YDLIDAR SDK PACKAGE V1.3.7

SDK test application for YDLIDAR

Visit EAI Website for more details about YDLIDAR .

Support LIDAR MODEL(Only S4Pro support intensity)

MODEL	Baudrate	Sampling Frequency	Range(m)	Scanning Frequency(HZ)	Working temperature(°C)	Laser power max(mW)	voltage(V)	Current(mA)
G4	230400	9000	0.26-16	5-12	0-50	~5	4.8-5.2	400-480
X4	128000	5000	0.12-10	5-12	0-40	~5	4.8-5.2	330-380
F4	115200	4000	0.1-12	5-12	0-40	~5	4.8-5.2	400-480
S4	115200	4000	0.1-8	6-12	0-40	~5	4.8-5.2	330-380
S4Pro	153600	4000	0.1-8	6-12	0-40	~5	4.8-5.2	330-380

How to build YDLIDAR SDK samples

```
$ git clone https://github.com/yangfuyuan/ydlidar_sdk

$ cd ydlidar_sdk

$ git checkout master

$ cd ..
```

Linux:

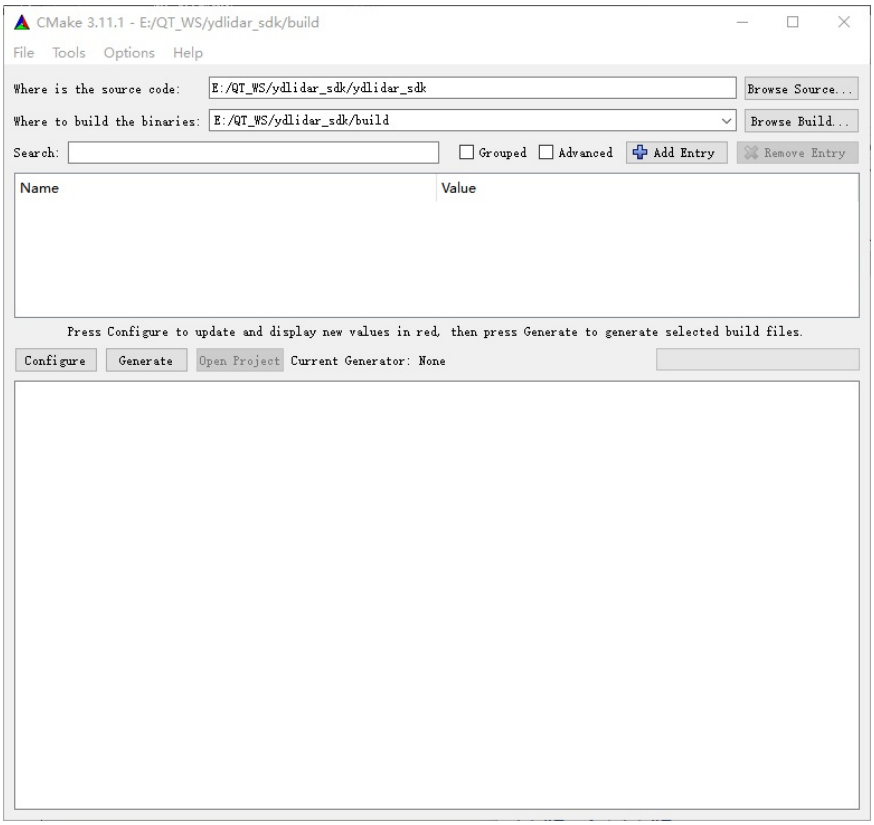
```
$ mkdir build

$ cd build

$ cmake ../ydlidar_sdk   ##windows: cmake -G "Visual Studio 14 2017 Win64" ../ydlidar_sdk

$ make
```

Windows:

