

Sample application: **Bluetooth Thermometer**  
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## What you need

- **LC2138**
- **DS1820 (1-Wire digital thermometer)**
- **IFBT41 (RN-41/42 Bluetooth module)**  
**incl. 10-pin flat ribbon cable**
- **3.3V power supply**
- **Smartphone/Tablet with Android (>= 2.3)**
- **ECO-C-arm Compiler + BaseA/IF232LP**

## How it works

The DS1820 measures temperatures from -55°C to +125°C, with an accuracy of +/- half a degree between -10°C and +85°C. Data is read using a special protocol via ONE data line (see data sheet). For this, the LPC2138 is totally over-featured. Any 8Bit MCU (with a serial interface for the Bluetooth module) would do.

But it's not enough to read the temperature from the sensor, the temperature must also be displayed somehow...

Here, an Android app is used. The temperature can be displayed, observed and recorded. This example is mostly intended to show that it is possible to control the device without the need for further hardware (display, keyboard).

Of course this could have also been done using a PC program. But not everybody has his notebook ready everywhere, while more and more people (they may know it or not) carry a whizz kid in their shirt pocket: Display, touchscreen, sound, haptic, even Gigabytes of memory, all this wireless - what more do you want?

Compile **bttherm.c** and program the Flash of the LC2138.

Then connect the Bluetooth module, using the 10-pin flat ribbon cable.

Install **bttherm.apk**.

Before you start the app, the Bluetooth module must be paired with your smartphone/tablet (in Settings/Bluetooth).

**In case of connection problems:** To reduce power consumption, the Bluetooth module has an adjustable connect window, which is best maximized. To do this, install and start the Bluetooth terminal **bttm.apk**. Power on, connect and send **\$\$\$** within 1 minute. To maximize the connect window enter **sj,0800**.

For more documentation see **bttherm.c**.

## Operation

When the app gets started, it shows the screen for Bluetooth device selection. All currently paired devices are offered. As it makes no sense to connect to devices other than the Bluetooth module, the selection can be limited to device names containing a particular string, defined in settings. Always offered is „Demo“, in case the external hardware is not available. If only one device is available, it is selected automatically.

On successful connection, the main screen is shown. It shows the temperature and a „smiley“, which changes colors like a traffic light, depending on the temperature. The colors green, yellow and red are made from specific value ranges (and similar to a traffic light, green means OK, red means ALERT, and yellow is the transition state).

You can adjust the ranges for „Green“ and „Yellow“ in settings, depending on your requirements. Tests are as follows:

Value within green range? Display shows green. Else,  
value within yellow range? Display shows yellow. Else,  
display shows red and - if enabled - an alarm is triggered.

„Red“ can trigger an alarm using a siren (plus vibration), using Text to Speech with text you can edit in settings, or by playing an audio file from the SD Card. You can set a fixed volume, or use the media volume.

Rotating the display shows the current value with large digits as well as min/max values. Optionally, the displayed value can be read out at regular intervals. A click on the display shows some statistics.

There is also a log-file option with the possibility to visualize the recorded data as diagram (when the display is rotated). The maximum recording time is 10 hours. The log file (log.csv) is located in the directory „BT Thermometer“ on the SD Card and is overwritten each time the app is started. As an alternative, several log files (date-time.csv) are also possible. In addition log files can be processed by programs like „Excel&Co“.

In settings you can also enable the rotation functionality, activate fullscreen mode and set the read out interval..

### Screenshots

