Note before use: The CAN analyzer has been set and the communication between the CAN analyzer and the chassis is normal.

1. **Compile**
   1. Open the terminal and FW-mid-ros1 file content.
   2. Enter the command “catkin\_ make”, wait for compilation to complete.
2. **Operation**
   1. Open the terminal and enter FW-mid-ros1 file content, enter the following commands separately and press Enter button.

|  |
| --- |
| source devel/setup.bash |
| roslaunch yhs\_can\_control yhs\_can\_control.launch |

* 1. When it shows ">>open can deivce success!" that the opening is successful.

1. **Test**
   1. Before the test, it is recommended to rise the chassis up or send a lower speed.
   2. Open the terminal and enter FW-mid-ros1 file content, enter the following commands separately and press Enter button.

|  |
| --- |
| source devel/setup.bash |
| rostopic echo /ctrl\_fb |

* 1. When the feedback data is refreshing constantly, it indicates that the ROS driver is running normally.
  2. Issue messages to control chassis movement.

3.4.1.Open the terminal and enter FW-mid-ros1 file content, enter the command and press Enter button.

|  |
| --- |
| source devel/setup.bash |

3.4.2.Do not press Enter after entering the following commands.

|  |
| --- |
| rostopic pub -r 100 /ctrl\_cmd |

3.4.3. The following contents can be completed by pressing the Tab key. After completion, the gear, linear speed and angular speed should be input. Please note that the unit of angular speed shall be deg/s, not rad/s. After the input is completed, click Enter and switch the remote control to automatic control mode. Meanwhile you could observe that the red and blue lights on the CAN analyzer are sparkling, and the chassis starts to move.

**Publish Topics:**

Topic Name: /ctrl\_cmd

Topic Type: yhs\_can\_msgs/ctrl\_cmd

Topic Variable:

uint8 ctrl\_cmd\_gear Target gear

float32 ctrl\_cmd\_x\_linear Target vehicle X-axis linear velocity

float32 ctrl\_cmd\_z\_angular Target vehicle Z-axis angular velocity

float32 ctrl\_cmd\_y\_linear Target vehicle Y-axis linear velocity

The variable name corresponds to the name on the dbc file one by one. Please refer to the communication protocol for specific assignment. The publish frequency should be above 100 hz.

Topic Name: /io\_cmd

Topic Type: yhs\_can\_msgs/io\_cmd

Topic Variable:

bool io\_cmd\_lamp\_ctrl Lamp control

bool io\_cmd\_unlock Safety parking unlock switch

bool io\_cmd\_lower\_beam\_headlamp Lower headlight switch

bool io\_cmd\_upper\_beam\_headlamp Upper headlight switch

uint8 io\_cmd\_turn\_lamp Steering lamp switch

bool io\_cmd\_braking\_lamp Braking lamp switch

bool io\_cmd\_clearance\_lamp Clearance lamp switch

bool io\_cmd\_fog\_lamp Fog lamp switch

bool io\_cmd\_speaker Speaker switch(not available)

The variable name corresponds to the name on the dbc file one by one. Please refer to the communication protocol for specific assignment. The publish frequency should be above 100 hz.

Topic Name: /steering\_ctrl\_cmd

Topic Type: yhs\_can\_msgs/steering\_ctrl\_cmd

Topic Variable:

uint8 ctrl\_cmd\_gear Target gear

float32 steering\_ctrl\_cmd\_velocity Target vehicle speed

float32 steering\_ctrl\_cmd\_steering Target vehicle steering angle

The variable name corresponds to the name on the dbc file one by one. Please refer to the communication protocol for specific assignment. The publish frequency should be above 100 hz.

**Subscribe Topic:**

Topic Name: /ctrl\_fb

Topic Type: yhs\_can\_msgs/ctrl\_fb

Topic Variable:

uint8 ctrl\_fb\_gear Current gear feedback

float32 ctrl\_fb\_x\_linear Current linear X-axis linear velocity feedback

float32 ctrl\_fb\_z\_angular Current Z-axis angular velocity feedback

float32 ctrl\_fb\_y\_linear Current Y-axis linear velocity feedback

Topic Name: /steering\_ctrl\_fb

Topic Type: yhs\_can\_msgs/steering\_ctrl\_fb

Topic Variable:

uint8 steering\_ctrl\_fb\_gear Current gear feedback

float32 steering\_ctrl\_fb\_velocity Current vehicle steering speed feedback

float32 steering\_ctrl\_fb\_steering Current vehicle steering angle feedback

Topic Name: /io\_fb

Topic Type: yhs\_can\_msgs/io\_fb

Topic Variable:

bool io\_fb\_lamp\_ctrl Light control status feedback

bool io\_fb\_unlock Safety parking unlock status feedback

bool io\_fb\_lower\_beam\_headlamp Lower headlight switch status feedback

bool io\_fb\_upper\_beam\_headlamp Upper headlight switch status feedback

int8 io\_fb\_turn\_lamp Steering lamp switch status feedback

bool io\_fb\_braking\_lamp Brake light switch status feedback

bool io\_fb\_clearance\_lamp Clearance lamp switch status feedback

bool io\_fb\_fog\_lamp Fog lamp switch status feedback

bool io\_fb\_speaker Speaker switch status feedback(not available)