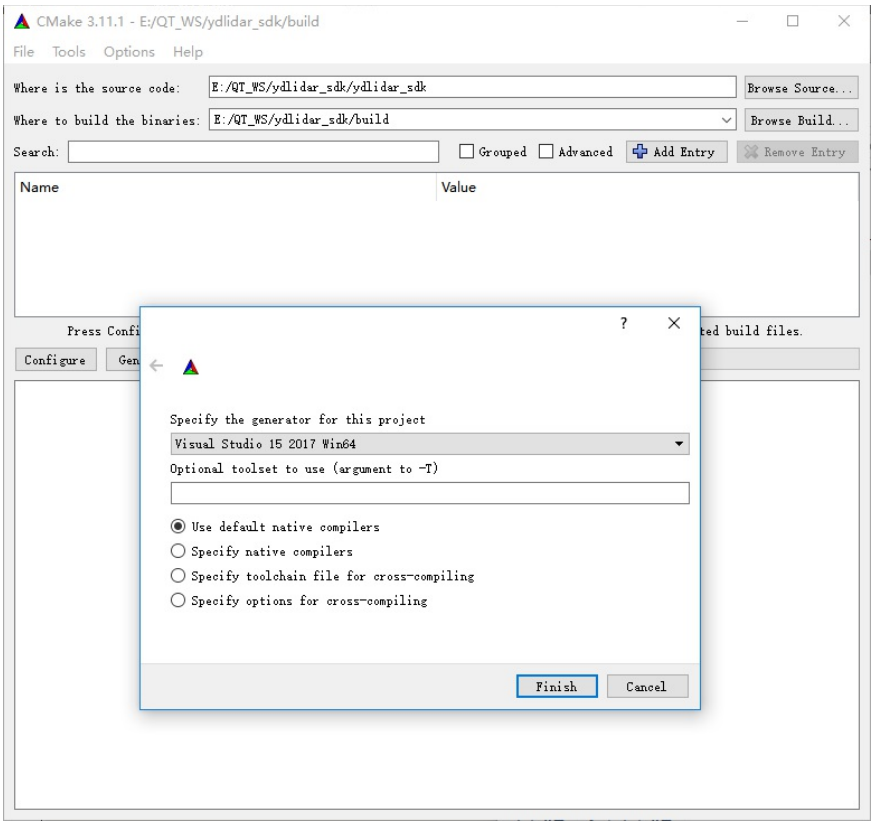
1. install cmake(if there is no cmake)

2. build steps:

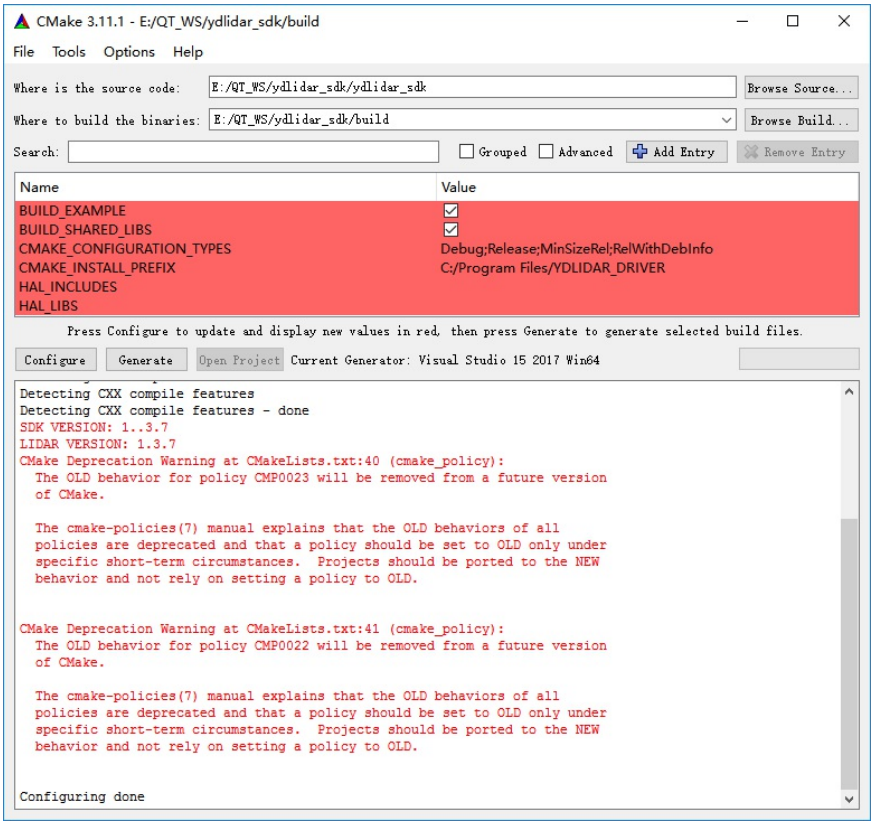
Step1: open cmake-gui and select source code/binaries directory



