Wallpaper, Widgets & Wear

Glanceable displays on Android

Elizabeth Mezias

Mezcode means mobile

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Mobile Systems Architect

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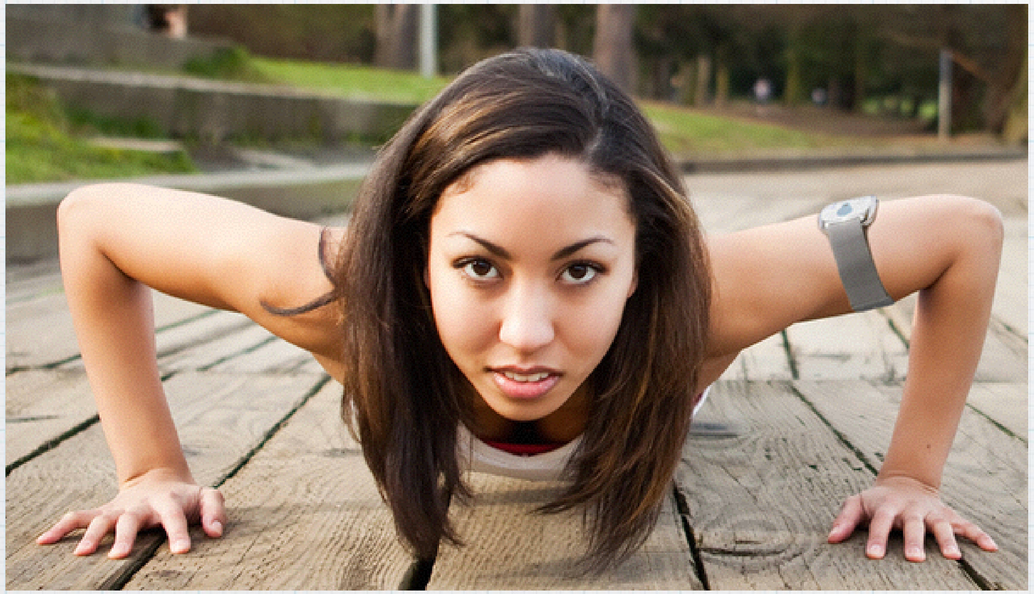
Other Wearables? Think Design! new paradigms…



Body Media

necomimi™
Brainwave Cat Ears

Is the phone a wearable?

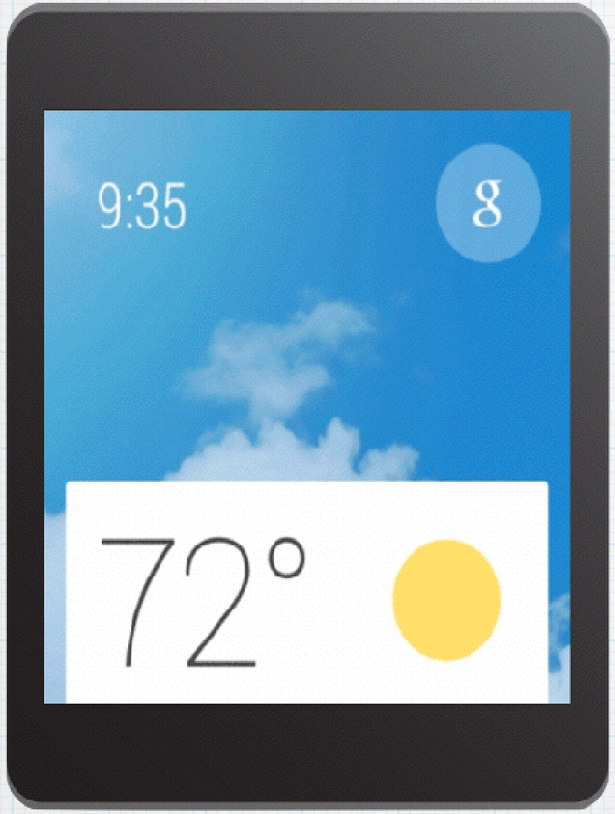
- Lumo Back
  - Worn around the midsection
  - Sensors measure posture, steps, sitting time, and sleep
  - Gentle, haptic input to stop a slouch
- Body Media
  - Armband records temp, heart rate, calories and sleep
  - Proven for weight loss, users win on the portal
- Neurosky
  - Brainwave reader (game input, maybe applied to assist autistics)

