range | Power | Resolution | Wake Up Sensor |
|---|---|---|---|---|---|---|---|---|---|
| MPU6515 Acceleration Sensor | Invensense | android.sensor.accelerometer | 150 | 200000 | 5000 | 19.6133 | 0.25 | 0.0023942017 | FALSE |
| MPU6515 Gyroscope Sensor | Invensense | android.sensor.gyroscope | 0 | 200000 | 5000 | 8.726646 | 6.1 | 2.663161E-4 | FALSE |
| AK8963C Magnetic field Sensor | Asahi Kasei Microdevices | android.sensor.magnetic_field | 0 | 200000 | 10000 | 2000.0 | 6.0 | 0.15 | FALSE |
| AK8963C Magnetic Sensor UnCalibrated | Asahi Kasei Microdevices | android.sensor.magnetic_field_uncalibrated | 0 | 200000 | 10000 | 1200.0 | 6.0 | 0.15 | FALSE |
| SAMSUNG Step Detector Sensor | Samsung Inc. | android.sensor.step_detector | 150 | 0 | 0 | 1.0 | 0.3 | 1.0 | FALSE |
| SAMSUNG Step Counter Sensor | Samsung Inc. | android.sensor.step_counter | 0 | 0 | 0 | 100000.0 | 0.3 | 1.0 | FALSE |
| SAMSUNG Significant Motion Sensor | Samsung Inc. | android.sensor.significant_motion | 0 | 0 | -1 | 1.0 | 0.3 | 1.0 | TRUE |
| SAMSUNG Game Rotation Vector | Samsung Inc. | android.sensor.game_rotation_vector | 150 | 200000 | 10000 | 8.726646 | 6.1 | 2.663161E-4 | FALSE |
| ADPD142 HRM Sensor Lib | ADI | android.sensor.heart_rate | 0 | 0 | 0 | 1.0 | 0.3 | 1.0 | FALSE |
| SAMSUNG Tilt Wake Sensor | Samsung Inc. | android.sensor.wrist_tilt_gesture | 0 | 0 | 5000 | 19.6133 | 0.25 | 0.0023942017 | TRUE |
| MPL Rotation Vector | Invensense | android.sensor.rotation_vector | 0 | 200000 | 10000 | 1200.0 | 6.0 | 0.15 | FALSE |
| MPL Orientation | Invensense | android.sensor.orientation | 0 | 200000 | 10000 | 1200.0 | 6.0 | 0.15 | FALSE |
| MPL Gravity | Invensense | android.sensor.gravity | 0 | 200000 | 10000 | 1200.0 | 6.0 | 0.15 | FALSE |
| MPL Linear Acceleration | Invensense | android.sensor.linear_acceleration | 0 | 200000 | 10000 | 1200.0 | 6.0 | 0.15 | FALSE |
| ADPD142 HRM Sensor Lib2 | ADI | com.samsung.android_wear.sam.heart_rate | 0 | 0 | 100000 | 1.0 | 0.3 | 1.0 | FALSE |

**Table 6: Metadata in Sensors of Samsung Smartwatch Used by Participant One**

# Participant Two: Session Details

### Overview:

The data was collected from one male participant who collected data continuously for about 2.5 hours while wearing the Sony smartwatch 3 on his dominant wrist (right) and carrying a Google Nexus 5 smartphone in his right-front pants pocket. He wore a hooded sweatshirt, loose fitting track pants, and sneakers. The data collection started at a public park in Newark, CA and ended at a nearby convenience store.

### The Participant

The data was collected from a 38 year old male participants with a height of 6 feet and a body weight of 230 pounds.

### The Labeling Process

The participant used a smartphone Android app to label the start and end times associated with each activity performed. Consequently, the smartphone was manipulated at the beginning and end of each activity which introduced a "motion" artifact that sometimes is not consistent with the activity (e.g. devices "On Table" resting). Consequently, the labels need to be manually modified to remove these labeling artifacts and this is something that has not been done in this dataset.

### Differences with Participant One Session

The participant two data collection session does not include smartwatch heart rate data because the Sony Smartwatch 3 does not include a PPG heart rate sensor. The participant two session also does not include GSM, SMS, or location data.

### Data Collection Protocol

Table 7 describes the data collection protocol followed by participant two. Sections labeled "Transition" were not labeled and are included as notes for researchers analyzing the data.

