Xicro Package

https://github.com/imchin/Xicro

Xicro Package - Content

- How to use Xicro
  - Config yaml
  - Generate Library
  - Generate node
- Import library to use with Arduino IDE
- Import library to use with VS Code Platform IO

Xicro Package

Clone Xicro from github to src folder and colcon build

Colcon Build

```
Starting >>> xicro_interfaces
Starting >>> xicro_pkg
Finished <<< xicro_pkg [0.16s]
Finished <<< xicro_interfaces [1.00s]

Summary: 2 packages finished [1.18s]
```

Xicro Package

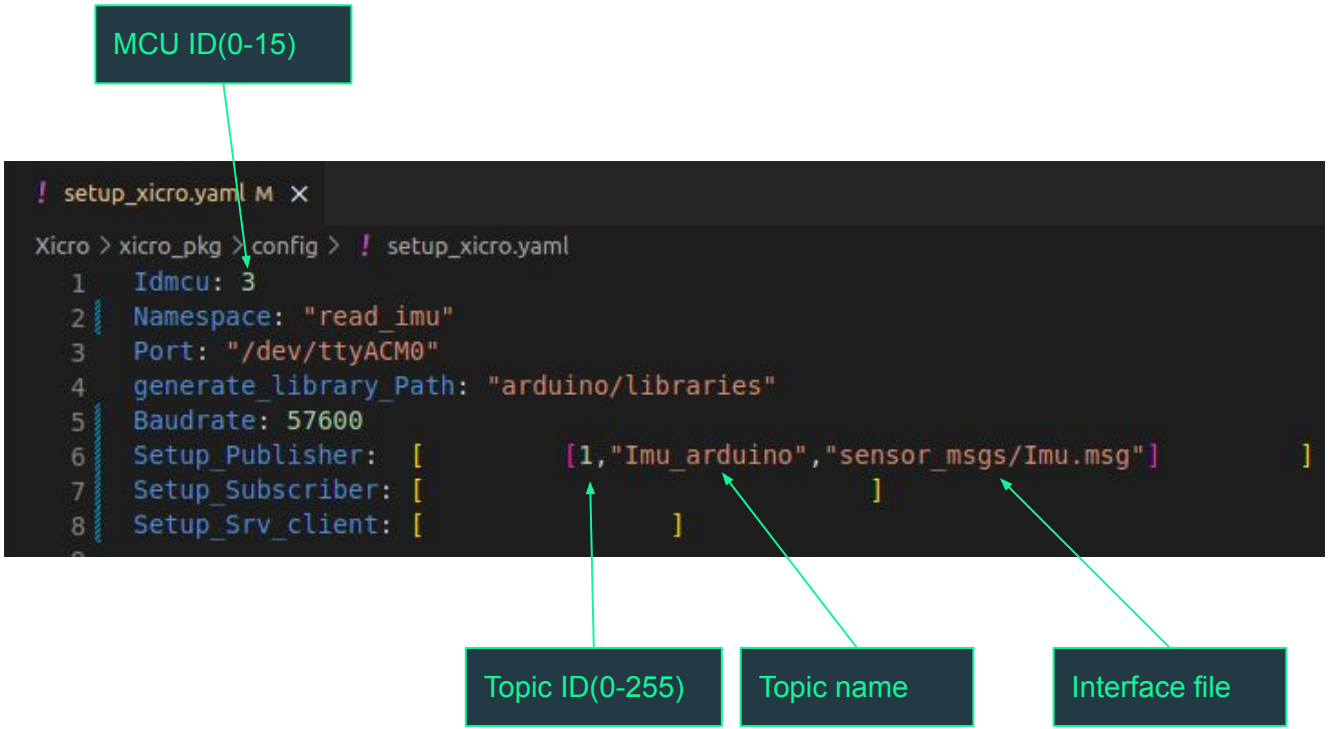
Open file **setup_xicro.yaml** in folder **xicro_pkg->config**

setup_xicro.yaml M

Xicro > xicro_pkg > config > setup_xicro.yaml

```yaml
Idmcu: 3
Namespace: "read_imu"
Port: "/dev/ttyACM0"
generate_library_Path: "arduino/libraries"
Baudrate: 57600
Setup_Publisher:  [        [1,"Imu_arduino","sensor_msgs/Imu.msg"]        ]
Setup_Subscriber: [                                ]
Setup_Srv_client: [               ]
```

