

- High mobility 4x4 platform using brushless motors
- Modular and open architecture
- Fully controllable over RS232 or Wifi
- Embedded CPU Linux Ubuntu

WIFIBOT Lab V4
A BRAND OF NEXTER ROBOTICS

Robot WIFIBOT Lab V4

Wifibot Lab is suited for those who want an affordable mobile platform for developing and learning robotics. The base system is composed by a four-wheel drive chassis controllable using RS232/USB, 4 infrared sensors, a USB Camera (or CSI), a WIFI adapter, a NVIDIA Jetson module running Linux Ubuntu 18,04LTS and a free WIFI access point.

2D Lidar, 3D Depth camera, GPS or IMU can be an option.

You can develop your application on the robot or remotely using the HDMI port or remote SSH over Ethernet RJ45 / WIFI.

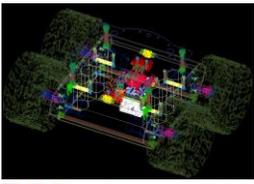
For controlling this robot, several GUI and API are available. The motor board can be programmed using MPLAD/ICD3/4/Pickit3/4 debugger or using our internal bootloader.

The RS232 or Ethernet protocol is open and simple, and it can be used with any kind of framework on any kind of computer board (**ROS1/2, RTMAPS, Matlab, Python2/3 etc...**)



Option





Lab V4

Default Specifications

Motor sensor :	4 hall effect coders 336 tics / wheel turn
Speed control :	4 x PID DSPIC Microchip 33E coded in C RS232 Boot loader ICD2/3 (option)
Motors :	4x 12v Brushless motors 26:1 planetary gear 156 rpm
Dimensions:	L : 32 cm W : 37 cm H : 15 cm W : 3.8Kg
Power Batteries:	12.8V LIFEPO4 10AH Power supply 18V / 220V Path Power Management Charger inside the robot You can use the robot during charging
Control bus :	RS232/USB Simple protocol C/C++ API, (ROS, MatLab, RTMAPS, possible)
Distant Protocol :	Sockets TCP/UDP via WIFI or RJ45
CPU :	Nvidia Jetson Nano or Xavier NX
Sensors :	4 Infrared 1 usb camera or usb 3d camera
Software:	C++ control API 1 HMI Embedded Camera Web Server

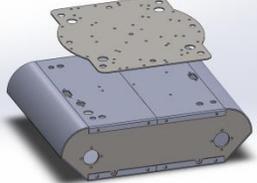


WIFI AP
(included)



DC 18V POWER
(included)

High level Architecture



Remote HMI
or
User Software

Robot deck

MJPEG Web
Server



Cameras

Embedded CPU



Mini-PCIe M2



USB/CSI

Other Sensors

Ethernet

(Option)



10m Lidar

Robot chassis



Firmware Update:
PicKit/ICD
or embedded
USB/RS232 boot loader

4 Static Relay
4A

3 x free signal
Can be IO
Rs232, i2C, SPI ...

USB/RS232
(Speed command
Battery level
Main Current
Odometer
Speed
...)