| Label | Date | Start Time | End Time | Notes |
|---|---|---|---|---|
| On Table | 02/02/2016 | 16:15:53 | 16:19:16 | Smartwatch and smartphone devices sitting undisturbed on a table in a public park. When labeling start and stop times, smartphone had to be used since the labeling GUI was on an Android app. |
| On Table | 02/02/2016 | 16:19:40 | 16:22:5 | |
| On Table | 02/02/2016 | 16:23:20 | 16:26:22 | |
| Sitting | 02/02/2016 | 16:27:37 | 16:32:37 | Sitting on a table bench in a public park. Smartphone was placed in right pants pocket with a different orientation for each label and efforts were made to collect a variety of sitting positions (hands, feet, fidgeting slightly, etc). |
| Sitting | 02/02/2016 | 16:32:56 | 16:36:21 | |
| Sitting | 02/02/2016 | 16:36:36 | 16:40:51 | |
| Eating | 02/02/2016 | 16:41:35 | 16:44:16 | Eating soup with the dominant hand (right hand) using a spoon and soup located in a bowl. There were only eating and no drinking events. Participant was sitting on a public park bench while eating. |
| Eating | 02/02/2016 | 16:44:34 | 16:48:21 | |
| Eating | 02/02/2016 | 16:48:43 | 16:52:26 | |
| Transition | | | | Participant transitioned from sitting on the bench to standing nearby to record the "Standing" event. No significant walking activity performed during this transition. |
| Standing | 02/02/2016 | 16:55:58 | 16:59:22 | Standing in a semi-quiet part of a public park. |
| Transition | | | | Participant walked from the park table to a semi-busy nearby street. |
| Standing | 02/02/2016 | 17:00:41 | 17:04:17 | Standing in a semi-quiet part of a public park. |
| Standing | 02/02/2016 | 17:04:41 | 17:08:30 | Standing near a semi-busy street with good car flow. |
| Transition | | | | Participant walked to a nearby car where he spent few minutes, and then to a nearby public restroom. |
| Washing Hands | 02/02/2016 | 17:18:10 | 17:20:37 | Washing hands in the restroom of a public park. Faucet had a button that needed to be pressed to release the water. Participant was standing. |
| Washing Hands | 02/02/2016 | 17:20:55 | 17:23:16 | |
| Washing Hands | 02/02/2016 | 17:23:26 | 17:25:40 | |
| Transition | | | | Participant walked from the public restroom to the start place of the Running activity. |
| Running | 02/02/2016 | 17:26:11 | 17:29:15 | Running inside a public park and by a semi-busy street. |
| Walking | 02/02/2016 | 17:29:27 | 17:33:00 | Walking inside a public park. |
| Running | 02/02/2016 | 17:33:11 | 17:36:54 | Running inside a public park and by a semi-busy street. |
| Walking | 02/02/2016 | 17:37:38 | 17:39:39 | Walking inside a public park. |
| Running | 02/02/2016 | 17:40:14 | 17:42:47 | Running inside a public park and by a semi-busy street. |
| Transition | | | | Participant walked to his car to start the driving activity. |
| Driving | 02/02/2016 | 17:45:44 | 18:02:16 | Driving from a public park to a nearby convenience store. Car windows where open at times, closed at other times. Driving occurred in the city (no freeway driving) at semi-busy traffic conditions. |
| Transition | | | | Participant walked from the car to the outside of the entry door of the convenience store to start the walking activity. |
| Walking | 02/02/2016 | 18:03:57 | 18:09:48 | Walking on semi-busy street from a convenience store to a nearby High School and back to the convenience store. |

**Table 7: Data Collection Protocol Followed by Participant two.**

## The Sensors Metadata

Table 8 presents a list of the metadata of sensors embedded in the Samsung S5 Active Smartphone used by participant two.

