

Using NS-RX231 with MPU-6050 for Demonstration <MPU-6050 <-> UNITY>

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1 Summary

The MPU-6050 is a sensor composed of a gyroscope and an accelerometer

There are Roll, Pitch, Yaw which represent the rotation of the object. However, it is difficult to catch accurate reference point of yaw angle by only the accelerometer and gyroscope. The 9 axis sensor including the magnetometer is MPU-9150 which is the upper model of MPU-6050.

Currently, only the Roll and Pitch angle data minus the Yaw angle is used in this document and project.

This document aims at visualizing the rotation of an object using Unity 3D by measuring roll and pitch angles using MPU-6050 data. There are so many filters used to fuse data from two sensors, but this article uses a complementary filter.

2 Device Manager Settings

Set the COM port of the additional communication board connected to the PC to No. 7 because Unity is configured to use COM7.

Run Device Manager from the control panel and make the following settings.

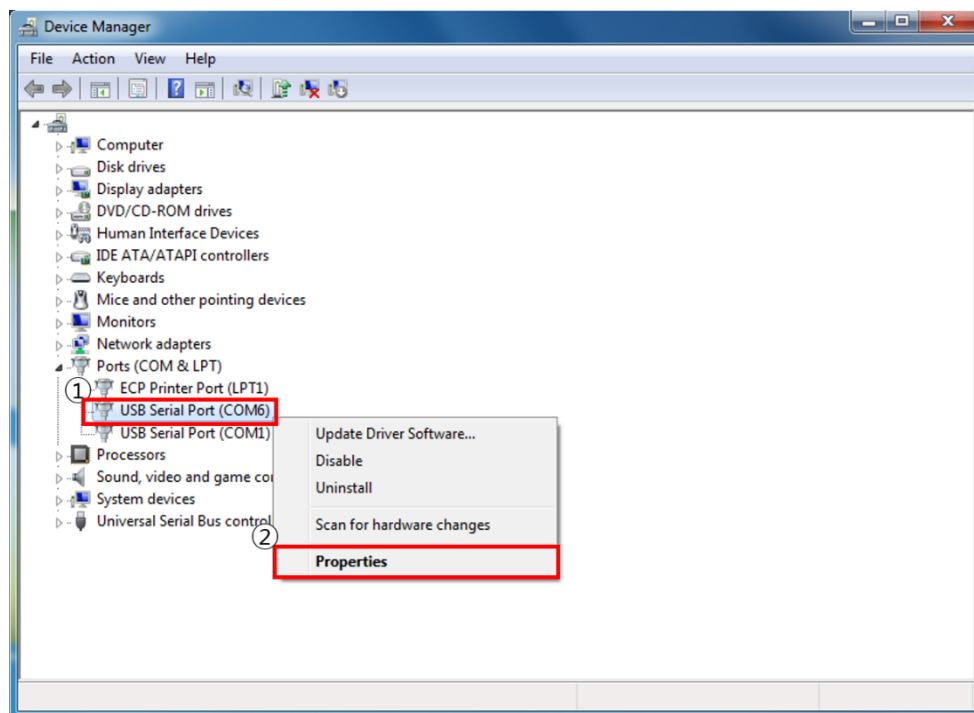


Figure 2-1 Device manager settings - 1

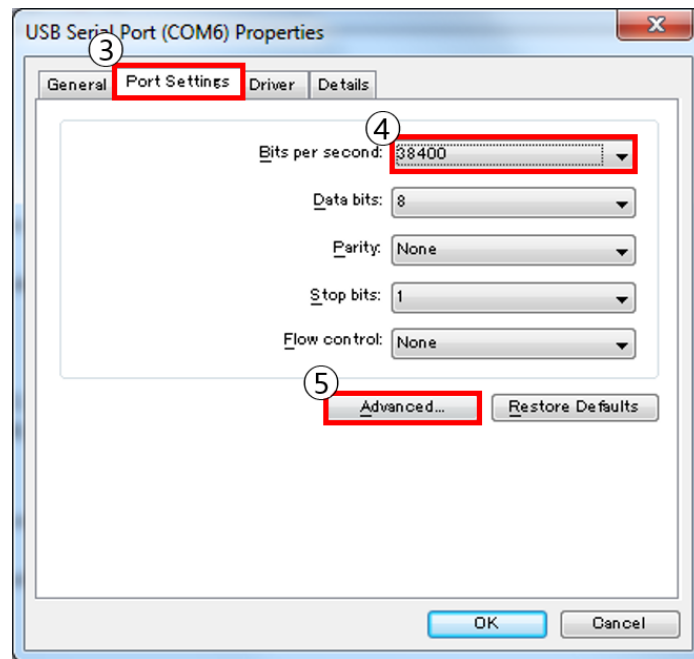


Figure 2-2 Device manager settings - 2

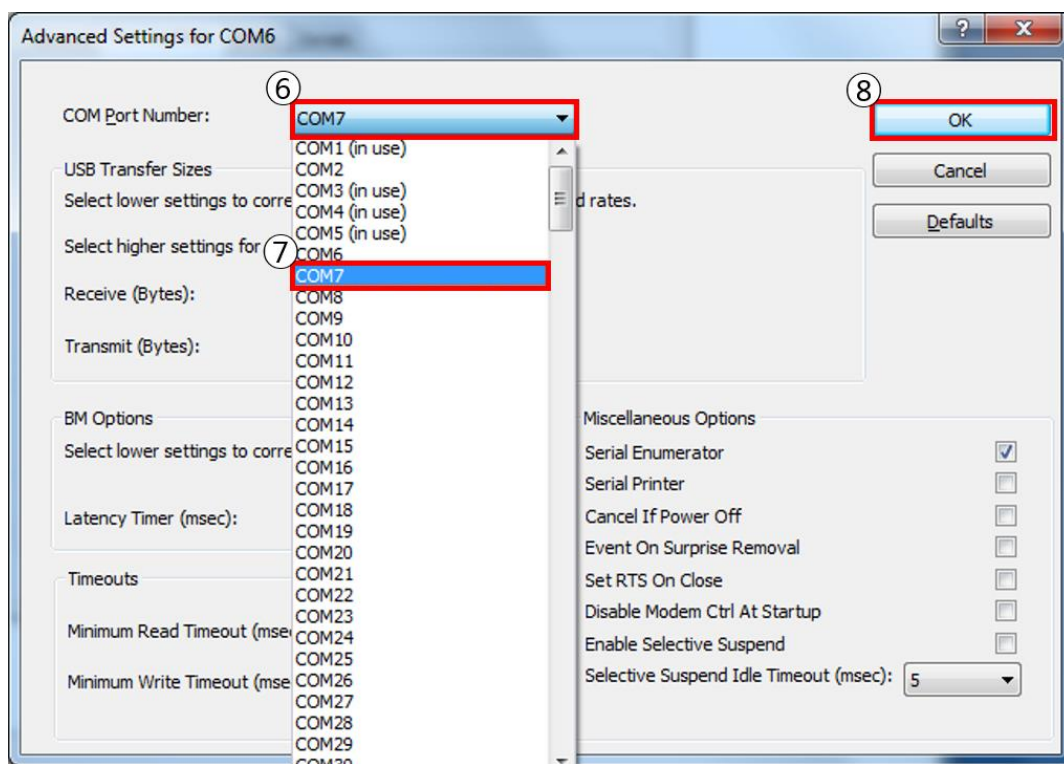


