HD-0001

HAL Accessory Board Hardware Document

Prepared	Brandon Lu	Sept. 23, 2018
Checked	Kia Kroas	Sept. 26, 2018
Released	Brian Seo	Sept. 26, 2018

1 Preface

1.1 Definitions / Abbreviations

Acc	Accessory
HAL	Human-like Augmented Link-module
SBC	Single Board Computer
RPi	Raspberry Pi
PIR	Passive InfraRed motion sensor
shall	Mandatory Requirement
should	Recommended Practice
may	Allowed Practice
could	Possible Practice

1.2 References

1.2.1 Raspberry Pi Pins

https://www.raspberrypi.org/documentation/usage/gpio/
https://www.raspberrypi-spy.co.uk/2012/06/simple-guide-to-the-rpi-gpio-header-and-pins/
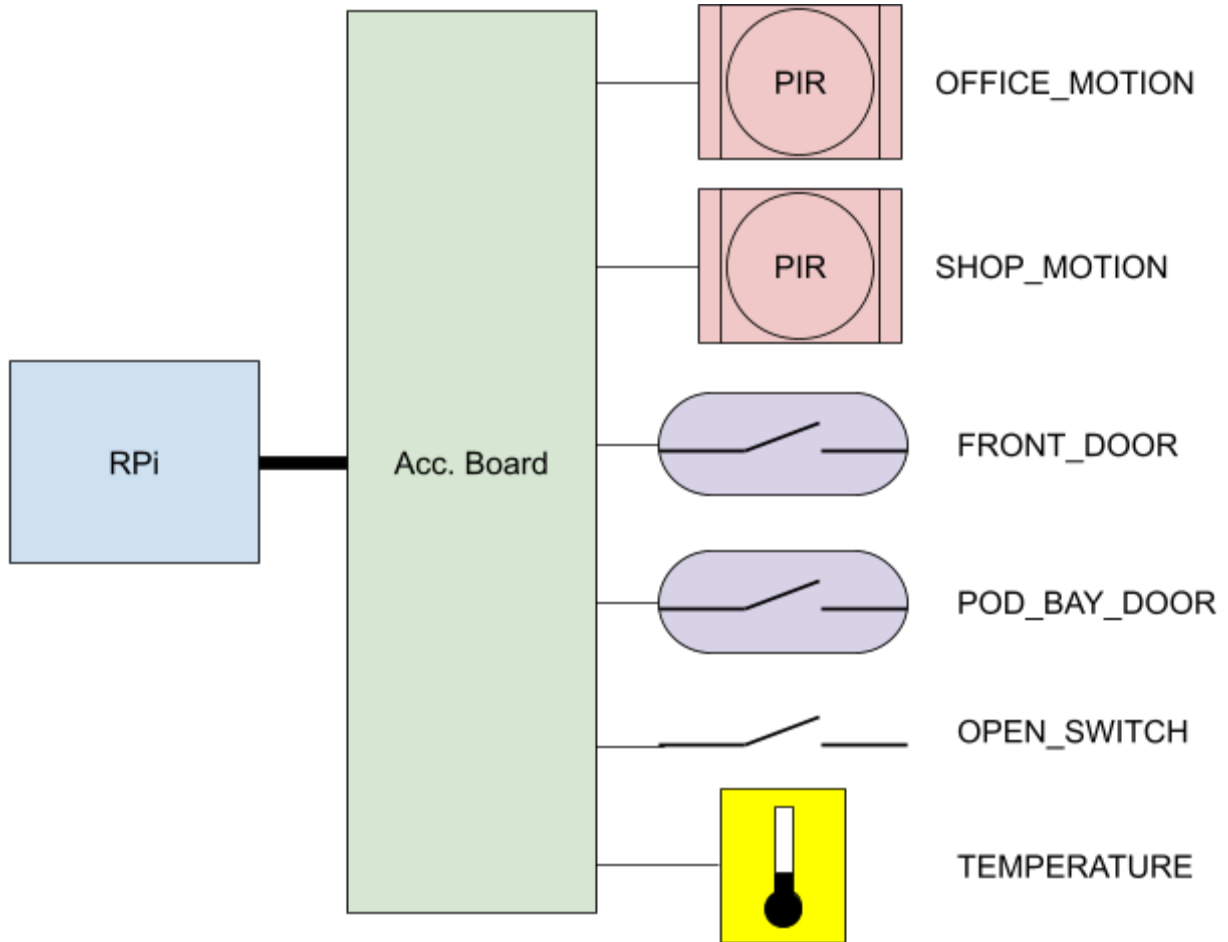
2 Purpose

This document serves to detail the new features that could be added to HAL in the near future along with various safety-oriented items which should be implemented regardless.

3 Design Summary

The HAL accessory board currently connects the embedded SBC (RPi) to various magnetic reed door sensors, pyroelectric motion sensors, and one one-wire DS18B20 sensor.