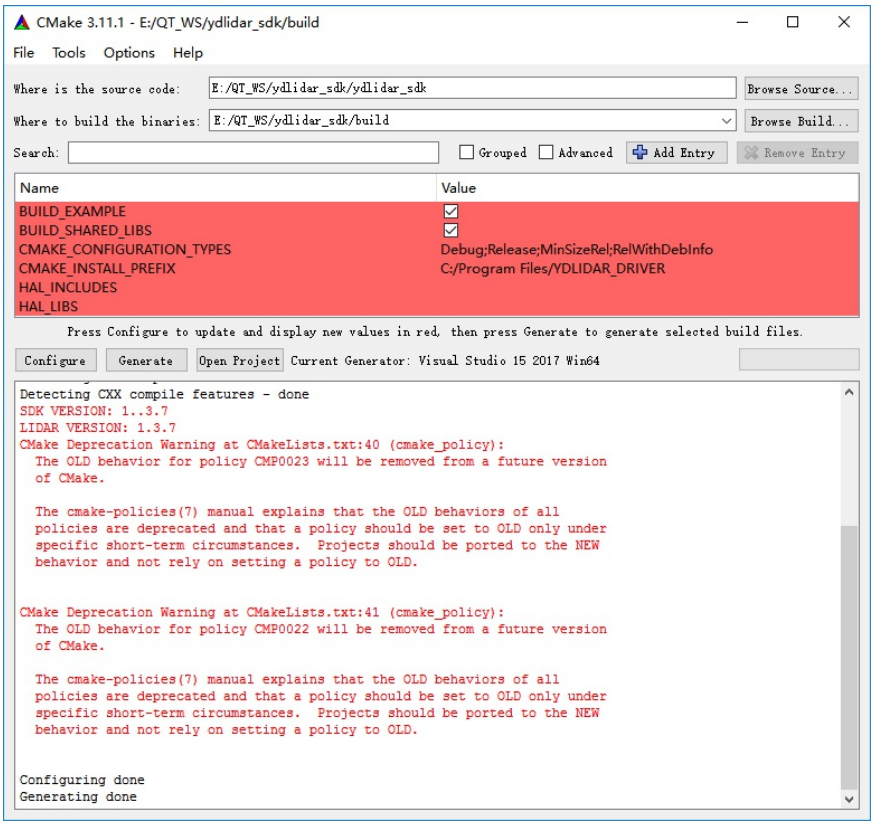
Step2: Configure and select build toolchain(choose the VS version in your system)



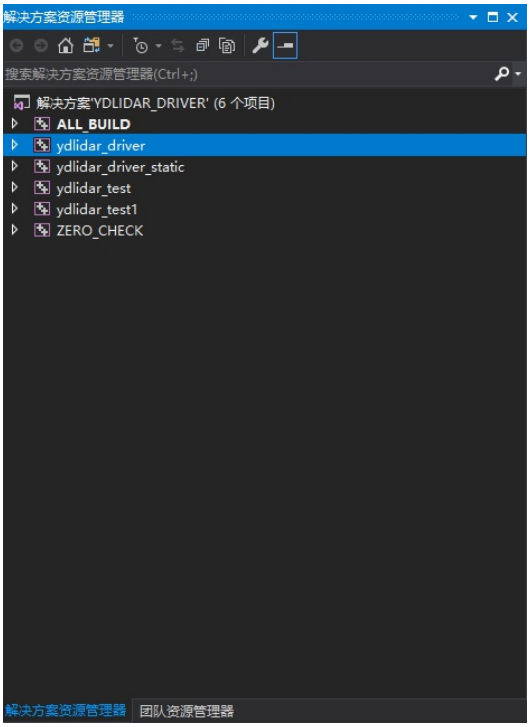
Step3: configuring done(click “Configure” button)



