

Sensing App

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File/Folder contained in the package:

- ◆ **Sensing.apk**: Android App file
- ◆ **Sensing**: Eclipse project files for the app source code
- ◆ **sensordata_upload.php**: Server side script for upload data and store into MySQL
- ◆ **CreateTable_Script.txt**: MySQL script for creating table to store sensor data

Function

This app is used to collect sensor data from Android Smartphone. It could record sensor information from following sensors:

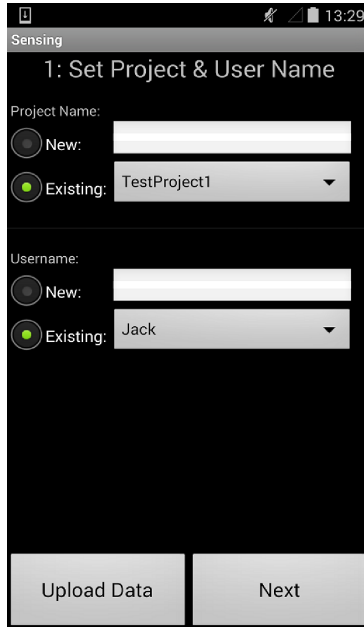
1. Accelerometer
2. Linear Acceleration
3. Gyroscope
4. Orientation
5. Magnetic field
6. Light
7. Barometer
8. Microphone (both sound level and audio file)
9. Cellular network
10. GPS
11. WiFi

Data are saved locally as CSV files. They could also be uploaded to server.

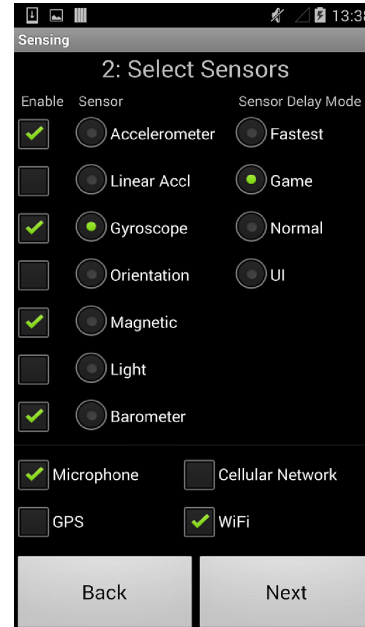
Run the App

- Environment: Android 4.0+
- Screen layout is customized for Galaxy S4
- Server side: MySQL + PHP (Apache)
 - If you don't plan to upload the sensor data to a server, just ignore this and directly access the CSV file from ADB command line.
- Code Modification: *This modification is only required for the data upload function.*
 - App client side: In SensingApp.java,
 - ◆ Change *m_blnUploadFunctionEnabled* to *true*.
 - ◆ Change *m_sURL* to the address of the data upload script on your server.
 - Server side: In sensordata_upload.php,
 - ◆ Set *host*, *username*, *password* and *db_name* for the data server.

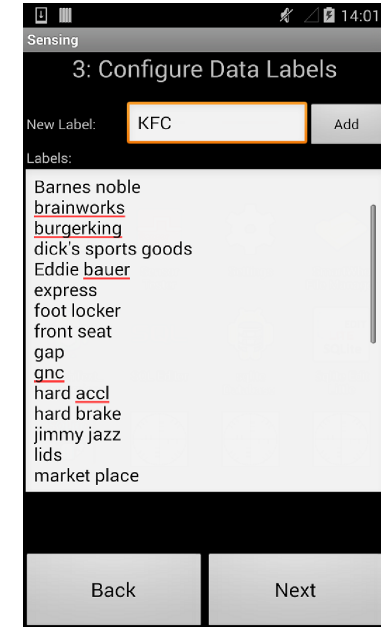
GUI Operation



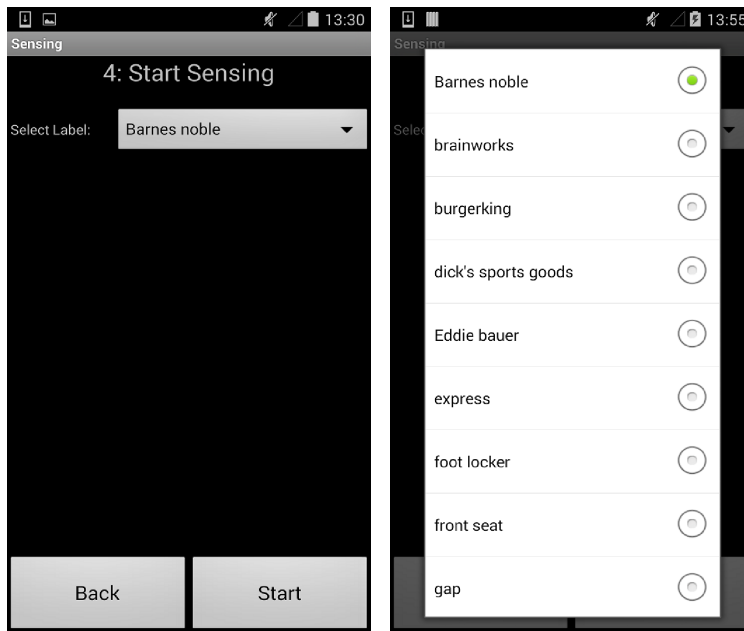
- On the first screen, user needs to set/select project name as well as username.
- Here click [Upload Data] button will directly go to data upload screen.