Xicro Package



Xicro Package - generate library

After, finish the config file

Colcon build and **run generate library**

Colcon build

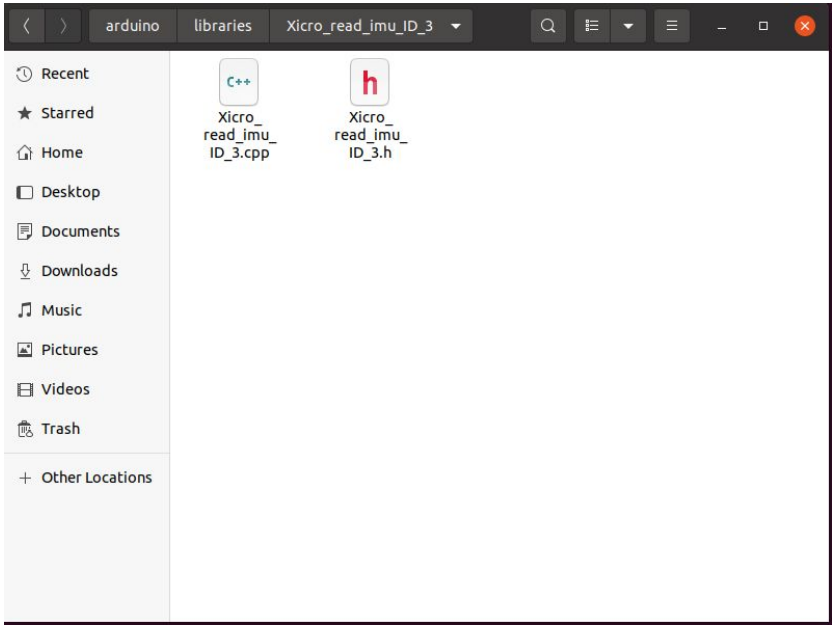
Source install/setup.bash

ros2 run xicro_pkg generate_library.py arduino

```
earthphisek@earthphisek-GF75-Thin-10SC:~/ros2_dl/LAB3_ws$ ros2 run xicro_pkg generate_library.py arduino
Get Idmcu Done.
Get Setup_Publisher Done.
/opt/ros/foxy/share/sensor_msgs/msg/Imu.msg
Get Setup_Srv_client Done.
Get Idmcu Done.
Done load YAML srv_client.
Get generate_library_Path Done.
Get Namespace Done.
Get Idmcu Done.
path: /home/earthphisek/arduino/libraries/Xicro_read_imu_ID_3
Get Namespace Done.
gen voidPub Done
Get Idmcu Done.
Get Setup_Subscriber Done.
gen public_struct Done
Get Setup_Srv_client Done.
Get Idmcu Done.
Done load YAML srv_client.
gen state_srv Done
Get Setup_Srv_client Done.
Get Idmcu Done.
Done load YAML srv_client.
Get Setup_Srv_client Done.
Get Idmcu Done.
Done load YAML srv_client.
gen client_res_struct Done
Get Idmcu Done.
Get Setup_Subscriber Done.
gen private_struct Done
.h Done.
Get generate_library_Path Done.
Get Namespace Done.
Get Idmcu Done.
path: /home/earthphisek/arduino/libraries/Xicro_read_imu_ID_3
Get Namespace Done.
Get Namespace Done.
Get Idmcu Done.
Get Setup_Subscriber Done.
gen pointer Done.
gen functionPub Done.
Get Setup_Srv_client Done.
Get Idmcu Done.
Done load YAML srv_client.
gen service call void Done.
.cpp Done.
*******Create library arduino complete*******
```