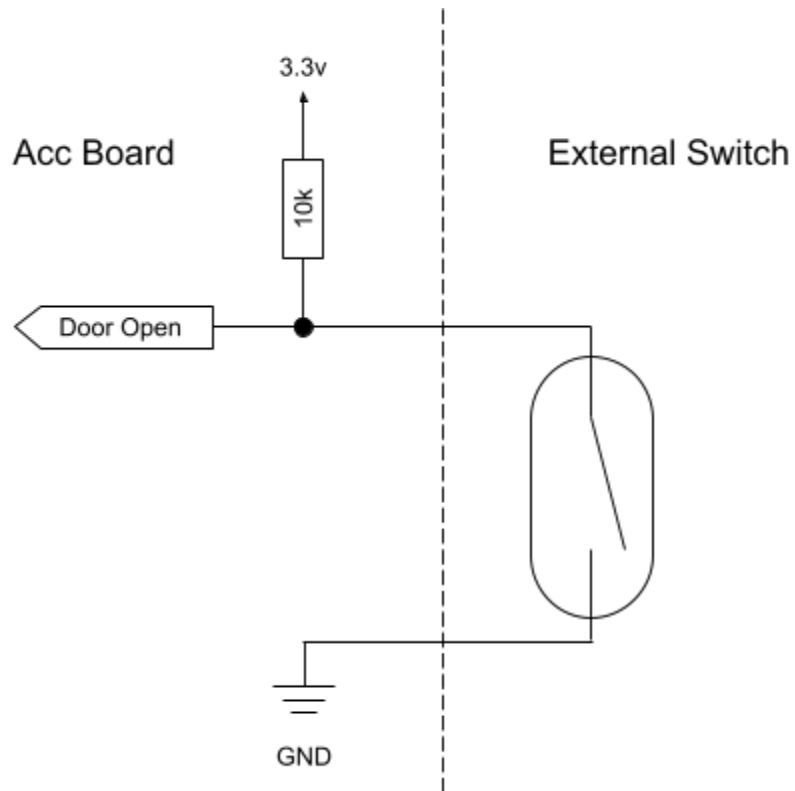The following diagram presents a synoptic view of the SBC / Acc. Board / Sensor configuration:

This document covers the Accessory Board and associated interfaces only.

4 Detailed Design

4.1 SBC Interface

HD-HAL-ACC-0001

HAL Accessory Board **shall** use the following signal connection for interfacing with the SBC 26-pin connector:

SBC 26-pin Conn	SBC Level Input / Output / Power	Acc Signal Name
1	Power	+3.3V
2	Power	+5V
7	Pull Down / Input (One-Wire)	TEMPERATURE
19	Input	SHOP_MOTION
20	Power	GND
21	Input	OFFICE_MOTION
22	Input	OPEN_SWITCH
23	Input	POD_BAY_DOOR
24	Input	FRONT_DOOR
25	Power	GND

Note that unlisted signals on the SBC interface cable are not connected.

The following image is the SBC 28-pin connector pinout from the Raspberry Pi B version 2.0:

4.2 External Switch Interface

HD-HAL-ACC-0002

HAL Accessory Board *shall* use the following 10k pull-up to 3.3v interface with external switches: OPEN_SWITCH, POD_BAY_DOOR, and FRONT_DOOR.
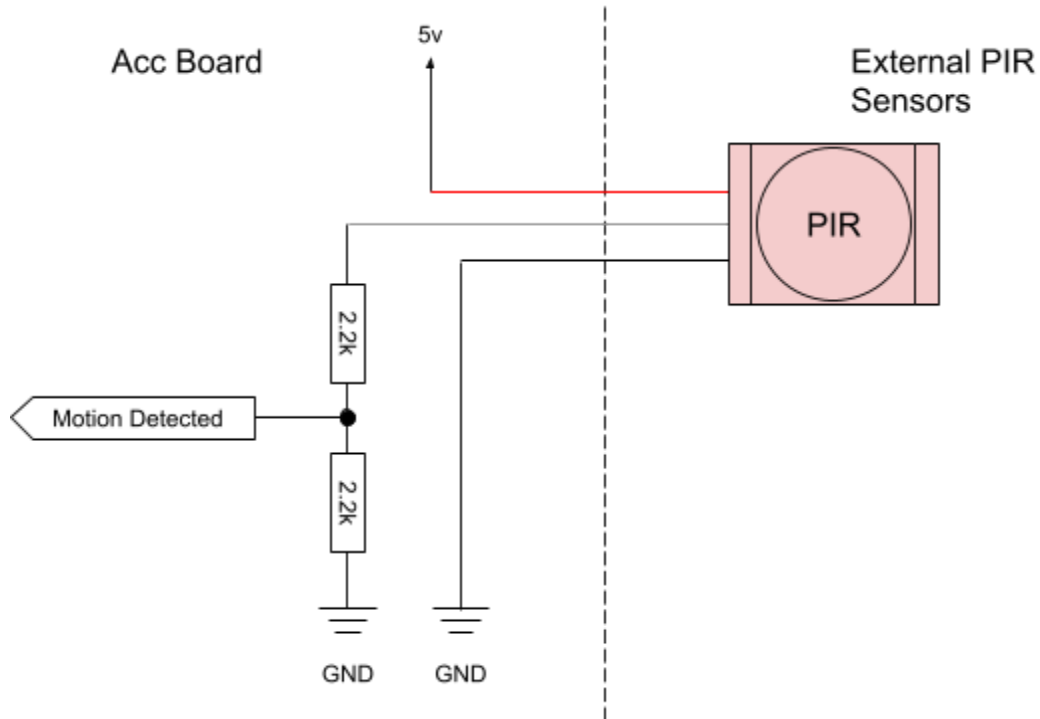
4.3 PIR Interface

HD-HAL-ACC-0003

HAL Accessory Board **shall** use the following ½ voltage divider interface with PIR sensors: SHOP_MOTION, OFFICE_MOTION.

4.3.1 Thermistor (1-wire, DS18B20) Interface

HD-HAL-ACC-0004

HAL Accessory Board *shall* use the following 4.7k pull-up interface for the one-wire thermistor:
TEMPERATURE.