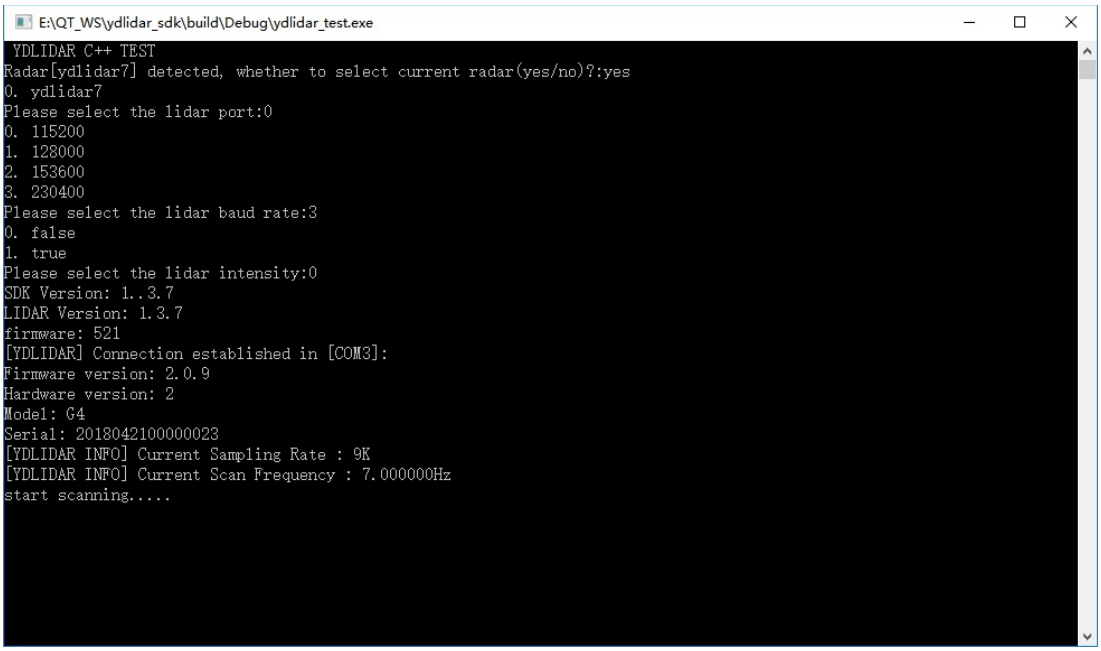
Step4: generating done(click “Generate” button)



Step5: open vs Project in binaries directory



Step6: build finished and run test:



3.Compile wth Qt:

1). Qt configuration cmake

2). Open the CmakeLists.txt project file with Qt.

How to run YDLIDAR SDK samples

linux:

```
$ ./ydlidar_test

  YDLIDAR C++ TEST

   Radar[ydlidar7] detected, whether to select current radar(yes/no)?:yes

   0. ydlidar7

$ Please select the lidar port:0

  0. 115200

  1. 128000

  2. 153600

  3. 230400

$ Please select the lidar baud rate:3

  0. false

  1. true

$ Please select the lidar intensity:0
```

windows:

```
$ ydlidar_test.exe

  YDLIDAR C++ TEST

   Radar[ydlidar7] detected, whether to select current radar(yes/no)?:yes

   0. ydlidar7

$ Please select the lidar port:0

  0. 115200

  1. 128000
```

```
  2. 153600
  3. 230400
$ Please select the lidar baud rate:3
  0. false
  1. true
$ Please select the lidar intensity:0
```