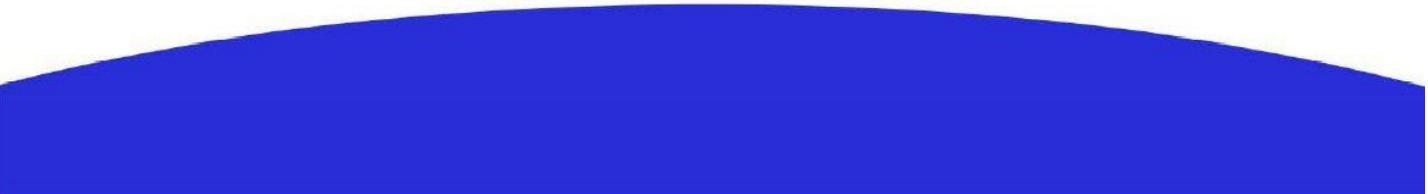
LIFEPO4
SMART
Batteries
12.8V

Charging
and
Power
Management
Board

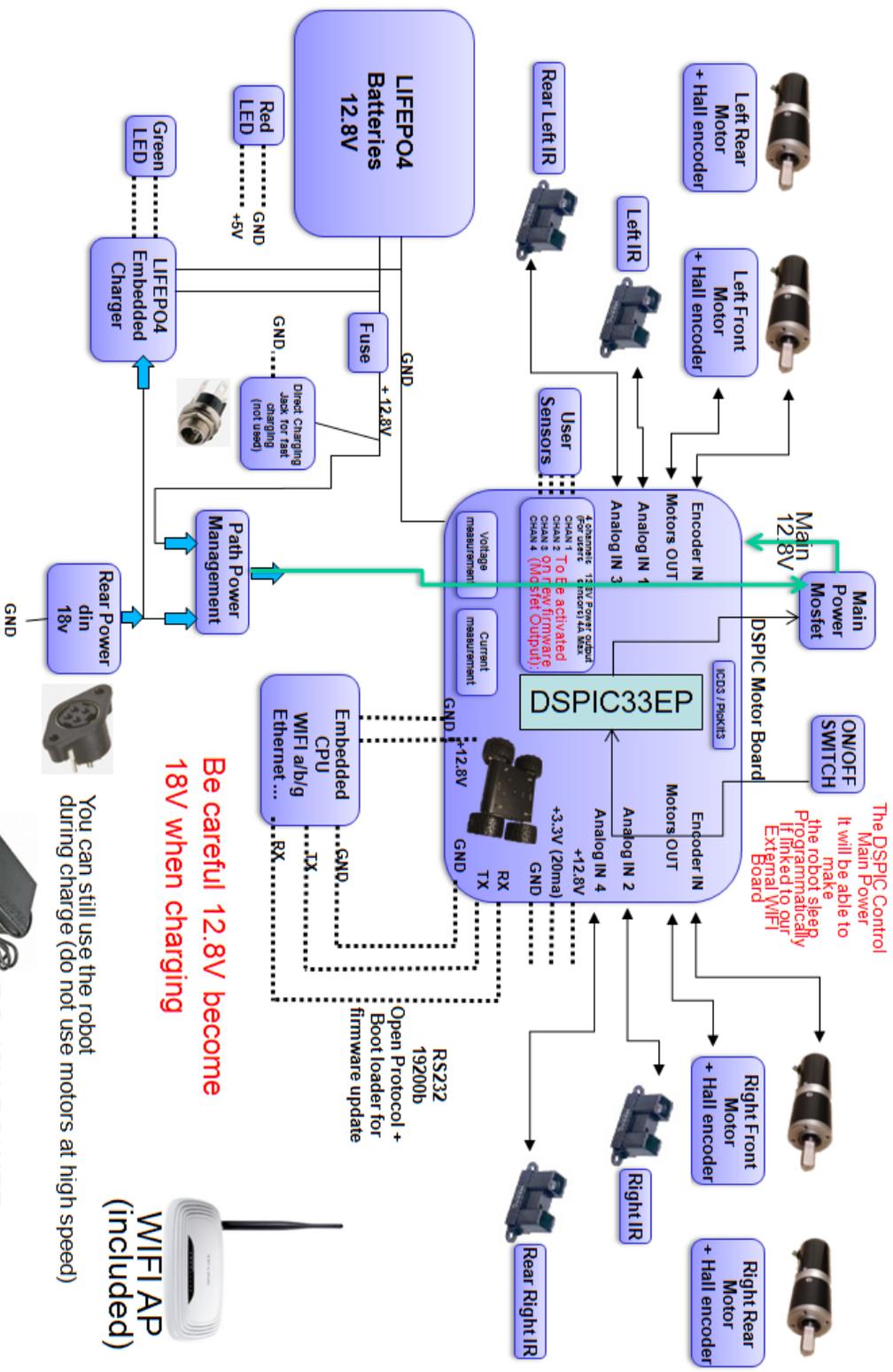
DSPIC 33EP
Brushless Motor Board

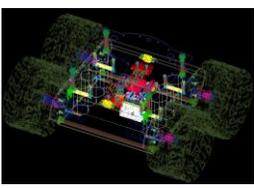
4 X Brushless Motors
+ Hall Coder

4 x IR Sensors



Low Level Architecture



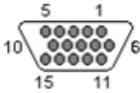


Low Level Architecture (DSUB15 on the robot)

WifibOT Lab V4

Be careful 12.8V become 18V when charging so check that your device is 18V tolerant or use a DC/DC

DSUBF



HD-D-sub-15 Female

DsubF-1 et 2 -> +12.8V (8A Max, embedded PC, other device)
 DsubF-6 à 10 -> GND
 DsubF-15 -> 12.8V (Linked to the Main Switch, 300mA)

Power Mosfet Output :

DsubF-3 -> Channel 1 : +12.8V (4A)
 DsubF-4 et 5 -> Channel 2 : +12.8V (4A)
 DsubF-11-12 -> Channel 3 : +12.8V (4A)
 DsubF-13-14 -> Channel 4 : +12.8V (4A)

We provide USB to RS232
 adapter

Serial port for Embedded PC:

DSUB15M-6 -> DSUB9F-3 TX
 DSUB15M-7 -> DSUB9F-2 RX
 DSUB15M-9 -> DSUB9F-5 GND

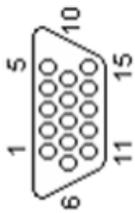
Infrared Sensors:

DSUB15M-3 -> Infra1-data
 DSUB15M-8 -> Infra1-gnd
 DSUB15M-1 -> Infra1-+5V
 DSUB15M-4 -> Infra2-data
 DSUB15M-8 -> Infra2-gnd
 DSUB15M-1 -> Infra2-+5V
 DSUB15M-5 -> Infra3-data
 DSUB15M-14 -> Infra3-gnd
 DSUB15M-2 -> Infra3-+5v
 DSUB15M-10 -> Infra4-data
 DSUB15M-14 -> Infra4-gnd
 DSUB15M-2 -> Infra4-+5V

FUTURE USE:

DsubM-11 -> free dspic IO (future use)
 DsubM-12 -> free dspic IO (future use)
 DsubM-13 -> free dspic IO (future use)
 DsubM-14 -> GND
 DsubM-15 -> 3.3V (20mA)

DSUBM



HD-D-sub 15 Male

Annex 1

150Mbps Wireless N Router TL-WR740N



Standards	IEEE 802.11n, IEEE 802.11g, IEEE 802.11b
Interface	4 10/100M Auto-Sensing RJ45 LAN Port(Auto MDI/MDIX) 1 10/100M Auto-Sensing RJ45 WAN Port(Auto MDI/MDIX)
Wireless Signal Rates	Up to 150Mbps
Frequency Range	2.4-2.4835GHz
EIRP	<20dBm(EIRP)
Wireless Functions	Enable/Disable Wireless Radio, WDS Bridge, WMM, Wireless Statistics
Receiver Sensitivity	130M: -68dBm@10% PER 54M: -68dBm@10% PER 11M: -85dBm@8% PER 6M: -88dBm@10% PER 1M: -90dBm@8% PER
Antenna Type	5dBi Fixed Omni Directional Antenna
Software Functions	NAT, DoS Firewall, DHCP
Access Control	Parental Control, Local Management Control, Host List, Access Schedule, Rule Management
Guest Network	2.4GHz guest network × 1
Protocols	Supports IPv4 and IPv6
Operating temperature	0°C~40°C (32°F~104°F)
Storage temperature	-40°C~70°C (-40°F~158°F)
Operating humidity	10% ~ 90%, Non-Condensing
Storage humidity	5%~90%, Non-Condensing
Dimensions	6.9 x 4.6 x 1.3 in. (174 x 118 x 33 mm)

Annex 2



Ultra wide angle Full HD webcam

Part NO.	32200312100
Video resolution	CIF/VGA: Up to 30fps 720P HD: Up to 30fps 1080p FHD: Up to 30fps
Image Sensor	1080p Full HD pixel CMOS
Interface	USB 2.0
Lens Type	Manual focus lens
Max. Still Image Resolution	12MP (Interpolation), 1920 x 1080, 1280 x 720, 640 x 480 pixels
File format	MJPEG/WMV
UVC (Plug & Play)	YES
IPM(Image Protection Mechanism)	YES
Microphone	YES

GP2Y0A02YK

Long Distance Measuring Sensor

■ Features

1. Less influence on the colors of reflected objects and their reflectivity, due to optical triangle measuring method
2. Distance output type
(Detection range:20 to 150cm)
3. An external control circuit is not necessary
Output can be connected directly to a microcomputer

■ Applications

1. For detection of human body and various types of objects in home appliances, OA equipment, etc

■ Absolute Maximum Ratings (T_a=25°C)

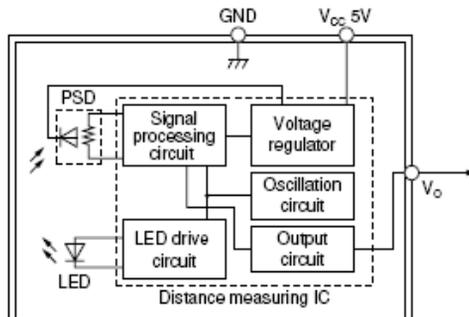
Parameter	Symbol	Rating	Unit
Supply voltage	V _{CC}	-0.3 to +7	V
*1 Output terminal voltage	V _O	-0.3 to V _{CC} +0.3	V
Operating temperature	T _{opr}	-10 to +60	°C
Storage temperature	T _{stg}	-40 to +70	°C