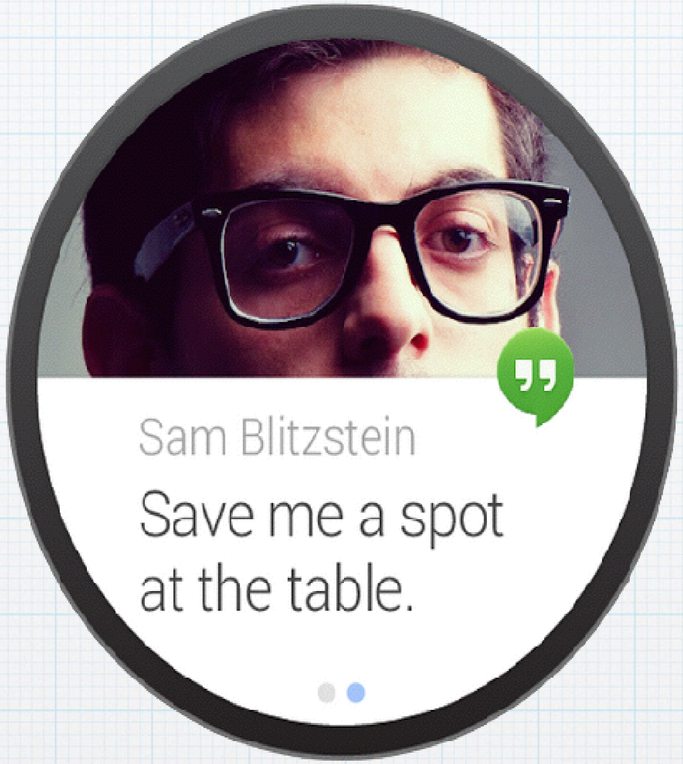
Big names making watches
What's next?

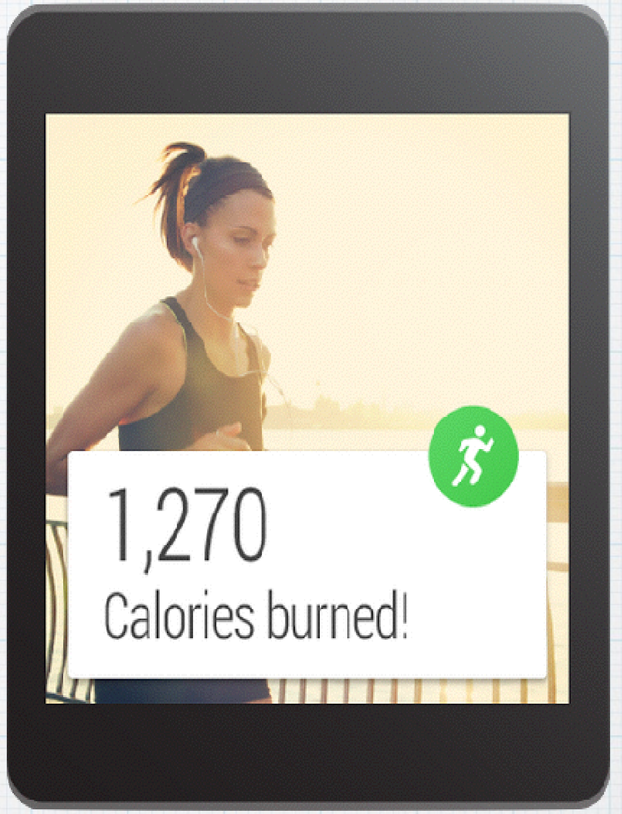
Brillo announced at Google I/O

Be practical, Be considerate

* Bridged notifications –> target Android 4.3, done
* Wear adds-on to apps, complements the phone
* Stay relevant and specific with time and location triggers
* Glanceable is short, sharp, immediate
* Zero to 2 touch interactions are simple, and fast
* Be helpful – anticipate, be efficient, respectful, & responsive







What can it do?