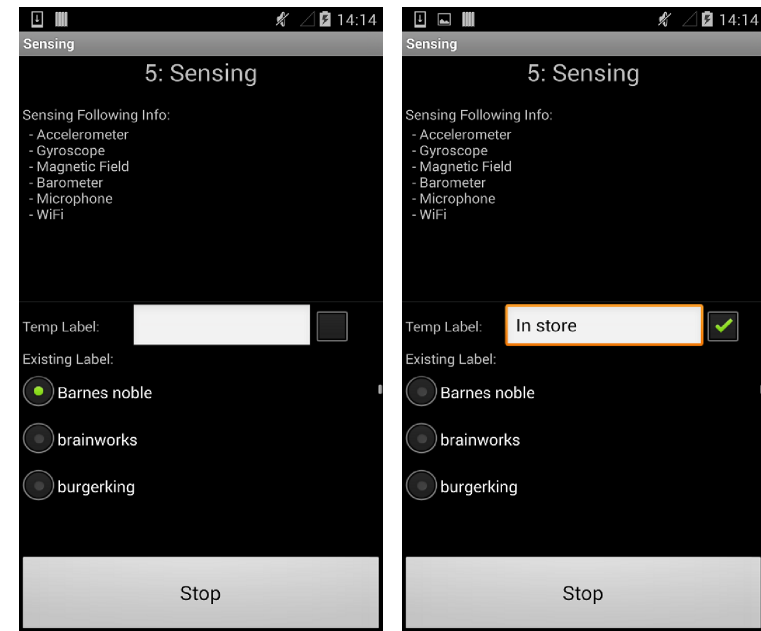
- On this screen, user could choose what sensor data to record.
- For Accelerometer/Linear Accl, Gyroscope, Orientation, Magnetic, Light and Barometer, user could choose sensor delay mode (which corresponds to how fast a sensor samples)
- If one sensor is not available or enabled, its option will be disabled.



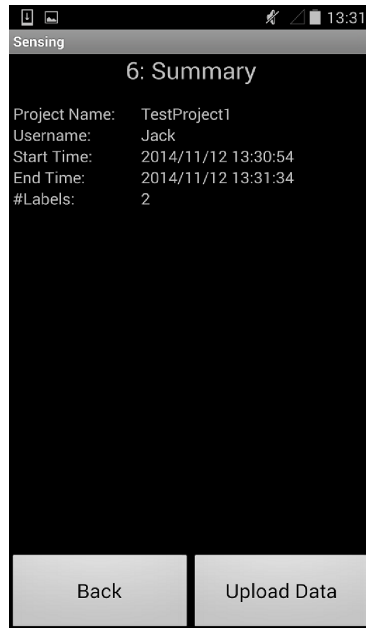
- On this screen, user could configure labels for sensor data.
- User could "Add" new label, edit/delete existing labels



- On this screen, user should select label for the sensor data which will be recorded.
- Click [Start] to start sensing.



- This screen shows what sensor data is being recorded.
- User could change label for sensor data from existing labels, or set temporary label.
- Click [Stop], sensing will stop and the app will switch to a summary screen.



- On the summary screen, the project name, username, sensing duration and the number of labels used are listed.
- Click [Upload Data] will switch to Upload screen.



- This screen is used to upload sensed data file to server.
- User could select which file to upload and click [Upload]. When the upload completes, the uploaded file will be removed from this screen.