Console Display

You should see YDLIDAR's scan result in the console:

```
YDLIDAR C++ TEST
Radar[ydlidar7] detected, whether to select current radar(yes/no)?:yes
0. ydlidar7
Please select the lidar port:0
0. 115200
1. 128000
2. 153600
3. 230400
Please select the lidar baud rate:3
0. false
1. true
Please select the lidar intensity:0
SDK Version: 1..3.7
LIDAR Version: 1.3.7
fhs_lock: creating lockfile:      18341
firmware: 521
[YDLIDAR] Connection established in [/dev/ttyUSB0]:
Firmware version: 2.0.9
Hardware version: 2
Model: G4
Serial: 2018042100000023
[YDLIDAR INFO] Current Sampling Rate : 9K
[YDLIDAR INFO] Current Scan Frequency : 7.000000Hz
received scan size: 1039
scan   system time: 1534400129245291000
scan     self time: 1534400129103710800
scan     frequency: 8.67053HZ
received scan size: 1231
scan   system time: 1534400129379541000
scan     self time: 1534400129232496800
scan     frequency: 7.31708HZ
received scan size: 1272
scan   system time: 1534400129530262000
```

```
scan     self time: 1534400129378863800

scan     frequency: 7.08105HZ

received scan size: 1295

scan   system time: 1534400129671749000

scan     self time: 1534400129519748800

scan     frequency: 6.95518HZ

^Csignal_handler(2)

received scan size: 1341

scan   system time: 1534400129839365000

scan     self time: 1534400129671106800

scan     frequency: 6.71642HZ

fhs_unlock: Removing LockFile
```

Lidar point data structure

data structure:

```
//! A struct for returning configuration from the YDLIDAR
struct LaserConfig {

    //! Start angle for the laser scan [rad].  0 is forward and angles are measured clockwise when viewing YDLIDAR from the top.
    float min_angle;

    //! Stop angle for the laser scan [rad].   0 is forward and angles are measured clockwise when viewing YDLIDAR from the top.
    float max_angle;

    //! Scan resolution [rad].
    float ang_increment;

    //! Scan resoltuion [ns]
    float time_increment;

    //! Time between scans
    float scan_time;

    //! Minimum range [m]
    float min_range;

    //! Maximum range [m]
    float max_range;

    //! Range Resolution [m]
    float range_res;

  };


  struct LaserScan {

    //! Array of ranges
    std::vector<float> ranges;

    //! Array of intensities
    std::vector<float> intensities;

    //! Self reported time stamp in nanoseconds
    uint64_t self_time_stamp;

    //! System time when first range was measured in nanoseconds
    uint64_t system_time_stamp;

    //! Configuration of scan
    LaserConfig config;

  };
```

example:

```
for(size_t i =0; i < scan.ranges.size(); i++) {

  // current angle
```

```
  double angle = scan.config.min_angle + i*scan.config.ang_increment;

  //current distance
  double distance = scan.ranges[i];

  //current intensity
  int intensity = scan.intensities[i];

}
```

code:

```
  void LaserScanCallback(const LaserScan& scan) {

      std::cout<< "received scan size: "<< scan.ranges.size()<<std::endl;

      std::cout<< "scan   system time: "<< scan.system_time_stamp<<std::endl;

      std::cout<< "scan     self time: "<< scan.self_time_stamp<<std::endl;

      std::cout<< "scan     frequency: "<< 1000000000.0/scan.config.scan_time << "HZ"<<std::endl;

      for(size_t i =0; i < scan.ranges.size(); i++) {

        // current angle
        double angle = scan.config.min_angle + i*scan.config.ang_increment;

        //current distance
        double distance = scan.ranges[i];

        //current intensity
        int intensity = scan.intensities[i];

      }

    }
```

Quick Start

The best way to learn how to use sdk is to follow the tutorials in our sdk guide:

https://github.com/yangfuyuan/ydlidar_sdk/Samples

If you want to learn from code examples, take a look at the examples in the Samples directory.

