acc_data_gps.c

This program works with the TD1205P module from TDNEXT. The aim is to send some information about the device, which are its GPS coordinates, its battery level and the temperature. The frequency which is used in order to get these data is changeable. By default, it is 1 Hz. The device sends information every hour by default. This interval can be changed too.

At the same time, it prints information about accelerometer if the user decides to use serial communication. The baud rate which is used is 9600 bits/s. It will print x, y and z values. These data will appear 3 minutes after the launching of the program.

A keepalive message is sent at every boot.

Useful information

- For configuring the environment, use the tutorial: http://www.instructables.com/id/Sigfox-GPS-Tracker/
- This example is only built and tested for TD1205P module.
- In order to see the received messages, use Sigfox backend: https://backend.sigfox.com

General message format

For transceiving information on the Sigfox network, this program uses a 12 bytes format. Message is formed by using some code from the tutorial:

- 4 bytes: GPS longitude or free
- 4 bytes: GPS latitude or free
- 1 byte: voltage
- 1 byte: temperature
- 2 bytes: free

Commands

Users can change some parameters of the program using serial communication. Indeed, it is possible to communicate with the module thanks to a serial console, for example putty.exe. Commands must be typed during the 3 minutes after the launching of the program. The serial port keeps open after these 3 minutes, but it is not recommended to type commands with new values after these 3 minutes, because it can cause errors (except for *ACC$DATA=* command).

AT$ACCFREQ=

- Used for choosing the frequency to retrieve accelerometer data.

- If empty, it prints the current value.

- (value: frequency) - (1: 1Hz), (2: 10Hz), (3: 25Hz), (4: 50Hz), (5: 100Hz), (6: 200Hz), (7: 400Hz), (8: 1.25KHz).

- Default value: 1Hz.

AT$ACCSCALE=

- Used for choosing the scale to detect movement. This value has an impact on the accuracy of the accelerometer data.

- If empty, it prints the current value.

- (value: scale) - (1: 2G), (2: 4G), (3, 8G), (4: 16G)

- Default value: 2G.

AT$ACCDATA=

- Possibility to choose if accelerometer data has to be printed on the serial console.

- If empty, it prints the current configuration.

- 0: x, y and z values will not be printed on serial port.

- 1: x, y and z values will be printed on serial port. This display will be stopped a few moments when the module sends a message on the Sigfox network.

- This command can be used at any time. Indeed, it is possible to change its value during the 3 minutes after the launching of the program, and after these 3 minutes too.

- Default value: 1.

AT$INTERVAL=

- This interval is the time between two consecutive messages sent on the Sigfox network.

- If empty, it prints the current value.

- When there is a positive value after this command, this value become the new interval in seconds. Don’t forget that Sigfox supports 140 messages a day!

- Default value: 3600 seconds (1 hour).

AT$MODE=

- Used for choosing GPS Power mode.

- 0 for *TD_GEOLOC_OFF* mode: with this mode, there is no RAM retention, everything is off, there is no consumption. The module doesn't store any information about the fixing and the satellites.

- 1 for *TD_GEOLOC_HW_BCKP* mode: with this mode, there is RAM retention. The module can store the last information about the fixing and the satellites in the RAM. It means that the fixing time for finding GPS data will be significantly shorter the next time the GPS will wake up in order to get data.

- 2 for TD_GEOLOC_POWER_SAVE_MODE mode: this mode is like the navigation mode (fully on) but the receiver is switched on/off every couple of seconds in order to save power.

- Default value: *TD_GEOLOC_HW_BCKP.*

AT$TIMEOUT=

- This data is the duration during which the GPS tries to find satellites in order to have GPS coordinates.

- If empty, it prints the current value.

- When there is a positive value after this command, this number will be the new timeout.

- Default value: 120 seconds.

Consumption

- Sleep mode = approximately 10 uA.
- Timeout = approximately 30 mA.
- During the sending of the message = approximately 50 mA.

Possible ameliorations

If the user decides to change the value of the interval, the device could try to find satellites directly after this command, and not wait for the end of the 3 minutes at the beginning.

I believe that it could be great to add other commands for configuring the device. For example, it could be good to have the possibility to choose if we want to detect movement on only one axis, or for two axes, or for the three axes.

A future work to do is to think about the calibration. For the voltage, the values are not really precise. For the temperature, the precision is equal to one degree, but I think that it is possible to do a better thing in order to gain accuracy.

Moreover, I think that it could be great to find interesting other information to send. Indeed, only ten bytes are sent in this application, but Sigfox messages can contain twelve bytes of data.