WiRobot™
The Heart of Robot

DHM5150 Human Motion Sensor Module
User Manual

DrRobot®

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Related Document:

WiRobot PMS5005 Sensing and Motion Controller User Manual

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I. Introduction

The DHM5150 Human Motion Sensor Module incorporates a pyroelectric infrared sensor to detect infrared energy radiation from human body. The DHM5150 is able to detect human presence (like security alarm) in the range up to 500 cm. With the use of two modules, human moving direction can also be detected in the range up to 150 cm. Typical applications include a general-purpose security alarm and human presence and motion sensing in a robot system.

Features

- Human infrared radiation detection
- On-board signal conditioning
- Human presence detection up to 5 meters
- Human motion direction up to 1.5 meters
- Plug-and-play in the WiRobot system

Applications

- Security alarm, human presence detection
- Human moving direction measurement
- Human-following devices
- Human avoidance and security robot

II. Operations

II.1. Theory of Operation

Infrared radiation exists in the electromagnetic spectrum at a wavelength that is longer than visible light. Objects that generate heat also generate infrared radiation including animals and the human body. The infrared radiation generated by human is strongest at a wavelength of 9.4 μm.

The sensor used in the DHM5150 module has two sensing elements. Together with a Fresnel lens, the behavior of the sensor is shown in Figure II.1.

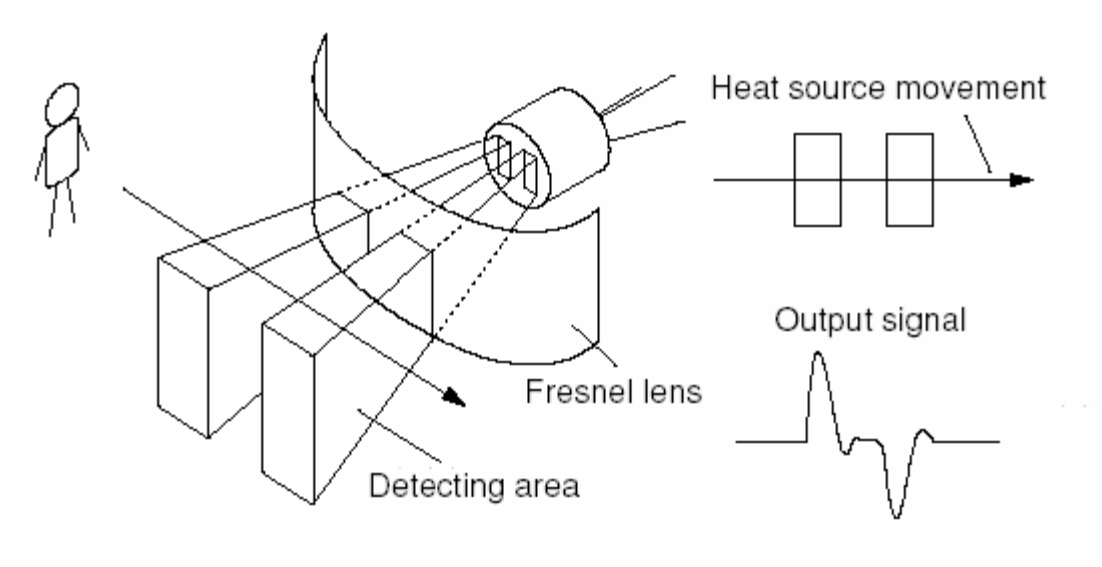

Figure II.1 Typical Sensor Behavior

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II.2. Running as Part of WiRobot System

When using the DHM5150 with the WiRobot system, user can simply connect the module to one of the human sensor module connectors on the PMS5005 controller board and the PMS5005 built-in sensor device driver will take care of the data acquisition. Users can simply call a function offered by the WiRobot SDK software on PC (requires Microsoft platform) or send a data request packet (platform independent) to obtain the data.

II.3. Running as a General Purpose Human Motion Sensor Module

When using the DHM5150 with a third party controller, the power supply and the input/output signals should be connected properly (please refer to Section III). The controller can get the human information data via an analog to digital converter.

There are analog outputs, one is the human motion (MS), and the other one is the human alarm (AS). When no human presents, output voltage of MS and AS is 1.5V. The change of AS is basically 5 times larger than MS due to the on-board amplifier. The closer the human and the faster the motion will cause the longer voltage change shown in MS and AS.

Note that when using two sets of the DHM5150 for human motion detection, the moving direction information can be identified by analyzing the pattern, timing and magnitude of two sensor output signals.