Figure 2-3 Device manager settings - 3

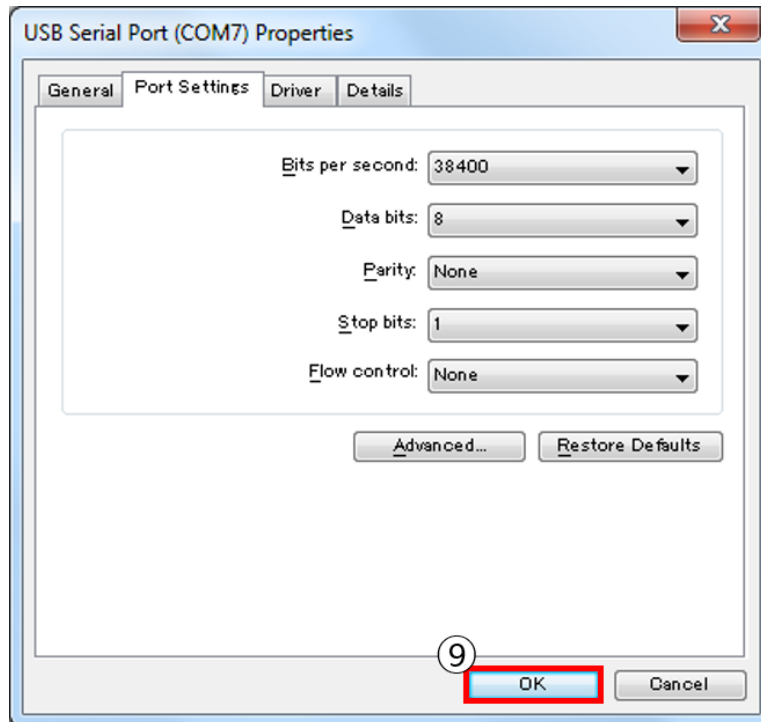


Figure 2-4 Device manager settings - 4

***Bitrate is 38400.**

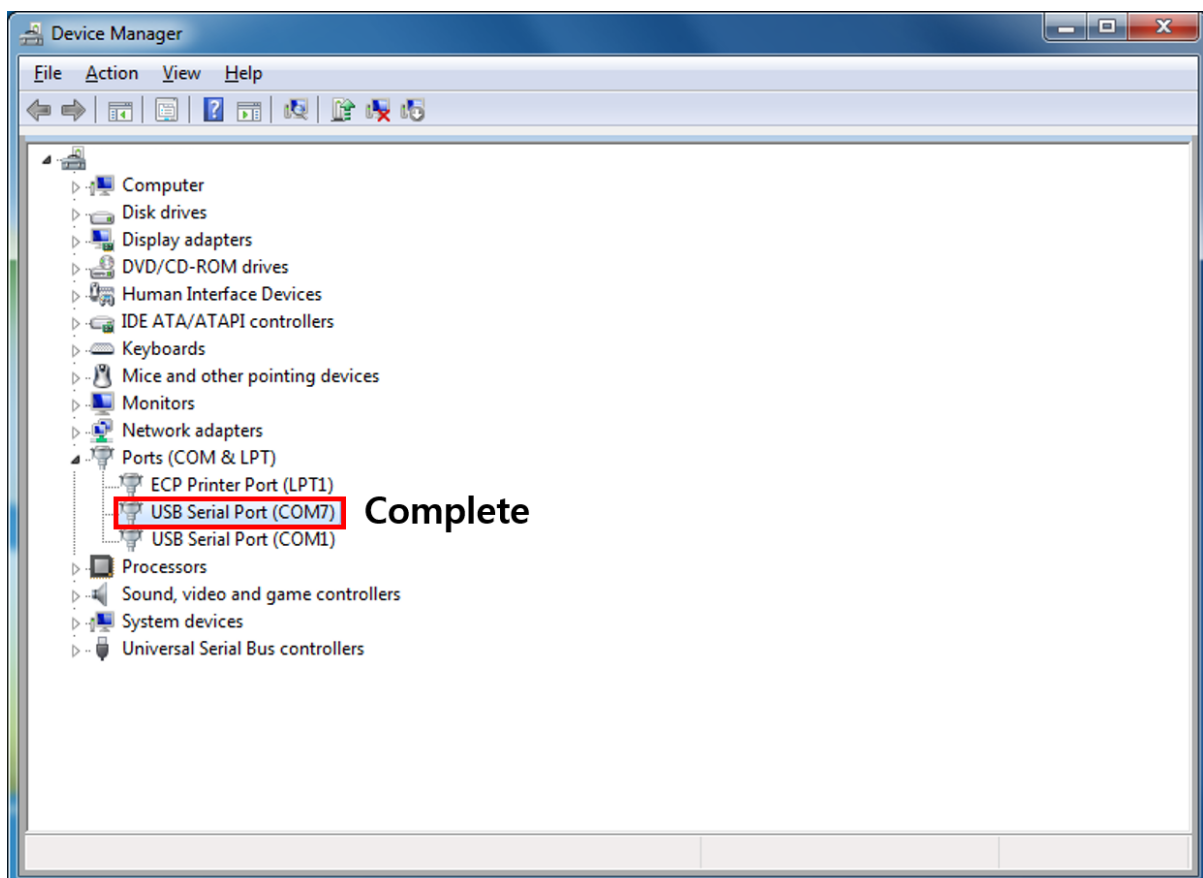


Figure 2-5 Device manager settings Complete

3 How to use

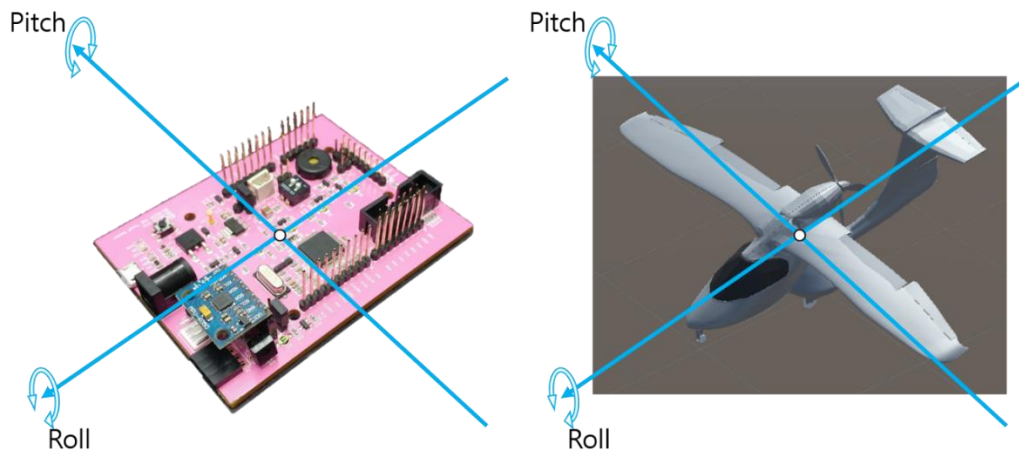


Figure 3-1 Roll Pitch Description

Connect NS-RX231 with MPU-6050 to PC through additional communication board.

And, run MPU-6050_UNITY_V1.1.exe from PC.