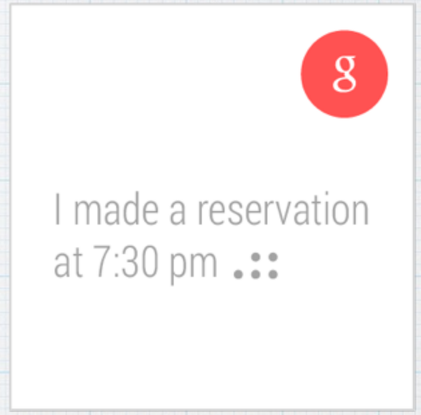
OK Google Dick Tracy hangouts, sensor accesss – GPS & heart rate

More rules…

- Use context, meaning location and time
- Sensor data from the watch OR the phone can show at a glance
- Consider QS, what can be measured?
  Give meaning to that measurement
- Don’t interrupt, assume the watch is muted
- A watch face without time - not much of the user's time...

3 Types of App (for Wear)

1. Notifications, in-line responses (speech, tap)



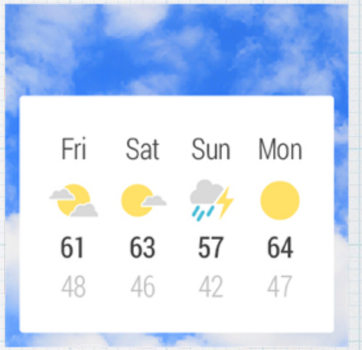
2. On-Board Apps, local sensors, speech, usually end in a request to the phone

   2.a. Watch Faces

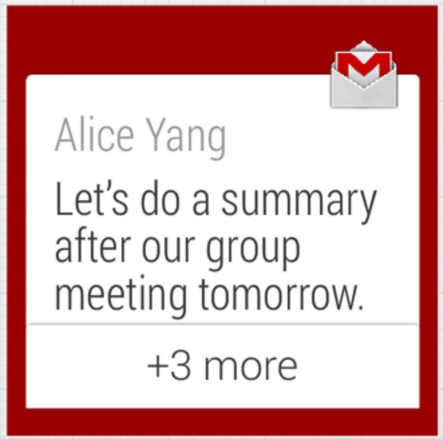
3. Data sync, leverage on-board sensors
   ...sync with the phone and or a desktop portal

Bridged Notifications

* NotificationCompat & NotificationManagerCompat
* WearableExtender for Action Cards (3)
* A “BigView” is a 2 parter, peek with pull up
* Hide the icon (make more room for text)
* RemoteInput & RemoteInput.Builder classes get speech
  * Notification responses get one interpretation
  * On-board apps get an array of possible text
* Stacking aggregates -> setGroup creates a scroll



☹ more text?



Voice Actions

1. Declare “Start…” activity in the manifest
2. Get a ride ”OK Google, get me a taxi" (also call me a car)
   com.google.android.gms.actions.RESERVE_TAXI_RESERVATION
3. Take a note “OK Google, take a note"
   android.intent.action.SEND This action has a Category, text is sent in as Intent Extras
   com.google.android.voicesearch.SELF_NOTE, android.content.Intent.EXTRA_TEXT
4. Set alarm "OK Google, set an alarm for 8 AM"
   android.intent.action.SET_ALARM
   Extras for this action are not required, hour and minute integers
5. Set timer "Ok Google, set a timer for 10 minutes"
   android.intent.action.SET_TIMER
   An integer to tell the duration of the timer android.provider.AlarmClock.EXTRA_LENGTH

Wear with Google Fit
(more Voice Actions)