Xicro Package - generate library

Check file in folder `"home/arduino/libraries"`



Xicro Package - generate node

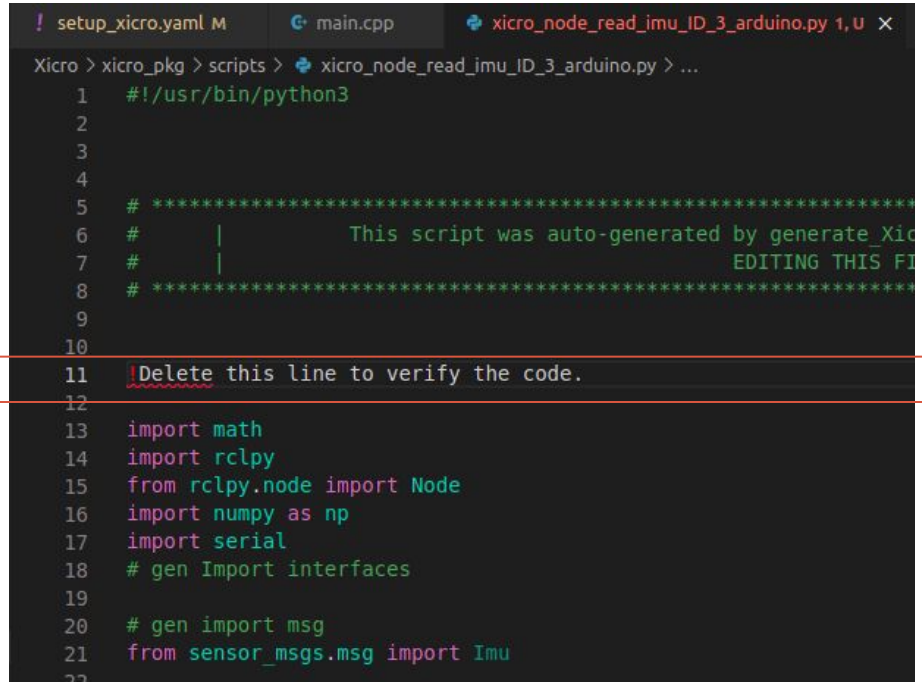
After that, Generate node

ros2 run xicro_pkg generate_xicro_node.py arduino

```
earthphisek@earthphisek-GF75-Thin-10SC:~/ros2_di/LAB3_ws$ ros2 run xicro_pkg generate_xicro_node.py arduino
Get Idmcu Done.
Get Setup_Subscriber Done.
Get Namespace Done.
Get Setup_Subscriber Done.
Get Setup_Publisher Done.
Get Setup_Srv_client Done.
Generate Import Interface Done.
Get Setup_Publisher Done.
Done load YAML pub.
Generate variable from msg Done.
Topic >>>  Imu_arduino Use :  217 bytes
Max_frequency On Topic  Imu_arduino  is :  53.08755760368663  Hz.
******Calculate Only 1 Topic per Second******
All topic average is :  53.08755760368663  Hz.
Get Setup_Srv_client Done.
Get Idmcu Done.
Done load YAML srv_client.
gennerate Sub Done.
gennerate Callback Done.
Get Baudrate Done.
----------------------generate xicro_node.py Done----------------------
Get Namespace Done.
Get Idmcu Done.
----------------------generate Entry_Point Done----------------------
```