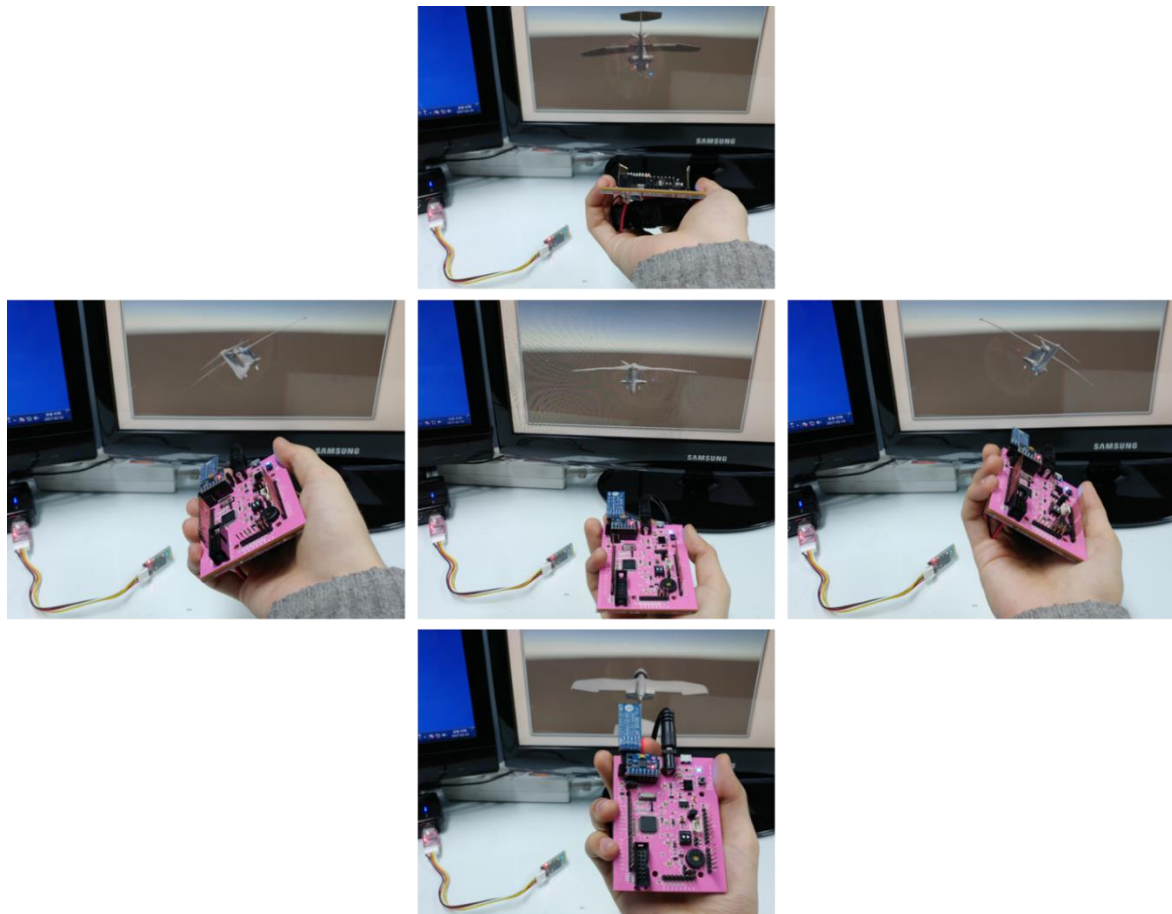


Figure 3-2 Operation example

4 Processing

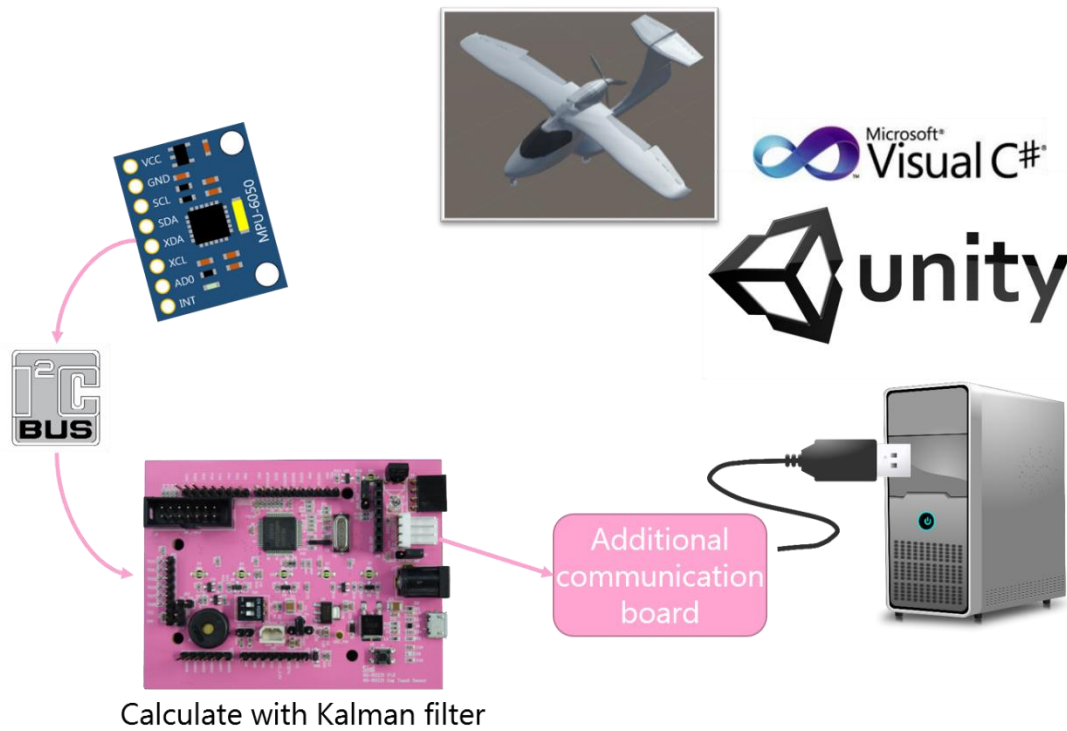


Figure 4-1 Processing

NS-RX231 uses I2C communication to retrieve the gyroscope and acceleration sensor data.

Then, data is processed with a complementary filter to extract the angle data. And it uses the additional communication board to send data to the PC to control the Unity3D model.

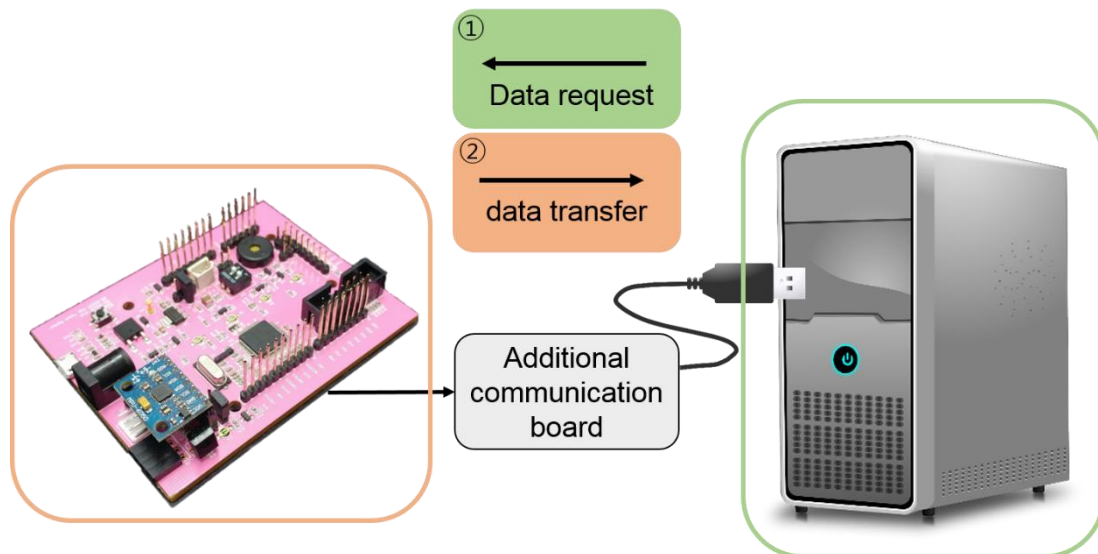
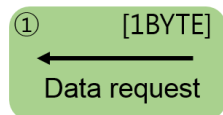
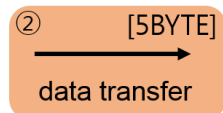


Figure 4-2 Connecting NS-RX231 to PC



Data[No.]	Data[0]
Description	Command
Value	0x40



Data[No.]	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]
Description	Start code	Roll data Positive Negative indicator	Roll Angle data	Pitch data Positive Negative indicator	Pitch Angle data
Value	0xFF	1 or 3	0~255	1 or 3	0~255

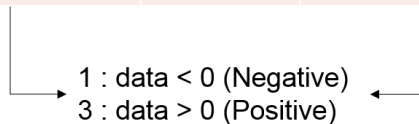


Figure 4-3 Request and Transmission Protocol

When PC sends command(0x40) to NS-RX231 and NS-RX231 receives command(0x40), it transmits start code and 4 bytes of angle data, total 5 bytes data to PC.

