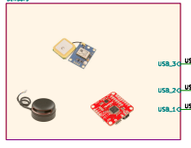
ROVER

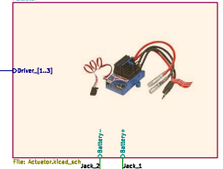
SBC

Sensors



LoRa

MotorDriver



(Antenna Gain + Power)

Environment

FreeSpace Path Loss (distance)

$$RSSI = P_r = P_t + G_T + G_r - (20.\log_{10}(d\,.f) - 147.55 - Loss_{noises})$$

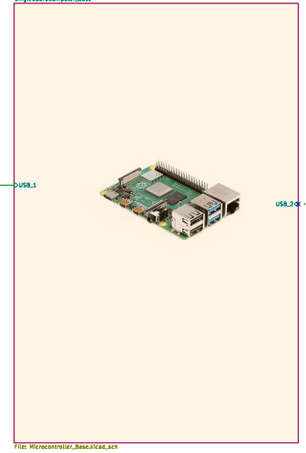
- $P_r\,, P_t$: Power of transmit and receive signal
- G_t, G_r : Antenna Gain of Transmitter and Receiver
- d : Distance between receiver and transmitter
- f : Communication Frequency
- -147.55 : Reference value of free distance path loss at 1 MHz and 1 meter
- $Loss_{noises}$: Path losses from noise and obstacles

(Antenna Gain + Power)

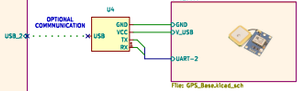
BASE

LoRa

SBC

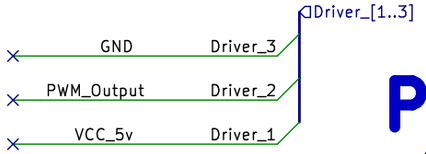


GPS

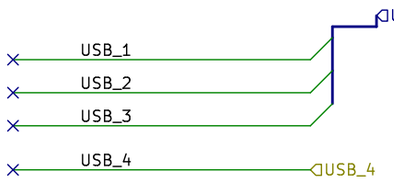


Sheets: /	
Files: blackbox.kicad_sch	
Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK	
Author: TOLGA	Date: 2024-10-13
KiCad E.D.A. kicad 7.0.10	Rev: Id: 1/11