SIMPLE USAGE

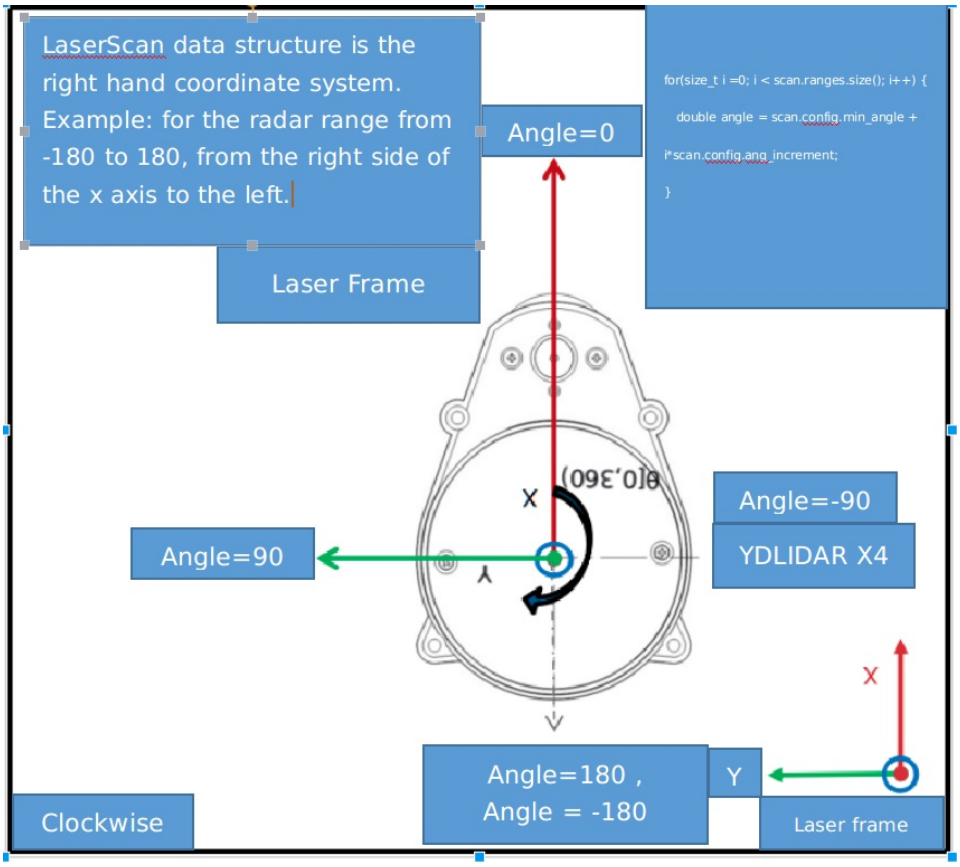
```
    try {

        LIDAR ydlidar;

        LaserParamCfg cfg;

        ydlidar.RegisterLIDARDataCallback(&LaserScanCallback);

        ydlidar.UpdateLidarParamCfg(cfg);

         while(ydlidar::ok()){

             try {

                 ydlidar.spinOnce();

             }catch(TimeoutException& e) {

                 std::cout<< e.what()<<std::endl;

             }catch(CorruptedDataException& e) {

                 std::cout<< e.what()<<std::endl;

             }catch(DeviceException& e) {

                 std::cout<< e.what()<<std::endl;

                 break;
             }

         }
```

```
}catch(TimeoutException& e) {
    std::cout<< e.what()<<std::endl;
}catch(CorruptedDataException& e) {
    std::cout<< e.what()<<std::endl;
}catch(DeviceException& e) {
    std::cout<< e.what()<<std::endl;
}
```

Get Lidar List

```
std::vector<string> ports =  YDlidarDriver::lidarPortList();
for(std::vector<string>::iterator it = ports.begin(); it != ports.end(); it++) {
        printf("%s\n",  (*it).c_str());
 }
```

Coordinate System



LaserScan data structure radar coordinate system

The relationship between the angle value and the data structure in the above figure:

```
double Angle =  scan.config.min_angle + index*scan.config.ang_increment;
```

Upgrade Log

2018-08-14 version:1.3.7

1. **update** sdk interface **function**.
2. **add get** lidar port list.
3. support mutil-lidar binding port.
4. support **for** configuring radar parameters through ini file.
5. the currend interface **is not** compatible **with** the old sdk.