*1 Open collector output

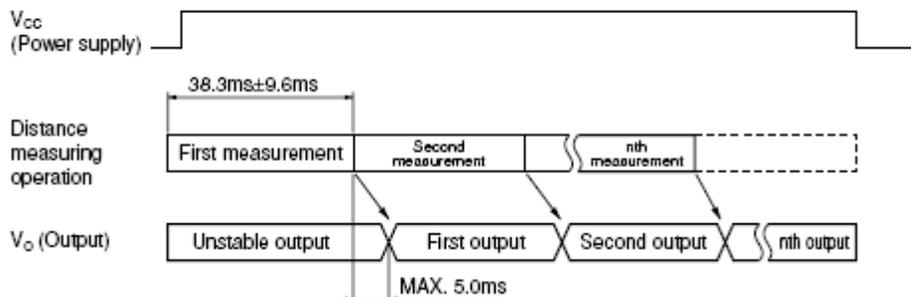
■ Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Operating Supply voltage	V _{CC}	4.5 to 5.5	V

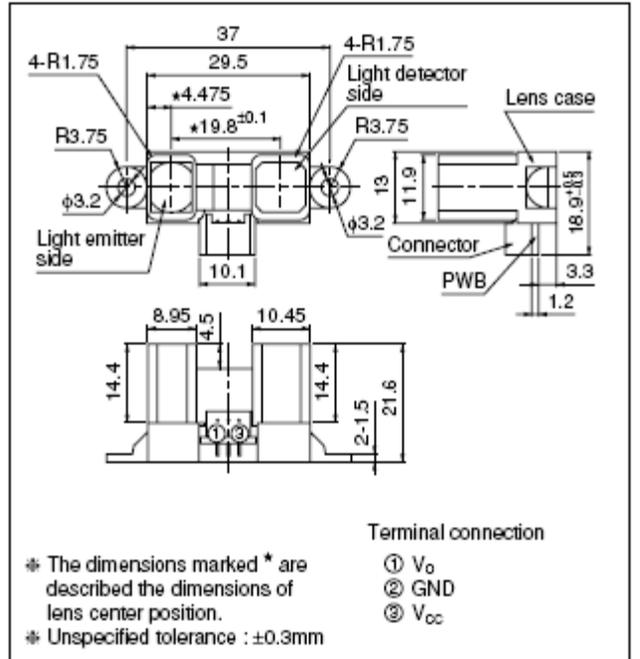
Internal Block Diagram



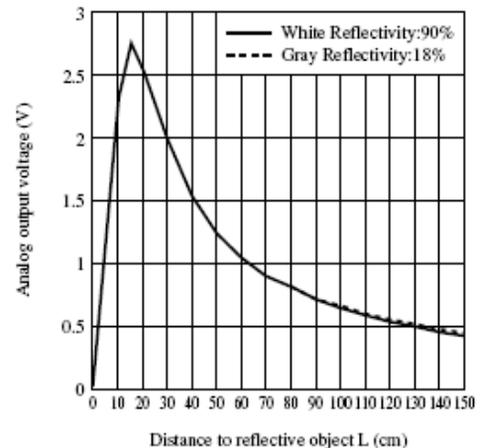
Timing Chart



■ Outline Dimensions (Unit : mm)



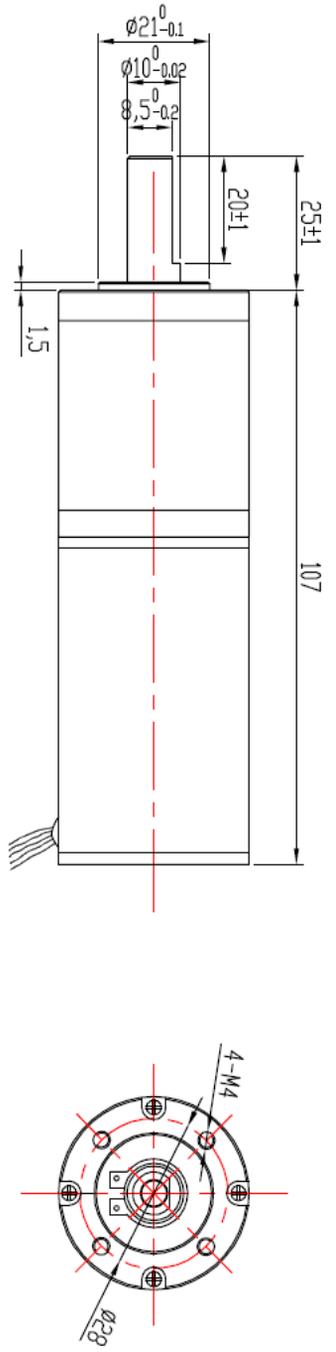
Analog Output Voltage vs. Distance to Reflective Object