6. Start stopwatch "Ok Google, start stopwatch"
   com.google.android.wearable.action.STOPWATCH

7. Record Exercise "OK Google, start/stop cycling", running, cycling
   Action is vnd.google.fitness.TRACK, extra ActiveActionStatus & CompletedActionStatus

   A. (Cycling Mime Type) vnd.google.fitness.activity/biking

   B. (Running, Workout Mime Type) vnd.google.fitness.activity/running ...other

8. Show Heart Rate/Step Count "OK Google, what's my heart rate/step count?"
   Action is vnd.google.fitness.VIEW

   A. vnd.google.fitness.data_type/com.google.heart_rate.bpm (Mime Types*)

   B. vnd.google.fitness.data_type/com.google.step_count.cumulative

Home Screen Widgets

Live Widgets
Collections Lists & Stacks, Shortcuts
Part 2

Mezcode means mobile

Demo?

* A completely new design and UX is required
* Not immersive, not interactive, apps time out
* Apps are using custom gestures for launch
* No webkit, print, backup, appwidget, usb classes

Meter Widgets

Stanford Medical School intervention

Accelerometer data

Minutes of “mvpa” and “sedentary” hours

Resets @midnight

Always-on service

(Notice the beloved calendar next door)

Mezcode means mobile

How to do it:

* Two classes and the methods to override...

1. RemoteViewsFactory - bind Collection data to widgets
    * getViewAt() - inflate a layout
    * onDataSetChanged() - show the collection
2. AppWidgetProvider - respond to the user, timed updates
    * onReceive(), like any Broadcast Receiver
    * onUpdate(), code runs on time, updatePeriodMillis

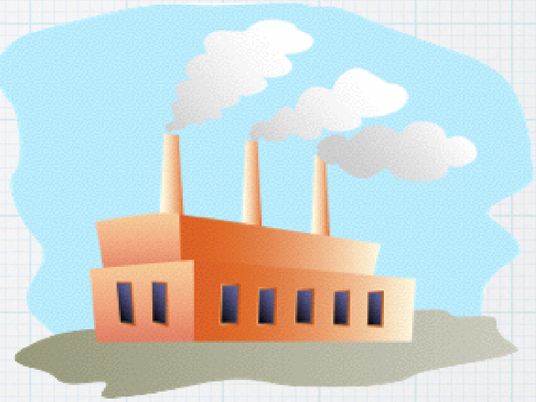
Manifest.xml

* The Homescreen app gets a Widget's views from the Manifest

1. PROVIDER Content provider, e.g. WeatherDataProvider
    * Binds a collection of data to the views of a widget
2. RECEIVER - AppWidgetProvider class declaration, e.g. WeatherWidget
    * Set the intent filter action - APPWIDGET_UPDATE
    * appwidget-provider xml file is meta-data with the content provider
3. SERVICE - RemoteViewsFactory is a service, e.g. WeatherWidgetService
    * Set BIND_REMOTEVIEW for the homescreen to see the data

1
```
<!-- The content provider serving the (fake) weather data -->
<provider android:name=".weatherwidget.WeatherDataProvider"
  android:authorities=".weatherwidget.provider" />
```
2
```
<!-- The widget provider -->
<receiver android:name=“.weatherwidget.WeatherWidget”>
  <intent-filter>
    <action android:name="android.appwidget.action.APPWIDGET_UPDATE" />
  </intent-filter>
  <!-- This specifies the widget provider info -->
  <meta-data android:name="android.appwidget.provider"
    android:resource="@xml/widgetinfo" />
  </receiver>
```
3
```
<!-- The service serving the RemoteViews to the collection widget -->
<service android:name=“.weatherwidget.WeatherWidgetService”
  android:permission="android.permission.BIND_REMOTEVIEWS"
  android:exported="false" />
```

#3 RemoteViewsService creates RemoteViewsFactory



* Override OnCreate to initialize
* Override onDataSetChanged to update the views
* Clean up in OnDestroy
* Examples are WeatherWidgetService, StackWidgetSvc