III. Connections

III.1. Board Structure

Figure III.1 illustrates the structure of the board.

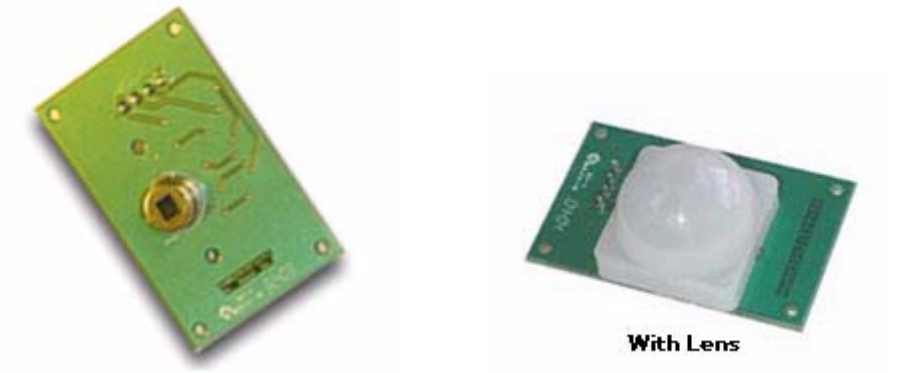

Figure III.1 DHM5150 Structure

III.2. Connector Description

The DHM5150 can be connected to the controller system via a 4-pin 2.54 mm-pitch single row connector:

Table III.1 DHM5150 Connector

Pin	Name	Function
1	Vcc	Positive power source, 5 V DC
2	MS	Human motion signal, analog output
3	AS	Human presence alarm, analog output
4	GND	Power ground

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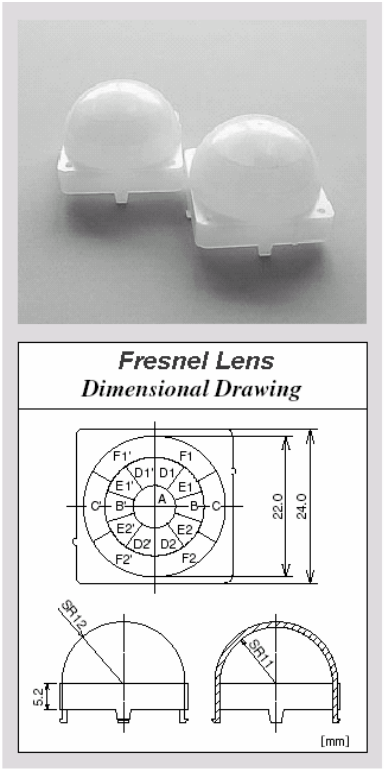
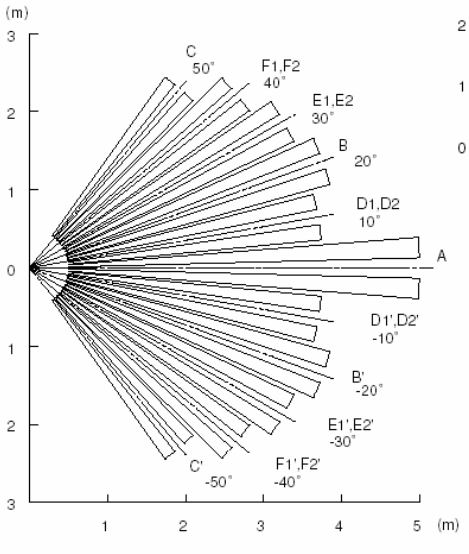
IV. Specifications

Table IV.1 DHM5150 Specification

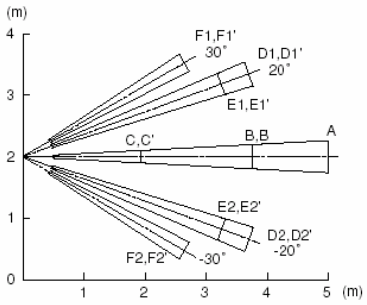
Parameter	Conditions	MIN	TYP	MAX	Unit
Power Supply Voltage	VCC	2.2	3.3	5.0	V
Current Consumption	VCC = 5 V			10	mA
Wavelength		5		14	μm
Human Motion Range				150	cm
Human Presence Range				500	cm
Directivity - Horizontal			100		°
Directivity - Vertical			60		°
Output Signal Voltage				VCC	V
Board Size			30 x 48		mm x mm

V. Fresnel Lens





Horizontal View Pattern



Vertical View Pattern

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