Marvelmind C library and example

Version 2018.03.15

1. About the library

Marvelmind C library provides an API and example of reading streaming data from mobile beacon or modem via USB or UART interface.

Supported operating systems:

- Microsoft Windows
- GNU/Linux

2. Building the example

- To build the example on GNU/Linux or another *nix-OS you need to have installed GCC
- Then unpack the archive, change directory to unpacked library and run make in console
- Then you can execute './marvelmind_c' to watch stream data from mobile beacon or modem connected via USB or UART.

Prebuilt example for Microsoft Windows is included in the archive. If you want to rebuild it, you may use integrated development environment (such a MS Visual Studio, Code::Blocks etc.): create empty console project and add 3 source files (marvelmind.c, marvelmind.h, example.c) into the project and run build. You may need to change the project settings to successfully build it.

3. Command line options of the example.

You may specify another serial port as command line argument. For example:

```
./marvelmind_c /dev/ttyACM2
```

or for Microsoft Windows:

```
marvelmind_c.exe COM4
```

Use prefix \\.\ if serial port number is bigger than 9:

```
marvelmind_c.exe \\.\COM10
```

4. Using the library

An example of library usage you may see in the file **example.c**. You can use the library in your own projects by adding file **marvelmind.c** into build, including **marvelmind.h**:

```
#include "marvelmind.h"
```

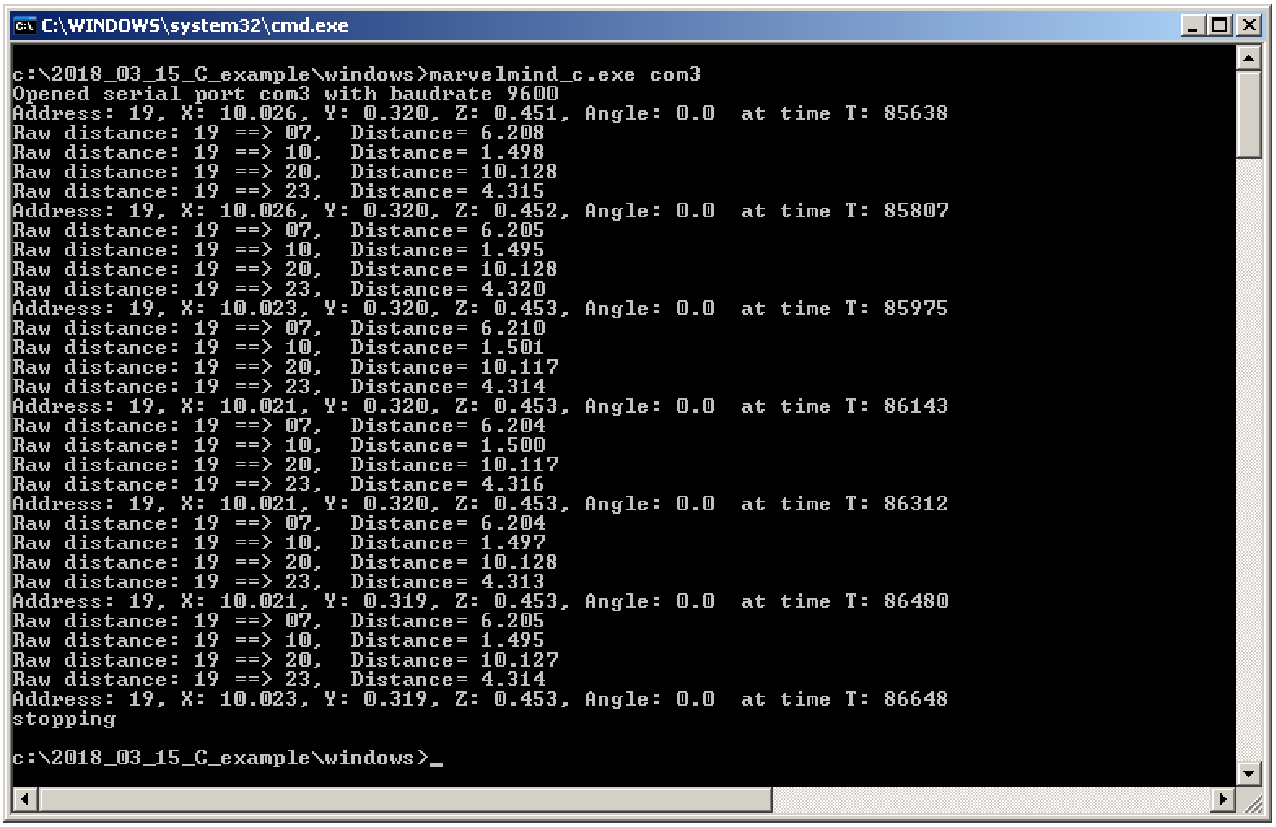
and your code may follow the sequence:

- Call **createMarvelmindHedge** to allocate memory for library structure (struct MarvelmindHedge). You need to call it before any other usage of the library
- Modify some variables in created structure, if needed (for example, serial port name). Also, you can add pointer to callback function **anyInputPacketCallback**, which will be called every time when incoming data appear.
- Call **startMarvelmindHedge** to tell library to start thread, which will process incoming data from mobile beacon or modem
- You can add callback function anyInputPacketCallback
- Call functions to get incoming data from mobile beacon or modem:

  - **getPositionFromMarvelmindHedge –** get 3D coordinates of mobile beacon and orientation angle by paired beacons (if exist) read state of selected beacon (voltage level, radio signal level, working time). Or call **printPositionFromMarvelmindHedge** to get and print these data to console.
  - **getStationaryBeaconsPositionsFromMarvelmindHedge** – get 3D coordinates of stationary beacons. Or call **printStationaryBeaconsPositionsFromMarvelmindHedge** to get and print these data to console.
  - **getRawDistancesFromMarvelmindHedge** - get raw distances from mobile beacon to stationary beacons. Or call **printRawDistancesFromMarvelmindHedge** to get and print these data to console. Mobile beacon transmits raw distances only if 'Raw distances data' option is enabled in 'Interfaces' section of mobile beacon's settings in dashboard.
  - **getRawIMUFromMarvelmindHedge** - get raw IMU sensors (accelerometer, gyroscope and compass) data from mobile beacon. Or call **printRawIMUFromMarvelmindHedge** to get and print these data to console. Mobile beacon transmits raw IMU data only if IMU hardware is exist in the beacon and 'Raw inertial sensors data' option is enabled in 'Interfaces' section of mobile beacon's settings in dashboard.
  - **getFusionIMUFromMarvelmindHedge** - get IMU fusion data from mobile beacon. This includes IMU fusion position of the mobile beacon, rotation quaternion, 3D velocity and acceleration. Or call **printFusionIMUFromMarvelmindHedge** to get and print these data to console. Mobile beacon transmits IMU fusion data only if IMU hardware is exist in the beacon and 'Processed IMU data' option is enabled in 'Interfaces' section of mobile beacon's settings in dashboard.
- After usage call **stopMarvelmindHedge** to stop the thread
- Call **destroyMarvelmindHedge** to free memory, used by the library

