Major Components:

1.Industrial PC

2. Feedback systems:

a. ROS Camera: PAL USB is a single sensor, omnidirectional vision system providing 360° stereoscopic sensing with depth perception. PAL USB enables visual intelligence with an unparalleled field of view that eliminates blind spots and combines full color video with precise depth mapping and detection in a single video stream. The reliable and efficient system has no moving parts, making it ideal for manufacturers and operators in robotics, factory and warehouse automation, and teleoperations where low latency and ease of use are critical. Use to get the coordinates for moving the motors in respective directions.

b. USB Camera: To live stream the input video to mobile application(user).

c. Wire Encoders: To get the feedback whether the UGV is reached the given destination and provide the same to camera.

d. Lidar: Sick NanoScan3 to detect the object present in front of UGV.

3. Output components:

a. Hub motors: HUB motors for movement of the wheels of UGV.

b. 8 channel Relays: 5v RS485 relays used to control front/fog/rear lights and brake actuator of the UGV.

c. 4 channel Relays: 12v relay used for changing the direction of wheels of UGV.

d. Linear actuator: Actuator is used to engage and disengage the brakes of the UGV.

e. Arduino Nano: To generate the PWM and also to change the direction of wheels.

f. RS485 to TTL convertor: Connected to industrial PC to Modbus relay.

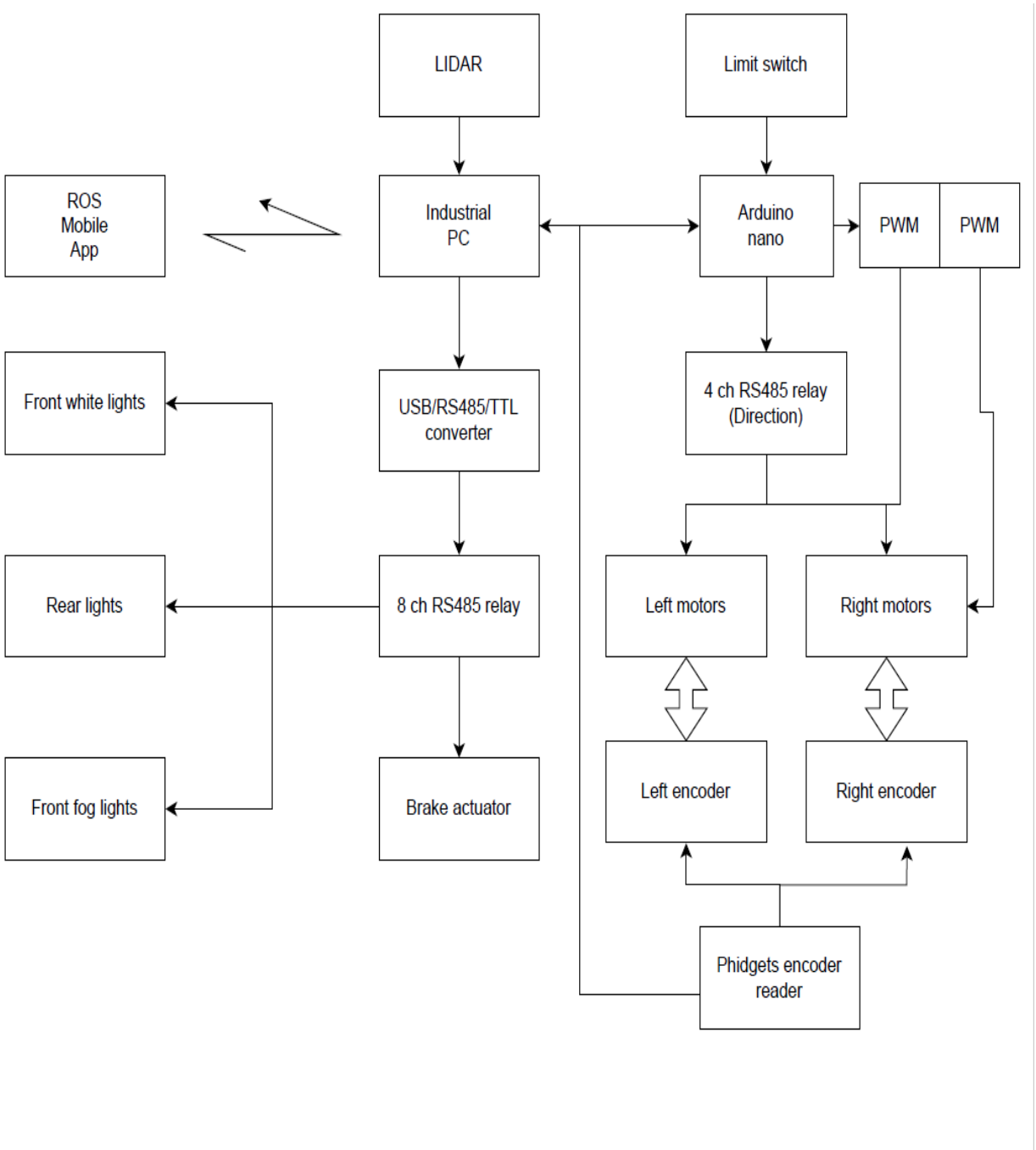
4. Communication Devices:

a. Serial Communication: Arduino Nano is connected to industrial PC through serial communication