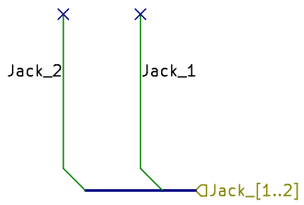
Jetson NANO



PWM OUTPUT FOR MOTOR DRIVER



USB ARRAY



POWER SUPPLY

Sheet: /SingleBoardComputer – Rover/
File: microcontroller.kicad_sch

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Author: TOLGA	Date: 2024-10-13	**Rev:**
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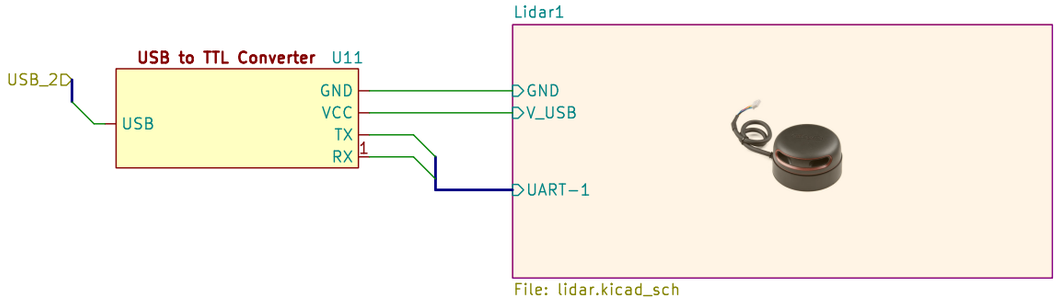
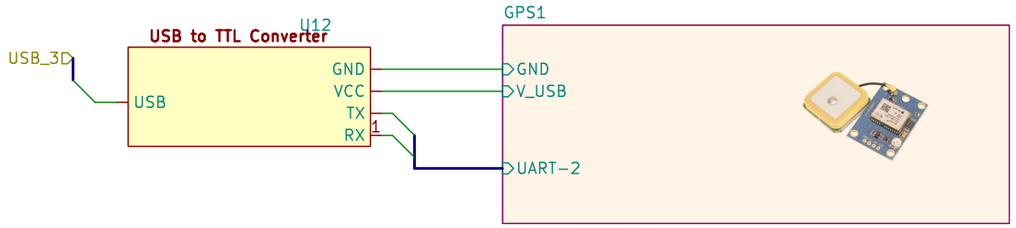
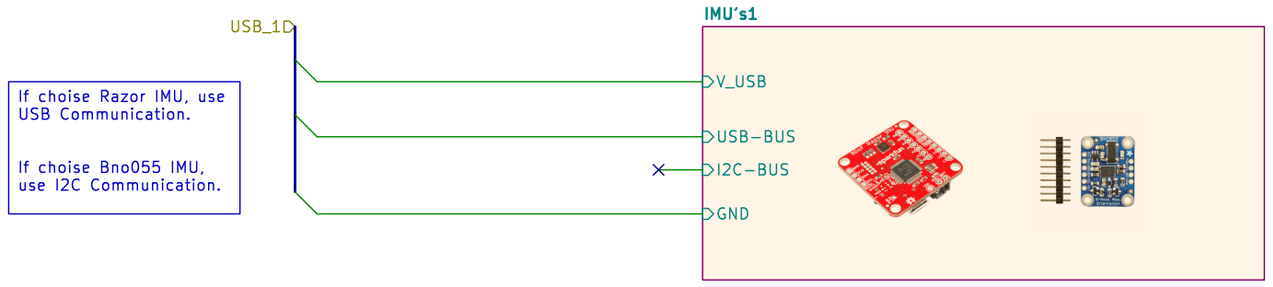


LIDAR



GPS



IMU

Sheet: /Sensors/ File: sensors.kicad_sch		
Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK		
Author: TOLGA	Date: 2024-10-13	**Rev:**
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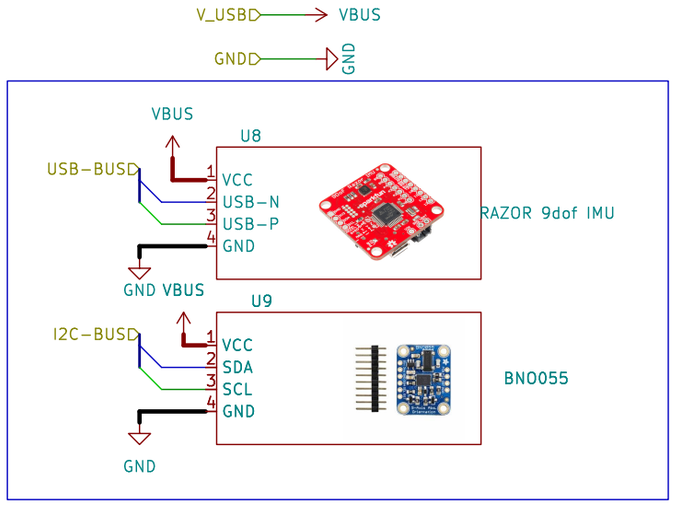

IMU'S

Feature	BNO055	MPU9250
Sensor Type	9 DoF IMU (Inertial Measurement Unit)	9 DoF IMU (Inertial Measurement Unit)
Components	3-Axis Gyroscope, 3-Axis Accelerometer, 3-Axis Magnetometer	3-Axis Gyroscope, 3-Axis Accelerometer, 3-Axis Magnetometer
Additional Features	Built-in Fusion Algorithm for Orientation Calculation	Raw Data Output (No Fusion processing)
Communication Interfaces	I^2C, UART	I^2C, SPI
Measurement Ranges	Gyro: ±125°/s to ±2000°/s	Gyro: ±250°/s to ±2000°/s
	Accel: ±2g to ±16g	Accel: ±2g to ±16g
	Mag: ±1300 µT to ±2500 µT	Mag: ±4800 µT
Power Consumption	4.5 mA (Full Power Mode)	3.9 mA (Gyro + Accel), 9.3 mA (Full Power Mode)
Sensitivity (Resolution)	Gyro: 0.0625°/s/LSB	Gyro: 16-bit
	Accel: 0.00025g/LSB	Accel: 16-bit
	Mag: 0.0625 µT/LSB	Mag: 13-bit
Measurement Frequency	100 Hz (Maximum)	1 kHz (for Gyro and Accel)
Dimensions	3.8 x 5.2 mm	3 x 3 mm
Calibration	Automatic, Built-in Calibration	Requires External Calibration
Physical Orientation	Can Detect Orientation	Provides Raw Orientation Data
Temperature Range	-40°C to +85°C	-40°C to +85°C
Applications	Robotics, AR/VR, Drones, Navigation, Wearables	Robotics, Gaming, Sports & Fitness, Wearables