Annex 4 (Brushless Motor 12V 1/28)

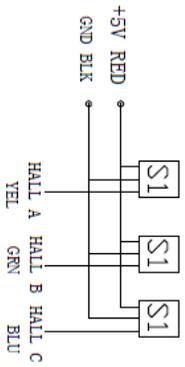


REV/A
DATE: 20120810

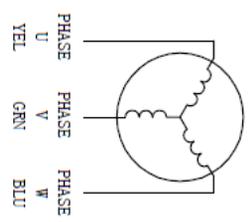


Electrical Spec:

Model	ITEM	UNIT	SPEC
	PHASE	PHS	3
	VOLTAGE	VDC	12
	NOLoad SPEED	RPM	5200REF
	NOLoad CURRENT	A	0.3REF
	RATED SPEED	RPM	3000
	RATED POWER	W	16
	RATED TORQUE	N.m	0.051
	RATED CURRENT	A	2.4
	INSULATING STRENGTH	VAC	500
	IP CLASS		IP40
	INSULATION CLASS		B
	RATIO		28.5:1
	RATED SPEED FROM GEARBOX	RPM	105
	RATED TORQUE FROM GEARBOX	N.m	1.1



Hall Wire : UL1007 26AWG
300mm



Motor Wire : UL1007 22AWG
300mm

Annex 5 (OPTION)

Hokuyo UST-10LX Scanning Laser Rangefinder



Specifications

Supply voltage: 12VDC/24VDC (Operation range 10 to 30V ripple within 10%)

Supply current: 150mA or less (during start up 450mA is necessary.)

Light source: Laser semiconductor (905nm) Laser class 1 (IEC60825-1:2007)

Accuracy: $\pm 40\text{mm}$

Repeated accuracy: $\sigma < 30\text{mm}$

Scan angle: 270°

Angular resolution: 0.25°

Start up time: Within 10 sec (start up time differs if malfunction is detected during start up)

Input: IP reset input, photo-coupler input (current 4mA at ON)

Output: Synchronous Output, photo coupler open collector output 30VDC 50mA MAX.

Interface: Ethernet 100BASE-TX

LED display: Power supply LED display (Blue): Blinks during start up and malfunction state.

Ambient temperature: -10°C to $+50^\circ\text{C}$

Ambient Humidity: Below 85%RH (without dew, frost)

Storage temperature: -30°C to $+70^\circ\text{C}$

Storage Humidity: Below 85%RH (without dew, frost)

Shock resistance: 196m/s^2 (20G) X,Y and Z direction 10 times.

Protective Structure: IP65

Material Front case: Polycarbonate, Rear case: Aluminum

Surrounding intensity: Less than 15,000lx

Detection range

0.06m to 10m (white Kent sheet)

0.06m to 4m (diffuse reflectance 10%)

Max. detection distance : 30m

Annex 6 (OPTION)

Slamtec Mapper M2M1 Pro - LiDAR Mapping Sensor(Industrial Grade)



Key Features

- Large Scenarios and High-quality Mapping
- Industry grade LiDAR, 2 times detecting range further than [M1M1](#), and higher sample rate.
- Plug and play, without any external dependence
- Can be used as a mapper as well as a laser range scanner
- Connected with WiFi or Ethernet, easy communication
- Fully Compatible with ROS, Easy Data Analysis
- Strong stability: work well in fast speed and in the tilting scenarios

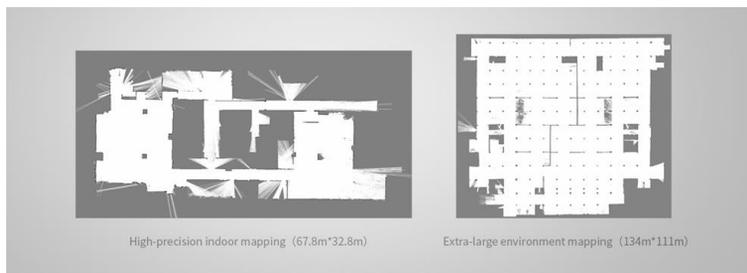
Description

Slamtec Mapper M2M1 is an industrial-grade LiDAR. Different from the normal LiDAR, M2M1 has the ability to work in some severe surroundings. SLAMTEC Mapper uses high-performance SLAM map optimization engine and SharpEdge™ fine-mapping technology, which can actively detect and correct closed-loop, and achieve 100,000 square meters high-precision map and pose. SLAMTEC Mapper can work without additional sensors or data input. Because of the built-in 9-DOF inertial navigation system, SLAMTEC Mapper in the hand-held mapping mode can work normally in a fluctuating environment with inclination, to ensure the best map data quality.