List Adapter vs. Remote Views, getView vs. getViewAt

```
public RemoteViews getViewAt(int position) {
    String city = "Unknown City";  int image_id = -1;
    if(mCursor.moveToPosition(position)) {
        city = mCursor.getString(mCursor.getColumnIndex(Columns.CITY));
        final int imgColIndex = mCursor.getColumnIndex(Columns.IMAGE);
        image_id = mCursor.getInt(imgColIndex);
  }
    RemoteViews rv = new RemoteViews(packageName,
        position % 2 == 0 ? R.layout.item1 : R.layout.item2);
    rv.setTextViewText(R.id.text, city);
    rv.setImageViewResource(R.id.image, image_id);
    rv.setOnClickFillInIntent(R.id.image, (new Intent())
        .putExtra(EXTRA_CITY_ID, city));
    return rv;
}
```

ACTION_APPWIDGET_UPDATE #2

3 parts to onUpdate()

1. Tell the widget to get the views from the adapter
   setRemoteAdapter(RemoteViewsService)
2. Bind an action to the Widget Views
   SetPendingIntentTemplate(), the response to a view on the widget
3. Code a touch response on any collection item
   SetOnClickPendingIntent(), set an activity or broadcast action

Pseudo-Code

```
@Override
public void onUpdate(Context ctx, AppWidgetManager appWidgetMgr, int[] appWidgetIds) {
    //set piece Soccer fans
    for (int i = 0; i < appWidgetIds.length; ++i) {
       appWidgetManager.updateAppWidget(appWidgetIds[i], rv);
    } //end for loop
    super.onUpdate(context, appWidgetManager, appWidgetIds);
} //end onUpdate
```

WidgetProvider - 2 Intents

First, set the RemoteViews Service

```
Intent i = new Intent…
i.putExtra(AppWidgetManager.EXTRA_APPWIDGET_ID, appWidgetIds[i]);
i.setData(Uri.parse(i.toUri(Intent.URI_INTENT_SCHEME)));
RemoteViews rv = new RemoteViews…
rv.setRemoteAdapter(R.id.stack_view, i);
// Set the service and the empty view, if appropriate
rv.setEmptyView(R.id.stack_view, R.id.empty_stack_view);
```

Intent 2 - fill in the blank

```
Intent viewItem = new Intent(context, ImageActivity.class);
rv.setPendingIntentTemplate(R.id.stack_view,
PendingIntent.getActivity(context, 0, viewItem,
    PendingIntent.FLAG_UPDATE_CURRENT));
```

set on the widget

```
rv.setOnClickPendingIntent(R.id.image,
PendingIntent.getActivity(context, 0, viewItem,
    PendingIntent.FLAG_UPDATE_CURRENT));
```

set on the list/stack item

AppWidgetProvider – touch it

```
public void onReceive(Context ctx, Intent intent) {
        final String action = intent.getAction();
        if(action.equals(REFRESH_ACTION)) {
                //Button pressed, update temperatures
        } else if(action.equals(CLICK_ACTION)) {
                //Touch on list, display photo in activity
        }
}
```

Broadcast Receiver

Set a pending intent on itself to fill in the blank


DEMO
PLEASE!