Sheet: /Sensors/IMU's1/
File: Microcontroller.kicad_sch

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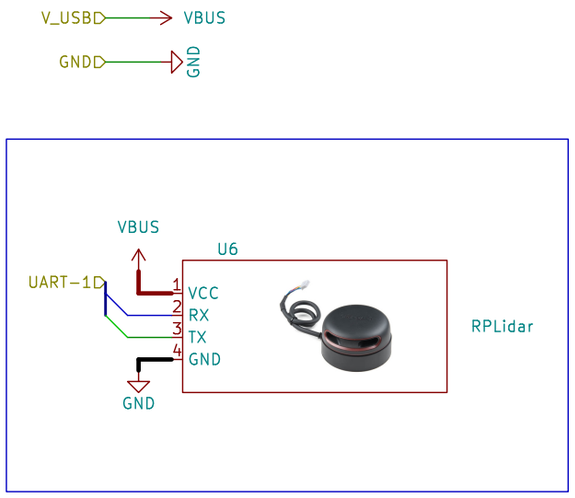

Sheet: /Sensors/Lidar1/
File: lidar.kicad_sch

Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK

Author: TOLGA	Date: 2024-10-13	**Rev:**
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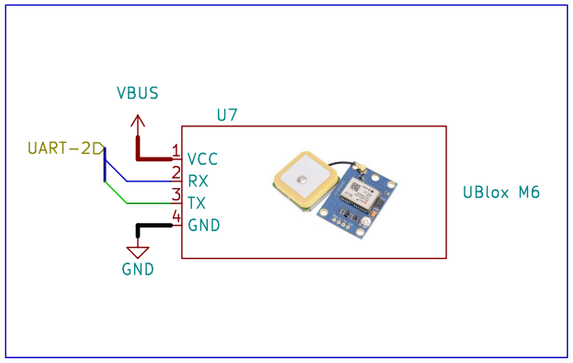
V_USB → VBUS

GND → GND



GPS

Sheet: /Sensors/GPS1/		
File: gps.kicad_sch		
Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK		
Author: TOLGA	Date: 2024-10-13	**Rev:**
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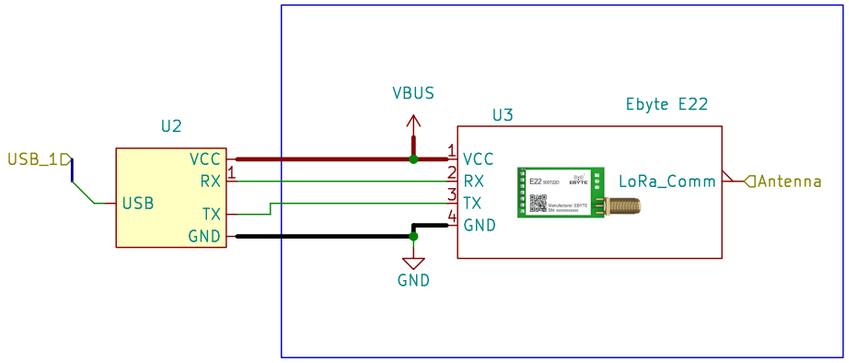
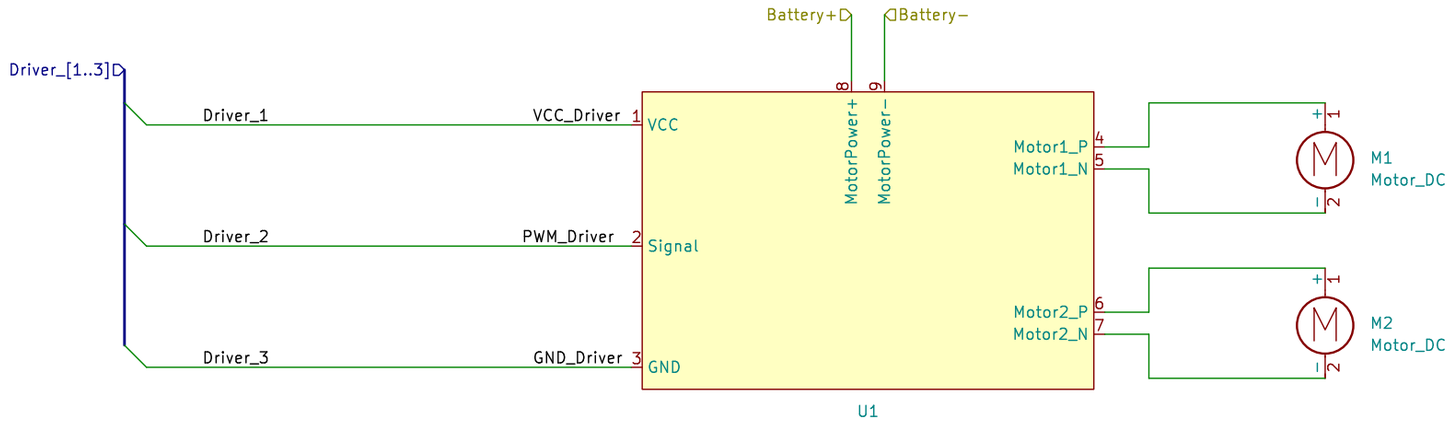