Xicro Package - generate node

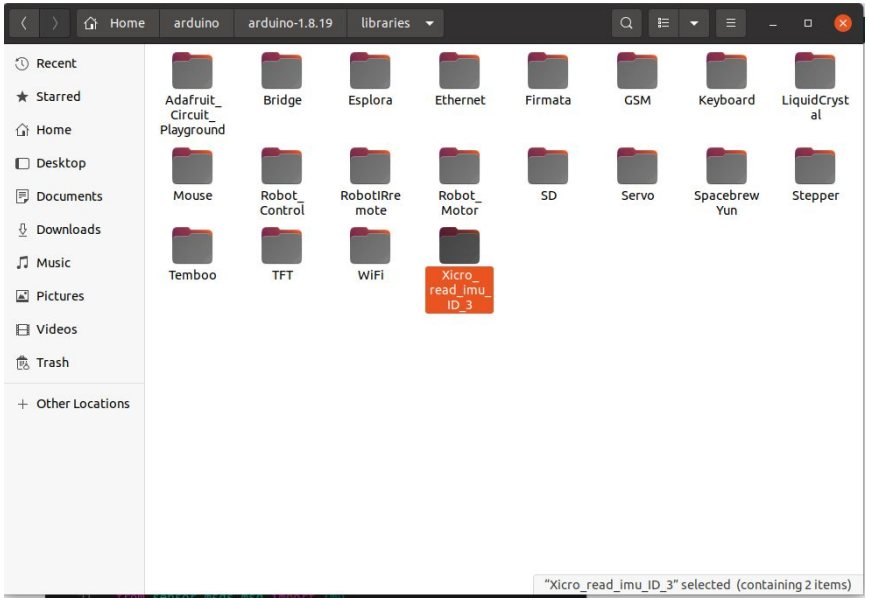
After finish generate node, VSCode will open and you have to delete the line that error.



Xicro Package - Arduino IDE

Copy library generate folder to Arduino library folder

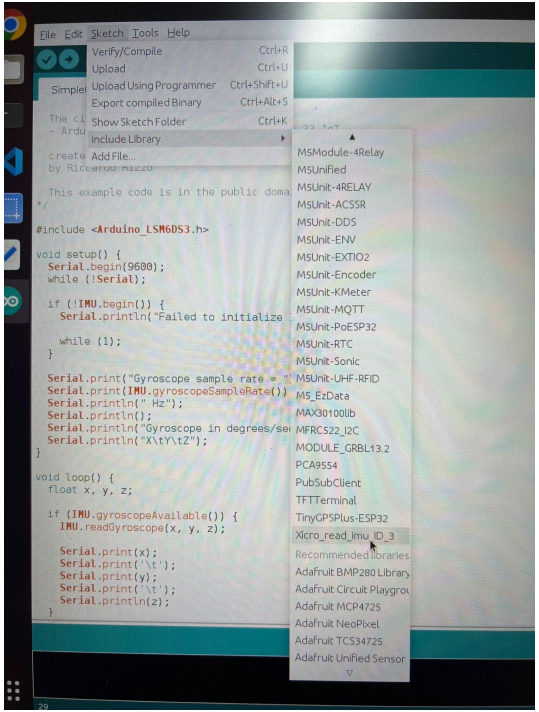
Run ***sudo ./arduino/arduino-1.8.19/arduino*** to open Arduino IDE



Xicro Package - Arduino IDE

Check Library in sketch -> include Library -> contributed Library

Include to sketch



Xicro Package - Arduino IDE

Example code

```ino
#include <Arduino.h>
#include <Arduino_LSM6DS3.h>
#include <Xicro_read_imu_ID_3.h>
Xicro xicro;

float ax, ay, az;
float gx, gy, gz;

float orientation[4]={0};
float orientation_covariance[9]={1,0,0,0,1,0,0,0,1};
float angular_velocity[3]={0};
float angular_velocity_covariance[9]={1,0,0,0,1,0,0,0,1};
float linear_acceleration[3]={0};
float linear_acceleration_covariance[9]={1,0,0,0,1,0,0,0,1};


void setup()
{
  // put your setup code here, to run once:
  Serial.begin(57600);
  xicro.begin(&Serial);
  IMU.begin();
  //Set timer
  TCB0.CTRLB = TCB_CNTMODE_INT_gc;
  // TCB0.CCMP  = 12500;   //20 Hz.
  TCB0.CCMP  = 25000;   //10 Hz.
  TCB0.INTCTRL = TCB_CAPT_bm;
  TCB0.CTRLA = TCB_CLKSEL_CLKTCA_gc | TCB_ENABLE_bm;
//end of set timer
}