| Name | Vendor | Sensor Type | FIFO max events | Max delay | Min delay | Max Range | Power | Resolution | Wake Up Sensor |
|---|---|---|---|---|---|---|---|---|---|
| MPU6515 Accelerometer | InvenSense | android.sensor.accelerometer | 10000 | 1000000 | 5000 | 19.613297 | 0.4 | 5.95E-04 | FALSE |
| AK8963 Magnetometer | AKM | android.sensor.magnetic_field | 1500 | 1000000 | 20000 | 4911.9995 | 5 | 0.14953613 | FALSE |
| AK8963 Magnetometer Uncalibrated | AKM | android.sensor.magnetic_field_uncalibrated | 1500 | 1000000 | 20000 | 4911.9995 | 5 | 0.14953613 | FALSE |
| MPU6515 Gyroscope | InvenSense | android.sensor.gyroscope | 2400 | 1000000 | 5000 | 34.906586 | 3.2 | 0.001068115 | FALSE |
| MPU6515 Gyroscope Uncalibrated | InvenSense | android.sensor.gyroscope_uncalibrated | 2400 | 1000000 | 5000 | 34.906586 | 3.2 | 0.001068115 | FALSE |
| APDS-9930/QPDS-T930 Proximity & Light | Avago | android.sensor.proximity | 0 | 0 | 0 | 5 | 12.675 | 0 | TRUE |
| APDS-9930/QPDS-T930 Proximity & Light | Avago | android.sensor.light | 240 | 0 | 0 | 10000 | 0.175 | 0.009994507 | FALSE |
| BMP280 Barometer | BOSCH | android.sensor.pressure | 1500 | 1000000 | 33333 | 1100 | 0.004 | 0.009994507 | FALSE |
| Gravity | QTI | android.sensor.gravity | 2850 | 60014652 | 5000 | 19.613297 | 3.599990 | 5.95E-04 | FALSE |
| Linear Acceleration | QTI | android.sensor.linear_acceleration | 2850 | 60014652 | 5000 | 19.613297 | 3.599990 | 5.95E-04 | FALSE |
| Rotation Vector | QTI | android.sensor.rotation_vector | 4450 | 60014652 | 5000 | 1 | 8.599991 | 5.96E-08 | FALSE |
| Step Detector | QTI | android.sensor.step_detector | 4900 | 0 | 0 | 1 | 0.399993 | 1 | FALSE |
| Step Counter | QTI | android.sensor.step_counter | 4900 | 0 | 0 | 1 | 0.399993 | 1 | FALSE |
| Significant Motion Detector | QTI | android.sensor.significant_motion | 0 | 0 | -1 | 1 | 0.399993 | 1 | TRUE |
| Game Rotation Vector | QTI | android.sensor.game_rotation_vector | 4450 | 60014652 | 5000 | 1 | 3.599990 | 5.96E-08 | FALSE |
| GeoMagnetic Rotation Vector | QTI | android.sensor.geomagnetic_rotation_vector | 2100 | 60014652 | 20000 | 1 | 5.399994 | 5.96E-08 | FALSE |
| Orientation | QTI | android.sensor.orientation | 4450 | 60014652 | 5000 | 360 | 8.599991 | 0.1 | FALSE |
| Tilt Detector | QTI | android.sensor.tilt_detector | 5000 | 0 | 0 | 1 | 0.399993 | 1 | TRUE |
| MPU6515 Game Rotation Vector Secondary | InvenSense | android.sensor.game_rotation_vector | 2400 | 1000000 | 5000 | 1 | 4 | 1 | FALSE |
| AMD | QTI | (Blank field) | 0 | 0 | 0 | 1 | 0.399993 | 1 | FALSE |
| RMD | QTI | (Blank field) | 0 | 0 | 0 | 1 | 0.399993 | 1 | FALSE |
| Basic Gestures | QTI | (Blank field) | 0 | 0 | 0 | 7 | 0.399993 | 1 | FALSE |
| Tap | QTI | (Blank field) | 0 | 0 | 0 | 6 | 0.399993 | 1 | FALSE |
| Facing | QTI | (Blank field) | 0 | 0 | 0 | 3 | 0.399993 | 1 | FALSE |
| Tilt | QTI | (Blank field) | 0 | 60014652 | 10000 | 180 | 3.199997 | 0.1 | FALSE |
| Pedometer | QTI | (Blank field) | 4900 | 0 | 0 | 1 | 0.399993 | 1 | FALSE |
| PEDESTRIAN-ACTIVITY-MONITOR | QTI | (Blank field) | 0 | 0 | 0 | 65535 | 0.399993 | 1 | FALSE |

**Table 8: Metadata of Sensors in Google Nexus 5 Smartphone Used by Participant Two**

Table 9 presents a list of the metadata of sensors embedded in the Samsung S5 Active Smartphone used by participant two.

| Name | Vendor | Sensor Type | FIFO max events | Max delay | Min delay | Max Range | Power | Resolution | Wake Up Sensor |
|------|--------|-------------|-----------------|-----------|-----------|-----------|-------|------------|----------------|
| BH1721 Ambient light sensor | Rohm | android.sensor.light, | 0 | 10000000 | 0 | 10240.0 | 0.14 | 10.0 | FALSE |
| em8170 accelerometer | EM Micro | android.sensor.accelerometer, | 184 | 62500 | 5000 | 156.96 | 0.13 | 0.1, | FALSE |
| em8170 magnetic field sensor | EM Micro | android.sensor.magnetic_field, | 0 | 1000000 | 10000 | 4915.2 | 2.4 | 0.0305 | FALSE |
| em8170 gyroscope | EM Micro | android.sensor.gyroscope, | 0 | 10000 | 5000 | 34.9 | 5.0 | 0.00266 | FALSE |
| em8170 quaternion | EM Micro | android.sensor.rotation_vector, | 0 | 1000000 | 5000 | 1.0 | 5.0 | 5.96E-8 | FALSE |
| em8170 orientation | EM Micro | android.sensor.orientation, | 0 | 1000000 | 5000 | 360.0 | 5.0 | 1.0 | FALSE |
| em8170 any motion detector | EM Micro | (Left blank) | 0 | 0 | 0 | 0.0 | 0.13 | 1 | TRUE |
| em8170 step counter | EM Micro | android.sensor.step_counter, | 0 | 16000 | 0 | 0 | 0.13 | 1 | FALSE |
| em8170 step detector | EM Micro | android.sensor.step_detector, | 0 | 16000 | 0 | 0 | 0.13 | 1 | FALSE |
| em8170 tilt sensor | EM Micro | android.sensor.wrist_tilt_gesture, | 0 | 100000 | 0 | 0 | 0.13 | 1 | TRUE |
| Gravity Sensor | AOSP | android.sensor.gravity, | 0 | 0 | 5000 | 19.6133 | 7.53 | 0.1 | FALSE |
| Linear Acceleration Sensor | AOSP | android.sensor.linear_acceleration | 0 | 0 | 5000 | 19.6133 | 7.53 | 0.1 | FALSE |

**Table 9: Metadata of Sensors in Sony Smartwatch 3 Used by Participant Two**