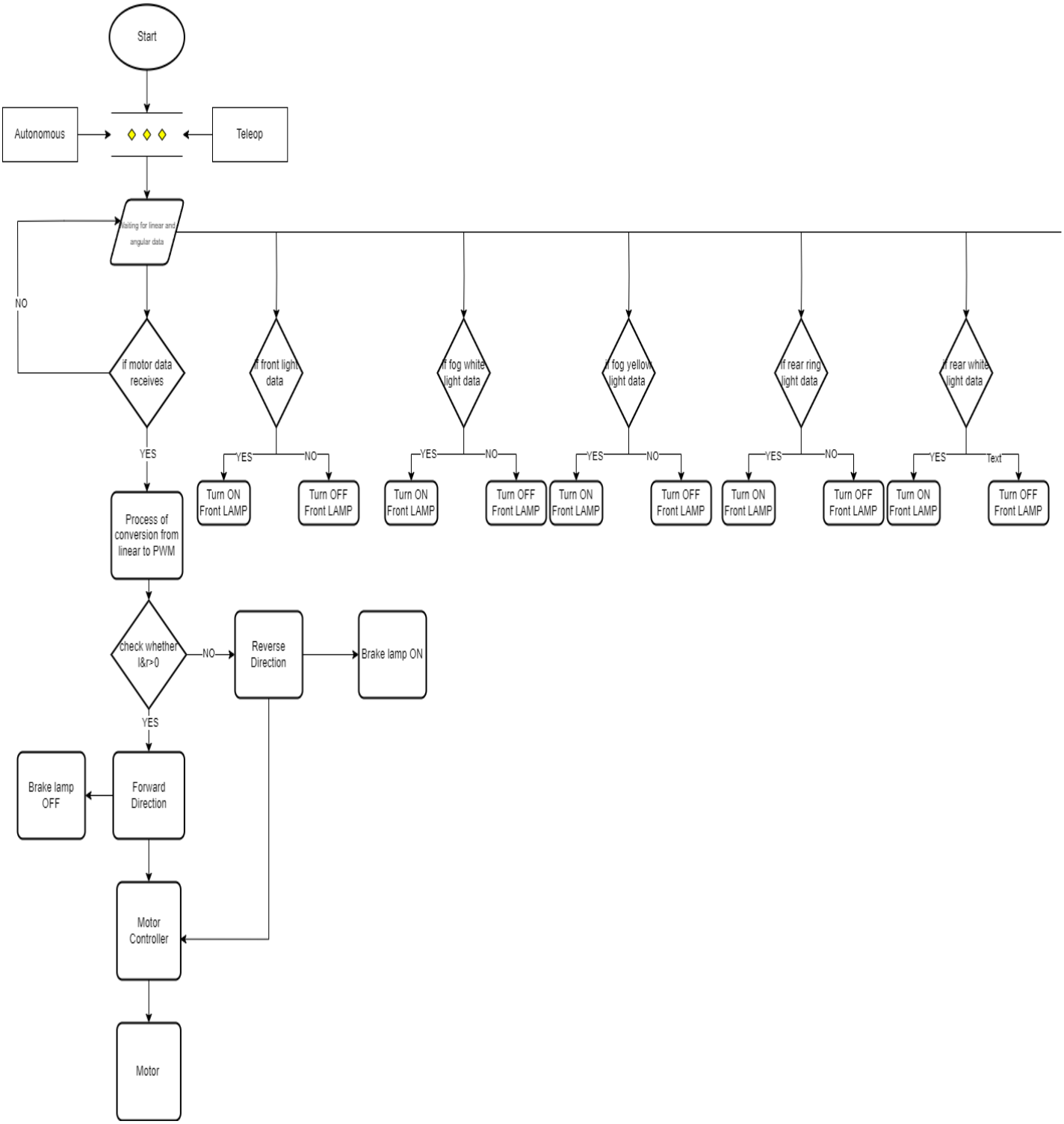
b. RS485: Relays are connected through RS 485.

c. Ethernet: LIDAR is connected to industrial PC via Ethernet.

Hardware Stack:



Operation Block Diagram:



ROS Package:

ROS Package name: Teleop

This ROS package consists of three nodes:

a. Teleop node: This node consists the code for receiving the data from ROS Mobile App and also give commands to relays to ON/OFF and acts as a publisher to brake node and Arduino serial node.
b. Brake node: This node consists the code for applying the brake for the UGV the inputs for this node are limit switch and the teleop node.
c. Arduino Serial node: This node consists the code for direction control, speed control and publishes the limit switch data when the switch is pressed.