Wallpaper X

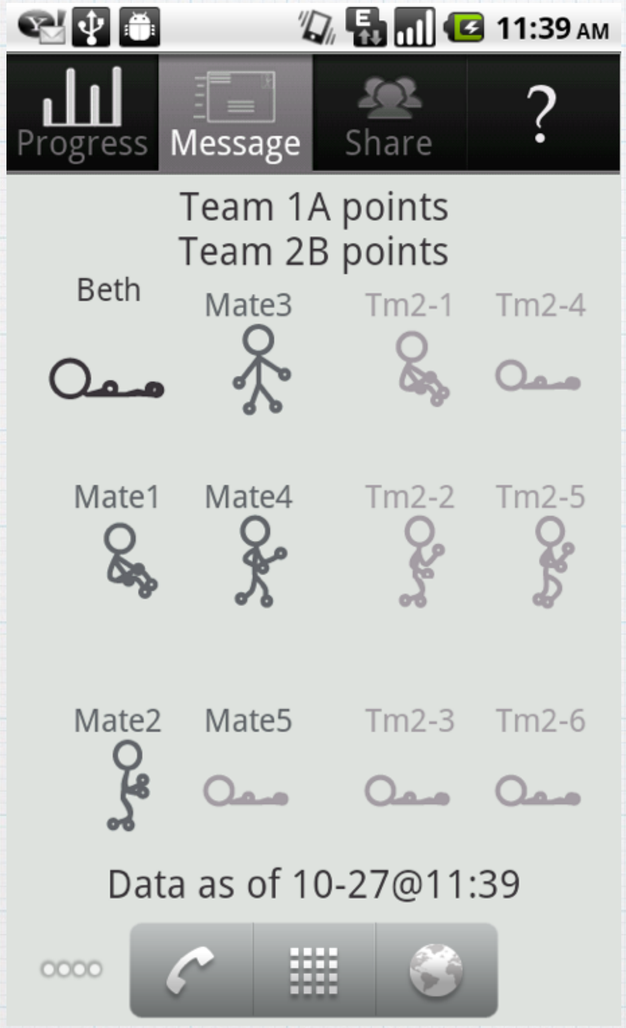
Live Wallpaper
More Glanceable Experiences…
Part 3

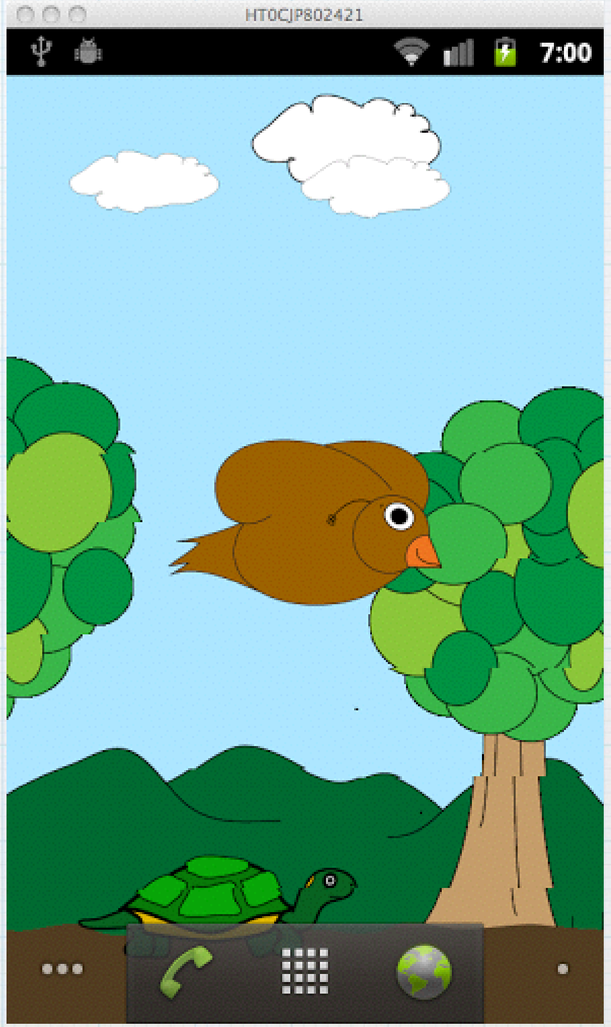
History of the term

* UbiFit
  Intel & University of Washington.
  Low-cost sensing, A.I.
  Bio-feedback - be more active.
  Activity-based
  ubiquitous computing

