



M 4 . 3 W N

REFERENCE DESIGN

A REFERENCE DESIGN MODULE FOR THE
NU4000AI 3D IMAGE AND COMPUTER
VISION PROCESSOR

A glowing blue light source, possibly a lens or sensor, is positioned at the bottom center of the page. It emits a bright blue light with a soft glow and a reflection on the surface below it.

INUITIVE

OVERVIEW

The M4.3WN is a reference design module that integrates deep learning, 3D computer vision and image processing functions. The M4.3WN is based on Inuitive's NU4000AI multi-core processor SoC which is optimized for 3D image processing, computer vision and AI. The power efficient M4.3WN is the leading solution for implementing 3D sensing and computer vision into consumer electronic devices. The M4.3WN is designed to function as a self-contained, self-sufficient depth sensor (at narrow Fov), vision and AI processor module. It functions as an independent sub-system, generating fully processed depth information to its host.

The M4.3WN primary processing unit is Inuitive's multi-core NU4000AI processor. In addition, the M4.3WN includes tracking and RGB sensors. These sensors are controlled and time stamped by the NU4000AI. Data generated by the sensors (and processed in real-time by the NU4000AI) is used to generate a hybrid tracking based on 2D, 3D and IMU.

The following picture illustrates the M4.3WN module – M4.3WN EOM (see at the front) connected to an NU4000AI base board (connected behind the EOM by a flat cable). Base can alternatively be placed anywhere else in the system:



MODULE'S STRUCTURE AND PARTITIONING

For design flexibility and enhanced performance, M4.3WN reference design is comprised of two sub-modules:

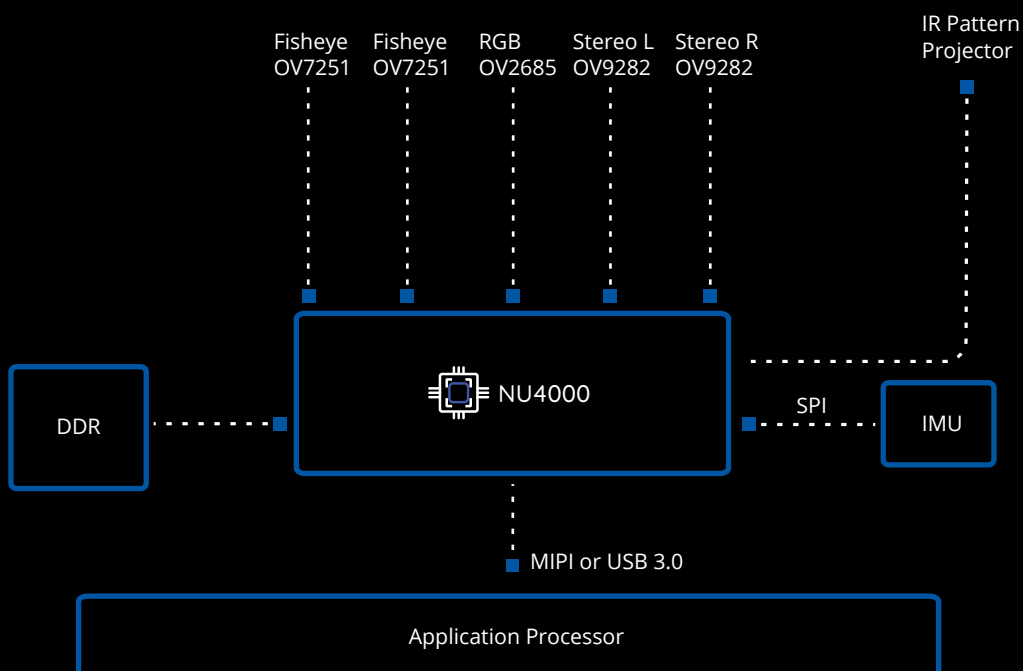
- M4.3WN EOM (Electro Optical Module) – the EOM hosts the cameras, the projector and the IMU.
- M4.3WN Base – the base includes the NU4000AI IC, various interfaces, power-management circuit and other peripherals.

KEY FEATURES

- Active stereo depth sensor based on IR pattern illumination and IR monochrome sensors
 - 0.3-3 or 0.5-5 meters range (configurable settings)
- Field of View (65°x40° FoV)
- RGB camera sensor, registered to the depth sensor
- 2 monochromatic Fish Eye cameras for tracking
- Utilizes Inuitive's NU4000AI multi-core computer vision and 3D image processor
- On-board Inertial Measurements Unit (IMU)
- Low power, small size
- Target Markets:
 - Robots
 - VR Head Mounted Displays (HMD)
 - Drones
 - 3D Scanners
- Enables AI processing on NU4000AI
- Supports Inuitive AI framework
- Supports Windows, Linux, and Android OSs
- Operates in all lighting conditions (from darkness to daylight)
- API for easy Application-Layer Design
- On-chip Feature Tracking algorithms

HIGH LEVEL BLOCK DIAGRAM

The following figure illustrates a high-level block diagram of the M4.3WN module:



KEY PARAMETERS

GENERAL PARAMETERS

PARAMETER	VALUE	UNITS	COMMENTS
Power consumption	1.1	W	Depth only, 30FPS, 4ms exposure, total power for EOM + Base
Module size - X	125	mm	
Module size - Y	40	mm	
Module size - Z	27	mm	
Minimum operating temperature	0	°C	
Maximum operating temperature	50	°C	Ambient conditions, preliminary results
Host Interface	USB-type C		USB 3.0 and USB 2.0 compliant

DEPTH IMAGE GENERATION

PARAMETER	VALUE	UNITS	COMMENTS
Sensor	OV9282	N/A	2 monochrome sensors on board
Sensor Resolution	1280x800	Pixels	Actual depth map size slightly smaller
Frame rate	60	fps	Sensor supports 130 fps (@720p), 180 fps (@VGA) and more.
Baseline	100	mm	
Minimum depth sensing range	0.3	m	
Maximum depth sensing range	5.0	m	Higher range can be achieved by Inuitive's support for specific tuning
Depth accuracy at maximum range	1	%	

TRACKING

PARAMETER	VALUE	UNITS	COMMENTS
Sensor	OV7251		2 monochrome sensors on board
Resolution	640x480	Pixels	VGA. Sensor supports QVGA as well
Frame rate	Up to 100	fps	@VGA Resolution
DFOV	166.5	°C	Fisheye
IMU	BMI-160		6 Axis. Utilizes a Gyro and an Accelerometer

RGB

PARAMETER	VALUE	UNITS	COMMENTS
Sensor	OV2685	N/A	
Resolution	1600x1200	Pixels	
Frame rate	60	fps	
FOV	60x45	Degrees	



INUITIVE

For further information please contact us at info@inuitive-tech.com