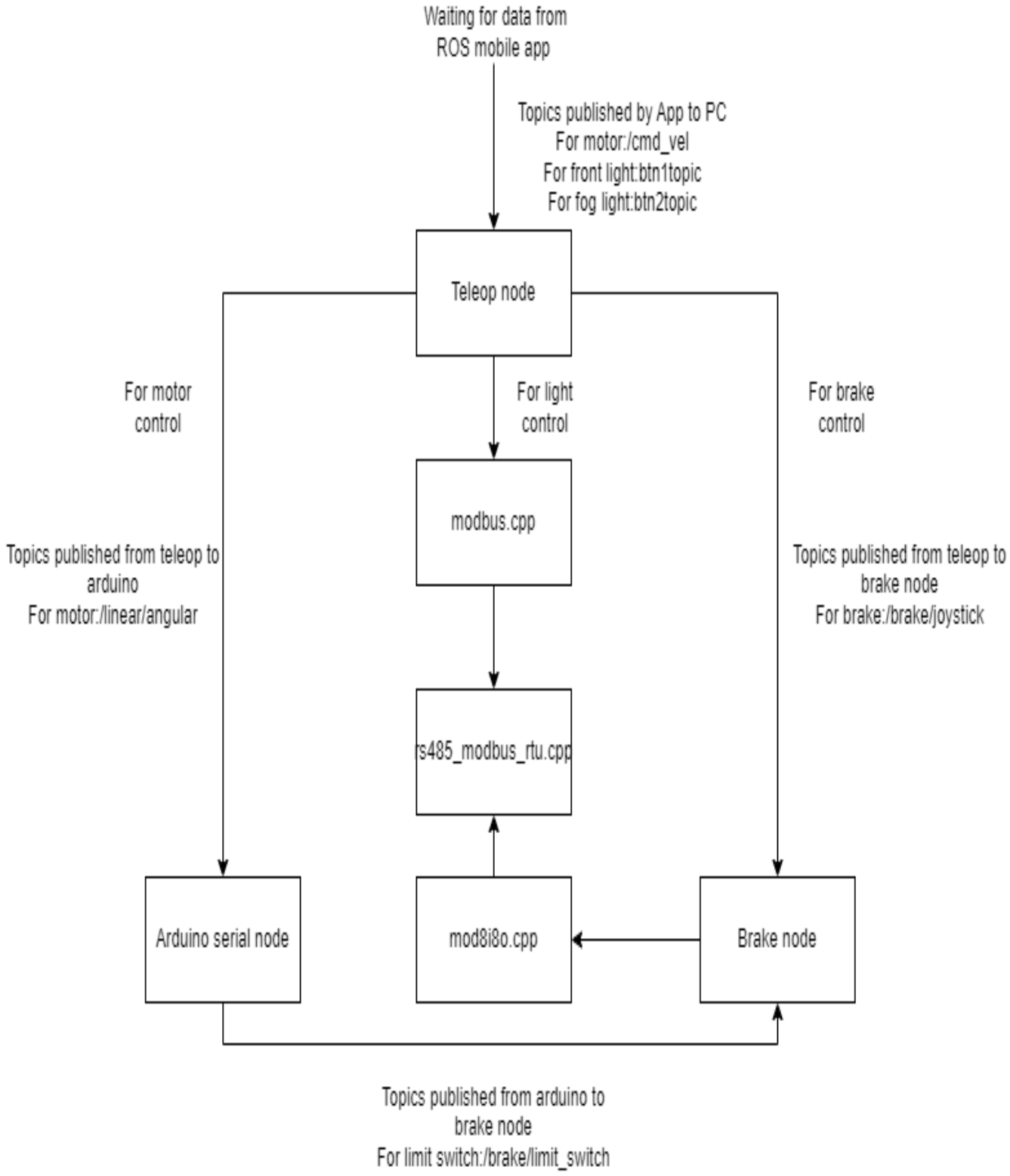
Include:

- -mod8i8o.h
- -rs485_modbus_rtu.h

Src:

- brake_wheel.cpp
- -joy_pub.cpp
- -mod8i8o.cpp
- -modbus.cpp
- -rs485_modbus_rtu.cpp

ROS Software Stack:


Waiting for data from
ROS mobile app
Topics published by App to PC
For motor:/cmd_vel
For front light:btn1topic
For fog light:btn2topic
Teleop node
For motor
control
For light
control
For brake
control
modbus.cpp
Topics published from teleop to
arduino
For motor:/linear/angular
Topics published from teleop to
brake node
For brake:/brake/joystick
rs485_modbus_rtu.cpp
Arduino serial node
mod8i8o.cpp
Brake node
Topics published from arduino to
brake node
For limit switch:/brake/limit_switch