Their latest app – Sleep…

MILES - Stanford Medical School





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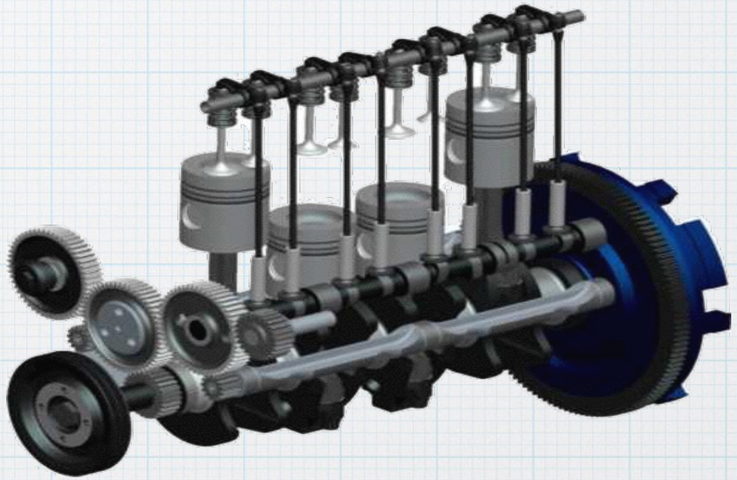
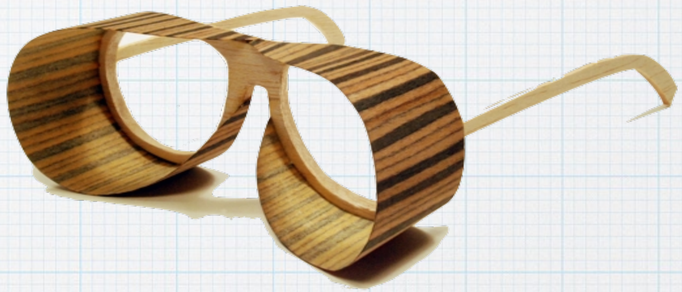
How-To

* WallpaperService nests an Engine with onCreateEngine( )
* Uses postDelayed on a Handler to draw, Canvas or view.draw()
  * onOffsetsChanged( ) - don’t go there
  * onVisibilityChanged( ) - stop the Handler
  * onSurfaceDestroyed( ) - cleanup, exit
  * onSurfaceChanged( ) - first call to draw
  * onTouchEvent( ) - user interaction (careful!)



```
public class MyWallpaperService extends WallpaperService {
    @Override
    public Engine onCreateEngine() {
            return new MyWallpaperEngine();
     }

    class MyWallpaperEngine extends Engine {
            Handler handler = new Handler();
            Runnable drawRunner = new Runnable() {
            @Override
                    public void run() {
                        draw();
                     }
              }; //end drawRunner

     public MyWallpaperEngine() { <constructor> }
              < Canvas drawing logic >
     }  //end MyWallpaperEngine class

  }//end service
```

```
@Override
public void onVisibilityChanged(boolean visible) {

  if(visible) {
    drawRunner.run();
  } else {
    handler.removeCallbacks(drawRunner);
  }
}
```



```
@Override
public void onTouchEvent(MotionEvent event) {
  //Each touch adds a circle
  //after some number, the list is cleared
  super.onTouchEvent(event);
  if(touchEnabled  && event.getAction() ==
            MotionEvent.ACTION_UP) {
    int x = Float.valueOf(event.getX()).intValue();
    int y = Float.valueOf(event.getY()).intValue();
    if(reset) {
      mNumber = 1;
      reset = false;
      touches.clear();
    } else {
      mNumber +=1;
      touches.add(new TouchPoint(x, y));
    Draw();
  }
}
```

MotionEvent.ACTION_UP, ACTION_DOWN, ACTION_MOVE, etc.

Links

* The MILES Study, Stanford University
  http://med.stanford.edu/miles
* MILES Apps, screen shot slide show, Mezcode site
  https://sites.google.com/site/mezcocorp/apps/miles
* Stanford results published
  http://goo.gl/1ntS8n
* Lars Vogel tutorial
  http://goo.gl/TSguD
* Mezcode, my portfolio site
  https://sites.google.com/site/mezcocorp/

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* eventmobi.com/adcboston