Output Data Format of Sensing App

➤ Folder: (on Smartphone)

- /sdcard/Sensing/Setting/
 - ◆ Setting/Configuration related files are stored here.
 - ◆ Files:
 - ExistingLabel.txt --- Existing labels for sensor data
 - ExistingProjectName.txt --- Existing project names
 - ExistingUsername.txt --- Existing usernames
 - UnUploadedFileName.txt --- The list of sensor data files which have been recorded but have not been uploaded to server
- /sdcard/Sensing/SensorData/
 - ◆ Store resultant sensor data file (in CSV format)

➤ Sensor Data File:

- **Filename:** Username-ProjectName-BeginTime_**RecordedSensorType**.csv

For example: meng-Localization-20141109142530_ARGONLBMCSW.csv

- ◆ “,” is not allowed in **Username** or **ProjectName**
- ◆ **BeginTime** is the time when the sensor recording started, which is in format **yyyymmddHHMMSS**
- ◆ **RecordedSensorType** tells what sensors are recorded in this file. Each letter below stands for a type of sensor, if one sensor is not recorded, the corresponding letter does not show in the filename:
 - **A: Accelerometer**
 - **R: Linear Acceleration**
 - **G: Gyroscope**
 - **O: Orientation**
 - **N: Magnetic Field**
 - **L: Light**

- **B: Barometer**
- **M: Microphone**
- **C: Cellular Network**
- **S: GPS**
- **W: WiFi**

■ **Data Format:**

- ◆ Data are in CSV format
- ◆ Each line has 59 fields (fixed). *If one sensor is not recorded, its corresponding field(s) in each line is empty, but all the fields are there in each line.*
- ◆ In each line, if the data from one sensor has not changed from previous line (i.e. previous moment), its values will be kept.
- ◆ Fields:

Field Position	Field Name	Format/Value/Unit	Remark
1	Timestamp	yymmddHHMMSSsss	Time stamp, to micro seconds (System Real world Time)
2	Label		The label for this line of sensor data, e.g. “corridor”, “highway”, etc. “,” is not allowed in label name
3	Data Type	1: Accelerometer 2: Linear Acceleration 3: Gyroscope 4: Orientation 5: Magnet 6: Light 7: Barometer 8: Microphone 9: Cellular Network 10: GPS 11: WiFi	It tells what sensor data have been changed (i.e. which sensor event happens) <i>Orientation changes along with Magnet, so data type for Magnet could also be considered as Orientation change.</i>
4~6	Accelerometer (X,Y,Z)	m/s ²	Acceleration on X,Y,Z-axis

Field Position	Field Name	Format/Value/Unit	Remark
7~9	Linear Accelerometer (X, Y, Z)	m/s ²	Linear acceleration on X, Y, Z-axis
10~12	Gyroscope (X, Y, Z)	radians/s	Gyroscope. Angular speed around X, Y, Z-axis
13~15	Orientation (X, Y, Z)	Degree	Azimuth (between magnetic north & Y-axis, i.e. rotation around the Z-axis): 0=North, East=90, South= 180, West=270, Pitch (Rotation around X-axis), with positive values when the Z-axis moves toward the Y-axis (0~+/-90), Roll (Rotation around Y-axis), the positive value when Z-axis moves towards X-axis (0~ +/-180)
16~18	Magnetic Field	uT	Magnet on X, Y, Z-axis
19	Light	SI lux	Light
20	Barometer	hPa (millibar)	Atmospheric pressure
21	Microphone	Decibel	Sound volumn. <i>In current version, when select "Microphone", besides sound volumn, audio file is also recored and saved as Username-ProjectName-BeginTime.wav</i>
22	Cellular ID		For GSM network, it is Cell ID. -1 if unknown; For CDMA network, it is Base Station Identification Number, -1 if unknown.
23	GPS Latitude	Degree	
24	GPS Longitude	Degree	
25	GPS Altitude	Meter	Meters above sea level
26	Geo Declination	Degree	The declination of the horizontal component of the magnetic field from true north, in degrees (i.e. positive means the magnetic field is rotated east that much from true north).
27	Geo Inclination	Degree	The inclination of the magnetic field in degrees -- positive means the magnetic field is rotated downwards.
28	GPS Speed	m/s	
29	GPS Bearing	Degree	Bearing is the horizontal direction of travel of the device and it is not related to the

Field Position	Field Name	Format/Value/Unit	Remark
			device orientation. It is guaranteed to be in the range (0.0, 360.0] if the device has a bearing.
30~59	WiFi	SSID, BSSID, RSS	10 tuples in total, each tuple occupies 3 fields. The tuples are ordered in the descending order of RSS. At each place, up to 10 WiFi AP information is recorded. If only N (N<10) could be detected, the fields for the last 10-N will be empty.

➤ **Upload to Server**

When the sensor data are uploaded to server, besides the data files in above table, “projectname” and “username” also become two fields in the database table, which will be 1st column and 2nd column. The sensor data listed in the above table will occupy 3rd ~ 61st column.

[Note]

Current version does not have file management module, so if you want to delete sensor data files from the smartphone, please use ADB command.