LoRa

Sheet: /Base_Lora/ File: base_lora.kicad_sch		
Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK		
Author: TOLGA	Date: 2024-10-13	**Rev:**
KiCad E.D.A. kicad 7.0.10		Id: 10/11



Sheet: /Actuator/
File: Actuator.kicad_sch

Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK

Author: TOLGA	Date: 2024-10-13	**Rev:**
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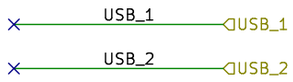
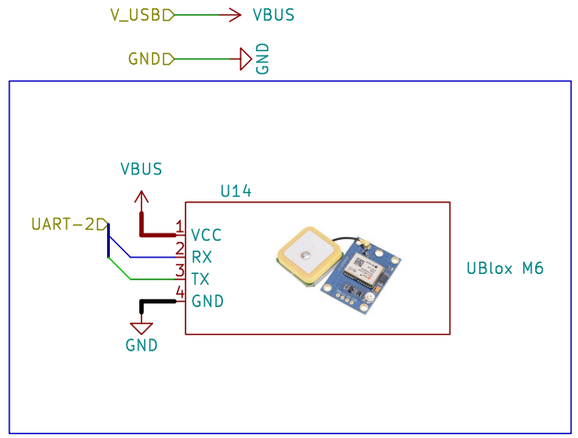


Sheet: /SingleBoardComputer_Base/
File: Microcontroller_Base.kicad_sch

Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK

Author: TOLGA	Date: 2024-10-13	**Rev:**
KiCad E.D.A. kicad 7.0.10		Id: 9/11



Sheet: /GPS_Base/
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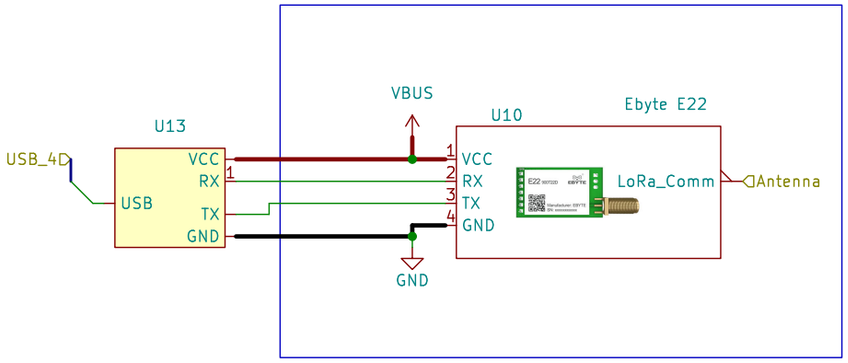
Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK

Author: TOLGA	Date: 2024-10-13	**Rev:**
KiCad E.D.A. kicad 7.0.10		Id: 11/11



LoRa

Sheet: /LoRa/
File: lora.kicad_sch

Title: BlackBox Diagram of Autonomous Rover using LoRa Based RTK

Author: TOLGA	Date: 2024-10-13	**Rev:**
KiCad E.D.A. kicad 7.0.10		Id: 7/11