```

```ino
void read_imu_Sendros2()
{
  if(IMU.readAcceleration(gx, gy, gz) && IMU.readGyroscope(ax, ay, az))
  {
      angular_velocity[0]=ax*(3.141592/180.00);
      angular_velocity[1]=ay*(3.141592/180.00);
      angular_velocity[2]=az*(3.141592/180.0);
      linear_acceleration[0]=gx*(9.80665);
      linear_acceleration[1]=gy*(9.80665);
      linear_acceleration[2]=gz*(-9.80665);
      xicro.publish_Imu_arduino((int32_t)micros() / 1000000.00, (uint32_t)micros() / 1000000.00, (String)"from arduino"
      ,orientation[0],orientation[1],orientation[2],orientation[3],orientation_covariance
      ,angular_velocity[0],angular_velocity[1],angular_velocity[2],angular_velocity_covariance
      ,linear_acceleration[0],linear_acceleration[1],linear_acceleration[2] ,linear_acceleration_covariance );
  }

}
void loop() {
  // put your main code here, to run repeatedly:
  xicro.Spin_node();
}

ISR(TCB0_INT_vect)
{
  read_imu_Sendros2();
  TCB0.INTFLAGS = TCB_CAPT_bm;
}
```

Xicro Package - Arduino IDE

Upload code and run generate node

ros2 run xicro_pkg xicro_node_read_imu_ID_3_arduino.py

```
earthphisek@earthphisek-GF75-Thin-10SC:~/ros2_di/LAB3_ws$ ros2 run xicro_pkg xicro_node_read_imu_ID_3_arduino.py
Input arg Port use is :/dev/ttyACM0
/dev/ttyACM0: port is Open.
Start Receive Uart : /dev/ttyACM0
XicroToRos_spin Srv client
Open Topic Name : Imu_arduino  >>>>  Use msg name : Imu
Open Topic All Done.
XicroToRos_spin pub
```

Check the result

ros2 topic list

Ros2 topic echo /Imu_arduino

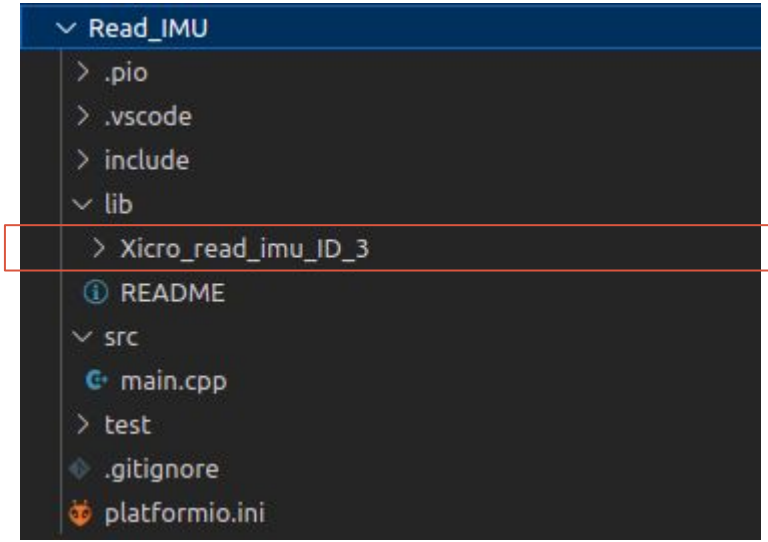
```
earthphisek@earthphisek-GF75-Thin-10SC:~$ ros2 topic list
/Imu_arduino
/parameter_events
/rosout
earthphisek@earthphisek-GF75-Thin-10SC:~$ ros2 topic echo /
/Imu_arduino       /parameter_events  /rosout
earthphisek@earthphisek-GF75-Thin-10SC:~$ ros2 topic echo /Imu_arduino
```

result:

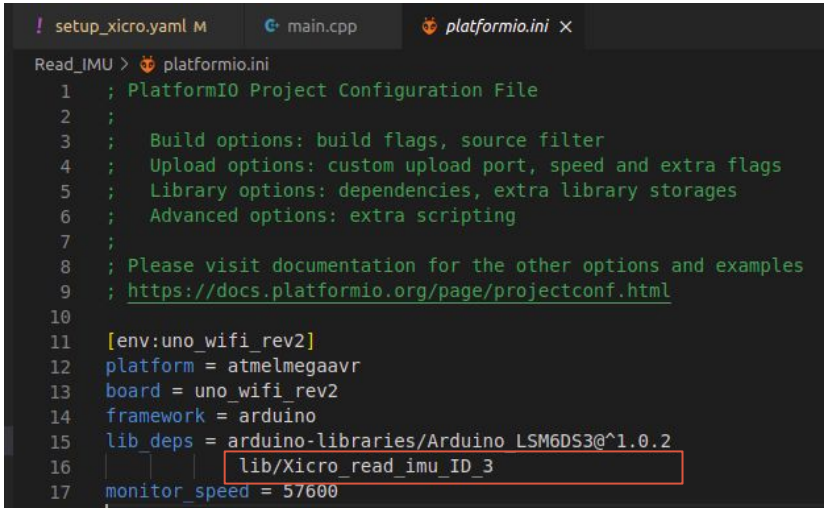
```
header:
  stamp:
    sec: 16
    nanosec: 16
  frame_id: from arduino
orientation:
  x: 0.0
  y: 0.0
  z: 0.0
  w: 0.0
orientation_covariance:
- 1.0
- 0.0
- 0.0
- 0.0
- 1.0
- 0.0
- 0.0
- 0.0
- 1.0
angular_velocity:
  x: 0.051132682710886
  y: -0.023435812443494797
  z: -0.04048004001379013
angular_velocity_covariance:
- 1.0
- 0.0
- 0.0
- 0.0
- 1.0
- 0.0
- 0.0
- 0.0
- 1.0
linear_acceleration:
  x: 0.1149216815829277
  y: -0.1472434103488922
  z: -9.97065258026123
linear_acceleration_covariance:
- 1.0
- 0.0
- 0.0
- 0.0
- 1.0
- 0.0
- 0.0
```

Xicro Package - Platform IO

Copy library generate folder to lib folder



Open platformio.ini add lib path



Xicro Package - Platform IO

Build once library will add to project

```
PACKAGES:
 - framework-arduino-megaavr @ 1.8.7
 - toolchain-atmelavr @ 1.70300.191015 (7.3.0)
LDF: Library Dependency Finder -> https://bit.ly/configure-pio-ldf
LDF Modes: Finder ~ chain, Compatibility ~ soft
Found 9 compatible libraries
Scanning dependencies...
Dependency Graph
|-- Arduino_LSM6DS3 @ 1.0.2
|   |-- SPI @ 1.0
|   |-- Wire @ 1.0
|-- Xicro_read_imu_ID_3 @ 0.0.0+20221027133436
Building in release mode
Compiling .pio/build/uno_wifi_rev2/src/main.cpp.o
Linking .pio/build/uno_wifi_rev2/firmware.elf
Checking size .pio/build/uno_wifi_rev2/firmware.elf
Advanced Memory Usage is available via "PlatformIO Home > Project Inspect"
RAM:   [=         ]  11.6% (used 712 bytes from 6144 bytes)
Flash: [===       ]  28.6% (used 13923 bytes from 48640 bytes)
```

Xicro Package - Platform IO

Platform IO permission error

https://techoverflow.net/2021/09/27/how-to-fix-linux-esp32-platformio-permissionerror-errno-13-permission-denied-dev-ttyusb0/