Data of 5 bytes of data [1] [3] data for positive and negative division is used for the coordinate axis calculated as subtract the sign classification data by -2 and multiply.

$$\begin{aligned}\text{Roll data} &= (\text{data}[1] - 2) \times \text{data}[2] \\ &= (1 - 2) \times 167 = -167\end{aligned}$$

The PC can rotate the plane 3D model in Unity using the received angle data.

5 Add

Connect NS-RX231 with MPU-6050 to PC through additional communication board.

Connect and run WALK_UNITY_V2.1.exe on PC to move the knight character.

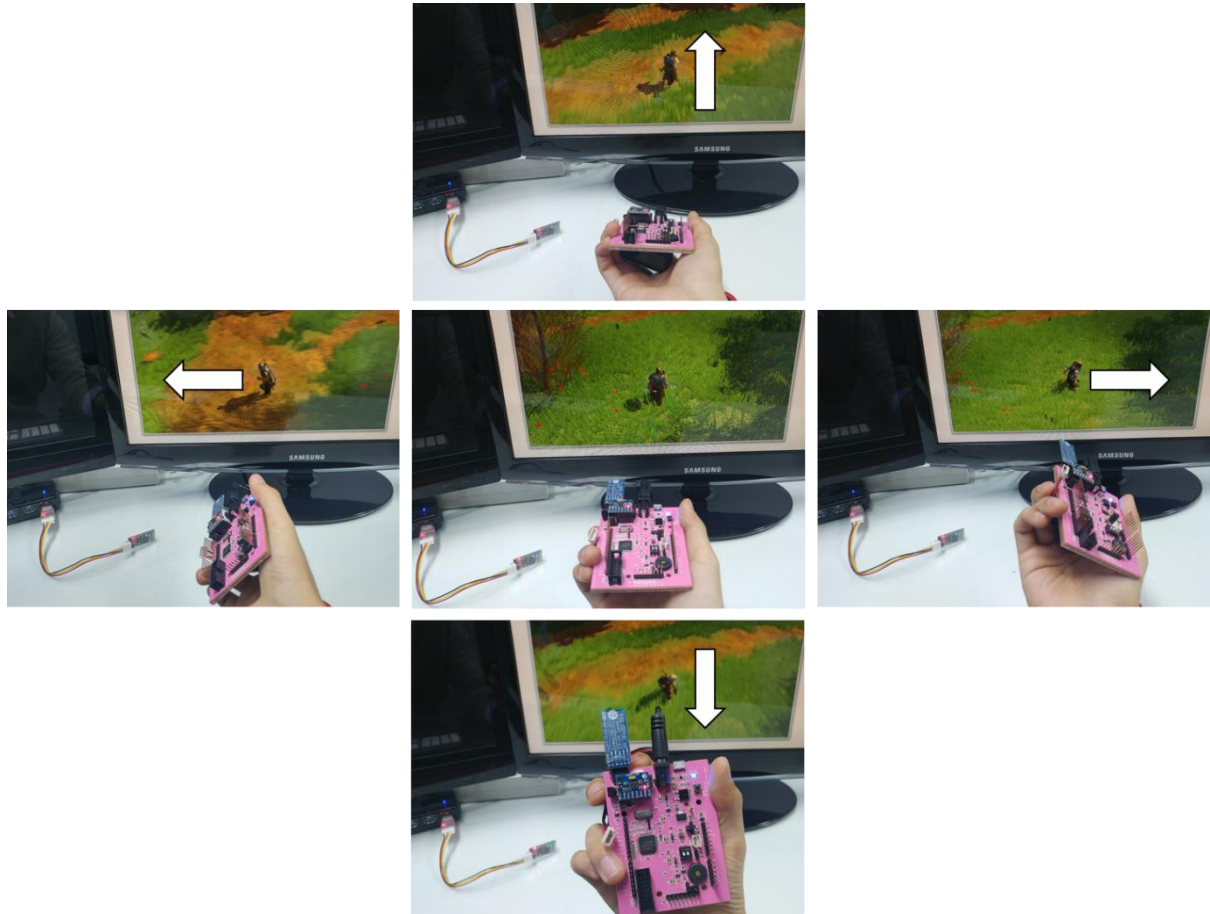


Figure 5-1 Another example of operation