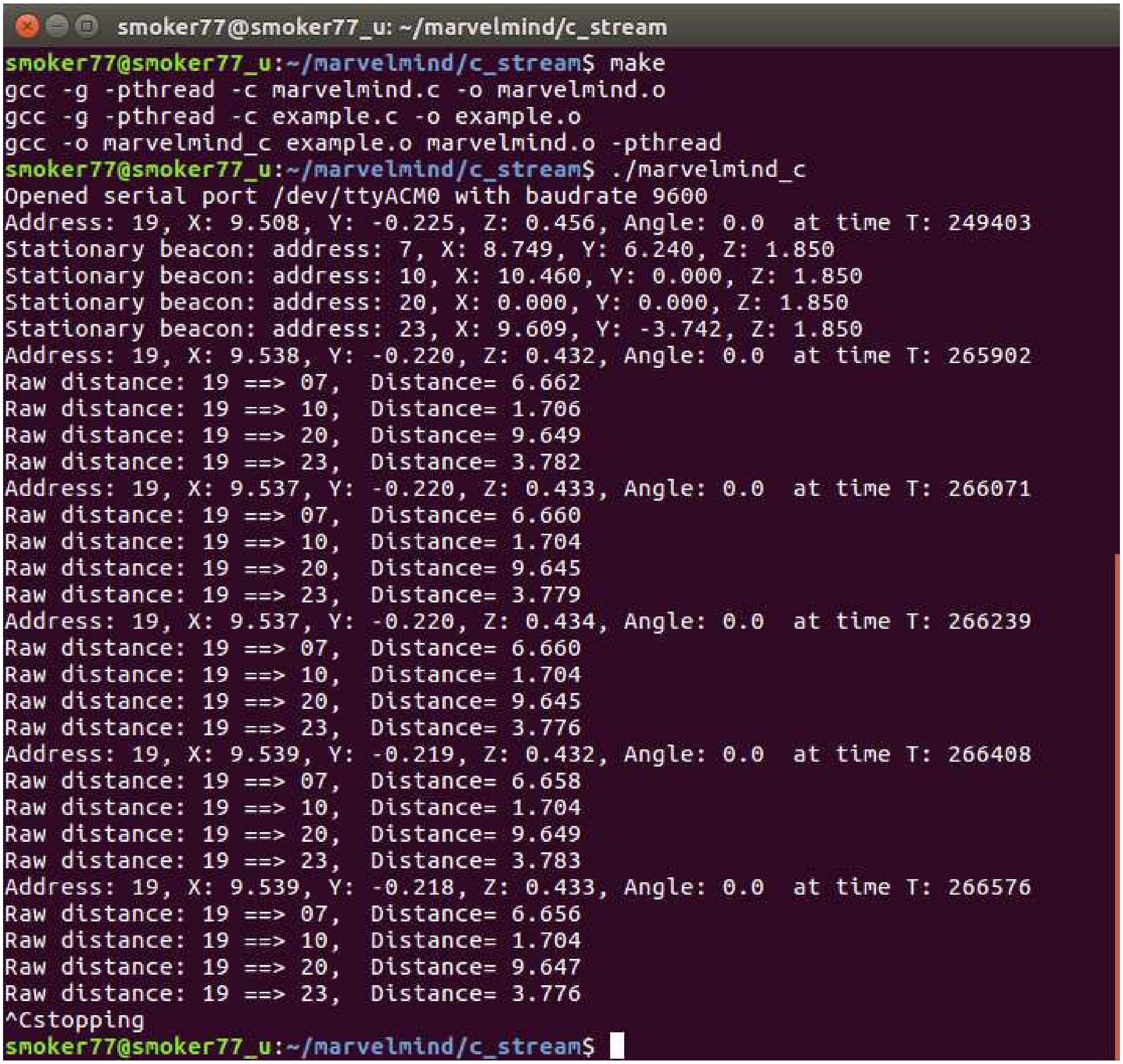
Appendix. Examples of usage of the example.