SLAMTEC Mapper provides a complete SDK development kit, mobile phone, and PC-side evaluation tools to facilitate users to expand development and data acquisition. At the same time, combined with the supporting ROS driver, the generated map and pose data can be directly used in the ROS environment, which is fully compatible.

Large Scenarios and High-quality Mapping

Slamtec Mapper adopts SLAMTEC third-generation high-performance SLAM graph optimization engine and SharpEdge™ mapping technology to realize a high accurate thousand-square-meter map building and real-time localization, and it can actively detect the closed-loop and correct map. The mapper is an ideal choice for users to realize mapping and re-localization in various complicated scenarios and output map and localization data that meets users' expectations.



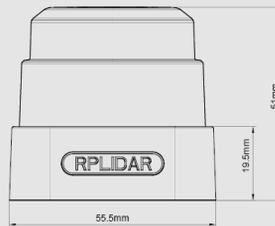
Annex 7 (OPTION)

RPLiDAR S1 Portable ToF Laser Scanner Kit - 40M Range



Dimension and Weight

Height: 51mm Weight: 105g
Mechanical Dimensions: 55.5mmX55.5mmX51mm

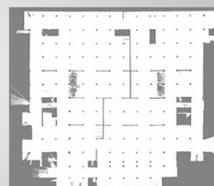


Measurement Performance

Application Scenarios	Works well both in indoor and outdoor environment, reliable resistance to daylight
Distance Range	On White Objects: 40m (White light-diffused surface)
	On Black Object: 10m
Sample Rate	9200 times per second
Sample Frequency	Typical value: 10Hz (the frequency is adjustable within the 5-15Hz range.)
Angular Resolution	Typical value: 0.391° (the resolution is adjustable within the 0.313°-0.587° range according to the sample frequency.)
Communication Interface	TTL UART (3.3V)
Band Rate	256000bps
Distance Resolution	1cm



High-precision indoor mapping (67.8m*32.8m)



Extra-large environment mapping (134m*111m)

Annex 8 (OPTION)



UTM-30LX-EW

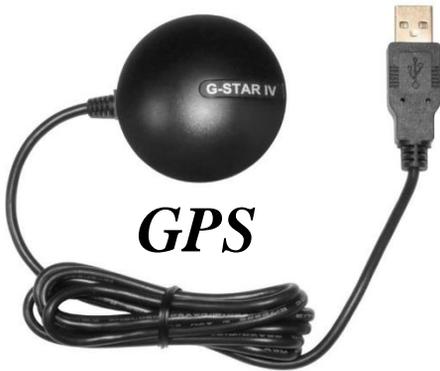
Long Range **HOKUYO** LRF

Model	UTM-30LX-EW
Power Source	12V DC +/- 10% , Current usage Max 1A at start-up, Normal use 0.7A
Light Source	Pulsed laser diode ($\lambda=905\text{nm}$), Laser safety class 1
Principle	Direct Time of Flight
Detection Range	0.1m to 30m (500mm x 500mm or more, White Kent Sheet)
Multi-Echo function	Max 3 output of distance per step
Accuracy	0.1m to 10m +/- 30mm, 10m to 30m +/- 50mm
Scan Window & Resolution	270° Resolution 0.25°
Scan speed	25ms/scan
Communication protocol	SCIP2.2 (Exclusive command)
Interface	Ethernet 100 Base-TX (Auto-negotiation) TCP/IP Synchronous output: NPN open collector
Connection	Power / synchronous output cable 2m Ethernet RJ-45 with male connector 30cm (female connector included)
Physical dimensions	62 x 62 x 87mm Weight 370g
Operating temperature / humidity	-10 to +50°C @ 85% humidity (no condensing or icing) (Storage -25 to +75°C)
Vibration resistance	Double amplitude 1.5mm, 10 to 55Hz each for 2 hours in X,Y,Z Directions
Impact Resistance	196m/s ² each 10 times in in X,Y,Z Directions



- 30 metres range
- Designed for outdoor use
- 270° scan 0.25° resolution
- 40 scans per second
- Compact: 62 x 62 x 87mm
- Lightweight: 400g
- Power frugal: 12VDC, 8.4W
- Ethernet connectivity
- Multi-Echo functionality
- Effective in adverse weather

Annex 9 GPS (Option)



- SiRF star iv chipset
- 48 channels all-in-view tracking
- WAAS/EGNOS support
- RoHS compliant

The 20 Channel BU-353 Waterproof SiRFIII USB GPS Receiver is a USB GPS receiver

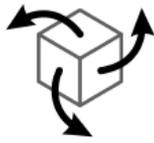
that features a highly sensitive, low power consumption chipset in a ultra compact form factor compatible with Microsoft Windows 8.