bool io\_fb\_fl\_impact\_sensor Front left anti-collision strip switch status feedback(reserve)

bool io\_fb\_fm\_impact\_sensor Front central anti-collision strip switch status feedback(reserve)

bool io\_fb\_fr\_impact\_sensor Front right anti-collision strip switch status feedback(reserve)

bool io\_fb\_rl\_impact\_sensor Rear left anti-collision strip switch status feedback(reserve)

bool io\_fb\_rm\_impact\_sensor Rear central anti-collision strip switch status feedback(reserve)

bool io\_fb\_rr\_impact\_sensor Rear right anti-collision strip switch status feedback(reserve)

bool io\_fb\_fl\_drop\_sensor Front left drop sensor status feedback(reserve)

bool io\_fb\_fm\_drop\_sensor Front central drop sensor status feedback(reserve)

bool io\_fb\_fr\_drop\_sensor Front right drop sensor status feedback(reserve)

bool io\_fb\_rl\_drop\_sensor Rear left drop sensor status feedback(reserve)

bool io\_fb\_rm\_drop\_sensor Rear central drop sensor status feedback(reserve)

bool io\_fb\_rr\_drop\_sensor Rear right drop sensor status feedback(reserve)

bool io\_fb\_estop Emergency stop status feedback

bool io\_fb\_joypad\_ctrl Remote controller status feedback

bool io\_fb\_charge\_state Charging station status feedback

Topic Name: /front\_angle\_fb

Topic Type: yhs\_can\_msgs/front\_angle\_fb

Topic Variable:

float32 front\_angle\_fb\_l Front left servo joint angle feedback

float32 front\_angle\_fb\_r Front right servo joint angle feedback

Topic Name: /rear\_angle\_fb

Topic Type: yhs\_can\_msgs/rear\_angle\_fb

Topic Variable:

float32 rear\_angle\_fb\_l Rear left servo joint angle feedback

float32 rear\_angle\_fb\_r Rear right servo joint angle feedback

Topic Name: /lf\_wheel\_fb

Topic Type: yhs\_can\_msgs/lf\_wheel\_fb

Topic Variable:

float32 lf\_wheel\_fb\_velocity Current front left wheel speed feedback

int32 lf\_wheel\_fb\_pulse Current front left wheel pulse feedback

Topic Name: /lr\_wheel\_fb

Topic Type: yhs\_can\_msgs/lr\_wheel\_fb

Topic Variable:

float32 lr\_wheel\_fb\_velocity Current rear left wheel speed feedback

int32 lr\_wheel\_fb\_pulse Current rear left wheel pulse feedback

Topic Name: /rf\_wheel\_fb

Topic Type: yhs\_can\_msgs/rf\_wheel\_fb

Topic Variable:

float32 rf\_wheel\_fb\_velocity Current front right wheel speed feedback

int32 rf\_wheel\_fb\_pulse Current front right wheel pulse feedback

Topic Name: /rr\_wheel\_fb

Topic Type: yhs\_can\_msgs/rr\_wheel\_fb

Topic Variable:

float32 rr\_wheel\_fb\_velocity Current rear right wheel speed feedback

int32 rr\_wheel\_fb\_pulse Current rear right wheel pulse feedback

Topic Name: /bms\_flag\_fb

Topic Type: yhs\_can\_msgs/bms\_flag\_fb

Topic Variable:

uint8 bms\_flag\_fb\_soc Current percentage of remaining power

bool bms\_flag\_fb\_single\_ov Single cell overvoltage protection

bool bms\_flag\_fb\_single\_uv Single cell undervoltage protection

bool bms\_flag\_fb\_ov Whole group overvoltage protection

bool bms\_flag\_fb\_uv Whole group undervoltage protection

bool bms\_flag\_fb\_charge\_ot Charging over temperature protection

bool bms\_flag\_fb\_charge\_ut Charging under temperature protection

bool bms\_flag\_fb\_discharge\_ot Discharging over temperature protection

bool bms\_flag\_fb\_discharge\_ut Discharging under temperature protection

bool bms\_flag\_fb\_charge\_oc Charging over current protection

bool bms\_flag\_fb\_discharge\_oc Discharging over current protection

bool bms\_flag\_fb\_short Short circuit protection

bool bms\_flag\_fb\_ic\_error Fore-end IC error detection

bool bms\_flag\_fb\_lock\_mos Software lock MOS

bool bms\_flag\_fb\_charge\_flag Charging flag bit

float32 bms\_flag\_fb\_hight\_temperature The highest temperature of battery

float32 bms\_flag\_fb\_low\_temperature The lowest temperature of battery

Topic Name: /bms\_fb

Topic Type: yhs\_can\_msgs/bms\_fb

Topic Variable:

float32 bms\_fb\_voltage Current battery voltage

float32 bms\_fb\_current Current battery current

float32 bms\_fb\_remaining\_capacity Current battery remaining capacity