The following screenshots show the examples of running the example in Windows and Linux.



```
c:\2018_03_15_C_example\windows>marvelmind_c.exe com3
Opened serial port com3 with baudrate 9600
Address: 19, X: 10.026, Y: 0.320, Z: 0.451, Angle: 0.0  at time T: 85638
Raw distance: 19 ==> 07,  Distance= 6.208
Raw distance: 19 ==> 10,  Distance= 1.498
Raw distance: 19 ==> 20,  Distance= 10.128
Raw distance: 19 ==> 23,  Distance= 4.315
Address: 19, X: 10.026, Y: 0.320, Z: 0.452, Angle: 0.0  at time T: 85807
Raw distance: 19 ==> 07,  Distance= 6.205
Raw distance: 19 ==> 10,  Distance= 1.495
Raw distance: 19 ==> 20,  Distance= 10.128
Raw distance: 19 ==> 23,  Distance= 4.320
Address: 19, X: 10.023, Y: 0.320, Z: 0.453, Angle: 0.0  at time T: 85975
Raw distance: 19 ==> 07,  Distance= 6.210
Raw distance: 19 ==> 10,  Distance= 1.501
Raw distance: 19 ==> 20,  Distance= 10.117
Raw distance: 19 ==> 23,  Distance= 4.314
Address: 19, X: 10.021, Y: 0.320, Z: 0.453, Angle: 0.0  at time T: 86143
Raw distance: 19 ==> 07,  Distance= 6.204
Raw distance: 19 ==> 10,  Distance= 1.500
Raw distance: 19 ==> 20,  Distance= 10.117
Raw distance: 19 ==> 23,  Distance= 4.316
Address: 19, X: 10.021, Y: 0.320, Z: 0.453, Angle: 0.0  at time T: 86312
Raw distance: 19 ==> 07,  Distance= 6.204
Raw distance: 19 ==> 10,  Distance= 1.497
Raw distance: 19 ==> 20,  Distance= 10.128
Raw distance: 19 ==> 23,  Distance= 4.313
Address: 19, X: 10.021, Y: 0.319, Z: 0.453, Angle: 0.0  at time T: 86480
Raw distance: 19 ==> 07,  Distance= 6.205
Raw distance: 19 ==> 10,  Distance= 1.495
Raw distance: 19 ==> 20,  Distance= 10.127
Raw distance: 19 ==> 23,  Distance= 4.314
Address: 19, X: 10.023, Y: 0.319, Z: 0.453, Angle: 0.0  at time T: 86648
stopping

c:\2018_03_15_C_example\windows>_
```



```
smoker77@smoker77_u: ~/marvelmind/c_stream
smoker77@smoker77_u:~/marvelmind/c_stream$ make
gcc -g -pthread -c marvelmind.c -o marvelmind.o
gcc -g -pthread -c example.c -o example.o
gcc -o marvelmind_c example.o marvelmind.o -pthread
smoker77@smoker77_u:~/marvelmind/c_stream$ ./marvelmind_c
Opened serial port /dev/ttyACM0 with baudrate 9600
Address: 19, X: 9.508, Y: -0.225, Z: 0.456, Angle: 0.0  at time T: 249403
Stationary beacon: address: 7, X: 8.749, Y: 6.240, Z: 1.850
Stationary beacon: address: 10, X: 10.460, Y: 0.000, Z: 1.850
Stationary beacon: address: 20, X: 0.000, Y: 0.000, Z: 1.850
Stationary beacon: address: 23, X: 9.609, Y: -3.742, Z: 1.850
Address: 19, X: 9.538, Y: -0.220, Z: 0.432, Angle: 0.0  at time T: 265902
Raw distance: 19 ==> 07,  Distance= 6.662
Raw distance: 19 ==> 10,  Distance= 1.706
Raw distance: 19 ==> 20,  Distance= 9.649
Raw distance: 19 ==> 23,  Distance= 3.782
Address: 19, X: 9.537, Y: -0.220, Z: 0.433, Angle: 0.0  at time T: 266071
Raw distance: 19 ==> 07,  Distance= 6.660
Raw distance: 19 ==> 10,  Distance= 1.704
Raw distance: 19 ==> 20,  Distance= 9.645
Raw distance: 19 ==> 23,  Distance= 3.779
Address: 19, X: 9.537, Y: -0.220, Z: 0.434, Angle: 0.0  at time T: 266239
Raw distance: 19 ==> 07,  Distance= 6.660
Raw distance: 19 ==> 10,  Distance= 1.704
Raw distance: 19 ==> 20,  Distance= 9.645
Raw distance: 19 ==> 23,  Distance= 3.776
Address: 19, X: 9.539, Y: -0.219, Z: 0.432, Angle: 0.0  at time T: 266408
Raw distance: 19 ==> 07,  Distance= 6.658
Raw distance: 19 ==> 10,  Distance= 1.704
Raw distance: 19 ==> 20,  Distance= 9.649
Raw distance: 19 ==> 23,  Distance= 3.783
Address: 19, X: 9.539, Y: -0.218, Z: 0.433, Angle: 0.0  at time T: 266576
Raw distance: 19 ==> 07,  Distance= 6.656
Raw distance: 19 ==> 10,  Distance= 1.704
Raw distance: 19 ==> 20,  Distance= 9.647
Raw distance: 19 ==> 23,  Distance= 3.776
^Cstopping
smoker77@smoker77_u:~/marvelmind/c_stream$ 
```