The BU-353-S4 is powered by a SiRF Star IV GPS chipset, and will provide you with superior performance in urban canyons, and in dense foliage.

With the SiRF CGEE (Client Generated Extended Ephemeris) technology, has the capability of predicting satellite positions for up to 3 days in advance, and will deliver a CGEE-start time of less than 15 seconds under most conditions without any network assistance. The BU-353-S4's MicroPower mode allows the receiver to stay in a hot start-like condition almost continuously while consuming very little power.

Annex 10 IMU (Option)

Technical Brief



YEI 3-Space Sensor™ Product Family

Miniature High-Performance Attitude & Heading Reference Systems / Inertial Measurement Units

Overview

The YEI 3-Space Sensor™ product line is a family of miniature, high-precision, high-reliability, Attitude and Heading Reference Systems (AHRS) / Inertial Measurement Units (IMU). Each YEI 3-Space Sensor uses triaxial gyroscope, accelerometer, and compass sensors in conjunction with advanced processing and on-board quaternion-based Kalman filtering algorithms to determine orientation relative to an absolute reference in real-time. The product family offers a breadth of communication, performance, and packaging options ranging from the ultra-miniature TSS embedded to fully integrated battery-powered wireless and data-logging versions.

Orientation can be returned in absolute terms or relative to a designated reference orientation. The proprietary multi-reference vector mode and 24-point ortho-calibration process increase accuracy and greatly reduce and compensate for sensor error. The YEI 3-Space Sensor system also utilizes a dynamic sensor confidence algorithm that ensures optimal accuracy and precision across a wide range of operating conditions.

The YEI 3-Space Sensor system features are accessible via a well-documented open communication protocol that allows access to all available sensor data and configuration parameters using a variety of communication interfaces. Versatile commands allow access to raw sensor data, normalized sensor data, and filtered absolute and relative orientation outputs in multiple formats including: quaternion, Euler angles (pitch/roll/yaw), rotation matrix, axis angle, two vector (forward/up).

Applications

- Robotics
- Motion capture
- Positioning and stabilization
- Personnel / pedestrian navigation and tracking
- Unmanned air/land/water vehicle navigation
- Education and performing arts
- Healthcare monitoring
- Gaming and motion control
- Accessibility interfaces
- Virtual reality and immersive simulation

Product Family



- 50x35x15 mm, 17 grams
- USB communications via virtual COM port
- RGB status LED, two buttons
- Hand-held or strap-down case style

Annex 11 Camera 3D ZED2

+ mounting



Video Output

Video Mode	Frames per second	Output Resolution (sid)
2.2K	15	4416x1242
1080p	30 / 15	3840x1080
720p	60 / 30 / 15	2560x720
WVGA	100 / 60 / 30 / 15	1344x376

Video Recording

Native resolution video encoding in H.264, H.265 or lossless format (on host)

ISP

New ISP tuned with machine learning for AI and vision tasks

Video Streaming

Stream anywhere over IP using ZED SDK

Motion

Motion Sensors

Accelerometer
Gyroscope
Data Rate: 400Hz

Pose Update Rate

Up to 100Hz

Position Sensors

Barometer
Magnetometer
Data Rate: 25Hz / 50Hz

Pose Drift

Translation: 0.35%
Rotation: 0.005°/m
(without loop correction)

Technology

6-DoF visual-inertial stereo
SLAM with advanced sensor fusion and thermal compensation

Depth

Depth Resolution

Native video resolution (in Ultra mode)

Depth FPS

Up to 100Hz

Depth Range

0.2 - 20 m (0.65 to 65 ft)

Depth FOV

110° (H) x 70° (V) x 120° (D) max.

Technology

Neural Stereo Depth Sensing

Object Detection

Object Types

Persons, Vehicles

Object Tracking

Yes

Detection Outputs

Bounding Boxes 2D/3D
Location
Speed
Unique ID
Segmentation Masks

Detection Range

Up to 20m (3D)
Up to 40m (2D)

Image Sensors

Sensor Resolution

Dual 4M pixels sensors with 2-micron pixels

Sensor Format

Native 16:9 format for a greater horizontal field of view

Sensor Size

1/3" backside illumination sensors with high low-light sensitivity

Shutter Sync

Electronic Synchronized Rolling Shutter

Camera Controls

Adjust Resolution, Frame rate, Brightness, Contrast, Saturation, Gamma, Sharpness, Exposure and White Balance

Sensors

Accelerometer
Gyroscope
Barometer
Magnetometer
Temperature sensor

Annex 12 (Option)

3d camera from Intel + robot mounting

Intel D455



Use Environment	Indoor/Outdoor
Depth Technology	Active IR stereo
Main Components	<ul style="list-style-type: none">- Intel® RealSense™ Vision Processor D4- Intel® RealSense™ module D450- Bosch BMI055 IMU
Depth Field of View (H × V)	86° × 57° (+/- 3°)
Depth Stream Output Resolution	<ul style="list-style-type: none">- 1280 × 720 @ 30fps- 848 × 480 @ 90fps
Depth Stream Output Frame Rate	Up to 90 fps
Minimum Depth Distance (Min-Z) at Max Resolution	~52 cm
Sensor Shutter Type	Global Shutter
Ideal Range	From 0.6 m to 6 m
Dimensions	124 mm × 26 mm × 29 mm
Connection Type	USB-C* 3.1 Gen 1
Mounting	<ul style="list-style-type: none">- Two M4 thread mounting points- One 1/4-20 UNC thread mounting point- Tripod

Annex 13 NVIDIA AI (CPU OPTION : replace SBC210 SBC)

Jetson Xavier NX Developer Kit



The NVIDIA® Jetson Xavier NX™ Developer Kit includes a power-efficient, compact Jetson Xavier NX module for AI edge devices. It benefits from new cloud-native support and accelerates the NVIDIA software stack in as little as 10 W with more than 10x the performance of its widely adopted predecessor Jetson TX2. For intelligent machine OEMs, start-ups and AI application developers who want to create breakthrough products, the Jetson Xavier NX Developer Kit delivers the capability to develop and test power-efficient, small form factor solutions with accurate, multi-modal AI inference.

GPU	NVIDIA Volta architecture with 384 NVIDIA CUDA® cores and 48 Tensor cores
CPU	6-core NVIDIA Carmel ARM®v8.2 64-bit CPU 6 MB L2 + 4 MB L3
DL Accelerator	2x NVDLA Engines
Vision Accelerator	7-Way VLIW Vision Processor
Memory	8 GB 128-bit LPDDR4x @ 51.2GB/s
Storage	microSD (not included)
Video Encode	2x 4K @ 30 6x 1080p @ 60 14x 1080p @ 30 (H.265/H.264)
Video Decode	2x 4K @ 60 4x 4K @ 30 12x 1080p @ 60 32x 1080p @ 30 (H.265) 2x 4K @ 30 6x 1080p @ 60 16x 1080p @ 30 (H.264)
Camera	2x MIPI CSI-2 DPHY lanes
Connectivity	Gigabit Ethernet, M.2 Key E (WiFi/BT included), M.2 Key M (NVMe)
Display	HDMI and display port
USB	4x USB 3.1, USB 2.0 Micro-B
Others	GPIO, I ² C, I ² S, SPI, UART
Mechanical	103 mm x 90.5 mm x 34.66 mm

Annex 14 NVIDIA AI (CPU OPTION : replace SBC210 SBC) Industrial Version



nVIDIA



SCALABLE, FLEXIBLE HARDWARE SOLUTIONS

Whether for enterprise, small to medium business, or research, the Jetson family of modules has a solution to meet specific performance and budget needs. They all share the same architecture and SDKs, allowing for one code base and seamless deployment across the entire product portfolio.

Jetson Nano

WIFIBOT Integration (power + mounting)

Auvidia or Connecttech Carrier Board + SSD 250G

NVIDIA Maxwell™ architecture with 128
NVIDIA CUDA® cores

Jetson TX2 Series

WIFIBOT Integration (power + mounting)

Auvidia or Connecttech Carrier Board + SSD 250G

NVIDIA Pascal™ architecture with 256
NVIDIA CUDA cores

Jetson Xavier NX

WIFIBOT Integration (power + mounting)

Auvidia or Connecttech Carrier Board + SSD 250G

NVIDIA Volta™ architecture with 384
NVIDIA CUDA cores and 48 Tensor
cores

Jetson AGX Xavier

WIFIBOT Integration (power + mounting)

Auvidia Carrier Board + SSD 250G

NVIDIA Volta™ architecture with 512
NVIDIA CUDA cores and 64 Tensor
cores

NVIDIA JetPack SDK - Unified software release across all Jetson products



Jetson modules power a range of applications that require various performance levels and prices—from AI-powered Network Video Recorders (NVRs) to automated optical inspection (AOI) in high-precision manufacturing to autonomous mobile robots (AMRs). Jetson modules pack unbeatable performance and energy efficiency in a tiny form factor, effectively bringing the power of modern AI, deep learning, and inference to embedded systems at the edge.