**Hardware - Software Interface (HSI)**

**Kenovo - Electric Blender (PO2\_EBL)**

**Document status:**

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| **Version** | **Status** | **Author** | **Date** |
| 1.3 | Released | Mohamed Megahed  Esraa Mansour | 8/2/2020 |

**Document History:**

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| **Version** | **Author** | **Date** | **Change Description** |
| 1.0 | Mohamed Megahed  Esraa Mansour | 23/1/2020 | Initial Creation of HSI |
| 1.1 | Mohamed Megahed  Esraa Mansour | 5/2/2020 | * Reference table was added * REQID and direction to pin connections table were added * TAGID was changed to REQID * Unreverent details were removed from the ATMEGA32 section |
| 1.2 | Mohamed Megahed  Esraa Mansour | 5/2/2020 | * Document status table was added * Reference table format was edited |
| 1.3 | Mohamed Megahed  Esraa Mansour | 8/2/2020 | According to Fatima’s cross review:   * Spaces between words were added * The requirement IDs were placed above   the requirement description   * The implementation #Imp: HW was added   to the requirement IDs   * The pin connections table was separated into two tables (ATMEGA32 and Other components) |

**Reference Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ref. number** | **Doc. name** | **Version** | **Status** |
| 1 | CRS | 1.0 | Released |

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# Introduction

# Purpose

This document defines the HIS data dictionary for Electric Blender.

# Scope

This document describes the structure of the HSI.

1. **Requirements**

# Block Diagram

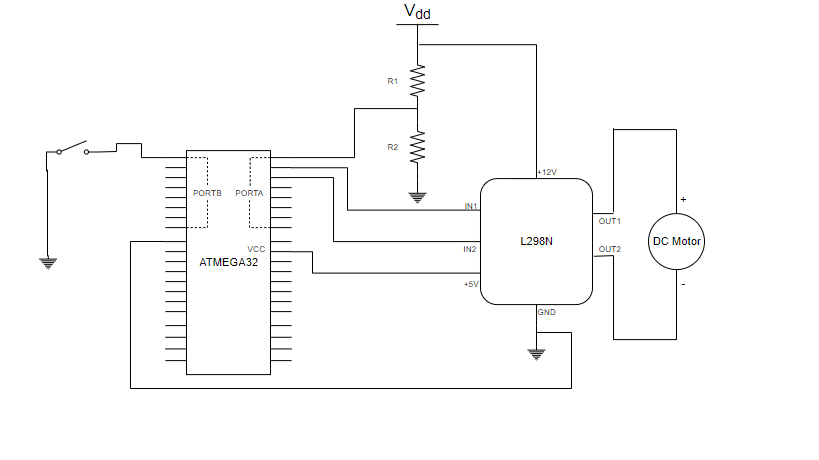


Figure 1–Block diagram

# Pins Connection

# 2.2.1 ATMEGA32

# REQID: Req\_PO2\_EBL\_Electric\_Blender\_HSI\_001\_1.0

|  |  |  |
| --- | --- | --- |
| **Pin Number** | **Connection** | **Direction** |
| PINA0 | Voltage Divider | Input |
| PINA1 | Motor Driver (IN1) | Output |
| PINA2 | Motor Driver (IN2) | Output |
| PINA2 | Tactile Switch | Input |
| PINA3 | Motor Driver (+5V) | Input |
| PINA4 | Motor Driver (GND) | N/A |
| PINA5 | N/A | Input |
| PINA6 | N/A | Input |
| PINA7 | N/A | Input |
| PINB0 | N/A | Input |
| PINB1 | N/A | Input |
| PINB2 | N/A | Input |
| PINB3 | N/A | Input |
| PINB4 | N/A | Input |
| PINB5 | N/A | Input |
| PINB6 | N/A | Input |
| PINB7 | N/A | Input |
| PINC0 | N/A | Input |
| PINC1 | N/A | Input |
| PINC2 | N/A | Input |
| PINC3 | N/A | Input |
| PINC4 | N/A | Input |
| PINC5 | N/A | Input |
| PINC6 | N/A | Input |
| PINC7 | N/A | Input |
| PIND0 | N/A | Input |
| PIND1 | N/A | Input |
| PIND2 | N/A | Input |
| PIND3 | N/A | Input |
| PIND4 | N/A | Input |
| PIND5 | N/A | Input |
| PIND6 | N/A | Input |
| PIND7 | N/A | Input |
| VCC | Motor Driver (+5V) | N/A |
| GND | Motor Driver (GND) | N/A |
| XTAL1 | N/A | N/A |
| XTAL2 | N/A | N/A |
| RESET | N/A | N/A |
| AREF | N/A | N/A |
| GND | N/A | N/A |
| AVCC | N/A | N/A |

Table 1 – ATMEGA32 pins connection

# 2.2.2 Other components

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Pin Number** | **Connection** | **Direction** |
| Motor Driver | +12V | VDD | Input |
| 5V | ATMEGA(VCC) | Output |
| GND | ATMEGA(GND) | N/A |
| IN1 | PINA1 | Input |
| IN2 | PINA2 | Input |
| OUT1 | DC Motor (+) | Output |
| OUT2 | DC Motor (-) | Output |
| DC Motor | Terminal1(+) | Motor Driver(OUT1) | Input |
| Terminal2(-) | Motor Driver(OUT2) | Input |
| Tactile Switch | Terminal1 | GND | N/A |
| Terminal2 | PINB0 | Output |
| Voltage Divider | Terminal1 | VDD | Input |
| Terminal2 | PINA0 | Output |
| Terminal3 | GND | N/A |

Table 2 – Other components pins connection

# Components Description

* + 1. **Switch**

**REQID:** Req\_PO2\_EBL\_Electric\_Blender\_HSI\_002\_1.0 Imp#HW

This Component change the electric blender speed from Off -> Speed 1 ->Speed 2 -> Speed 3 to Off again, it’s connected to ATMEGA32 PINB0 in pull up mode.

* + 1. **Motor Driver**

**REQID:** Req\_PO2\_EBL\_Electric\_Blender\_HSI\_003\_1.0 Imp#HW

This Component is used to supply the DC motor with enough current as microcontroller can’t supply enough current to rotate the motor.

It takes power from external power supply (VDD), it takes input from microcontroller through pins IN1 and IN2 and its output OUT1 and OUT2 is fed to the DC motor terminals.

* + 1. **DC Motor**

**REQID:** Req\_PO2\_EBL\_Electric\_Blender\_HSI\_004\_1.0 Imp#HW

This component takes its input from the motor driver and changes its speed according to that input.

* + 1. **Voltage Divider**

**REQID:** Req\_PO2\_EBL\_Electric\_Blender\_HSI\_005\_1.0 Imp#HW

This circuit consists of two resistances to drop down the power supply’s voltage to 5 volt.

* + 1. **ATMEGA32**

**REQID:** Req\_PO2\_EBL\_Electric\_Blender\_HSI\_006\_1.0 Imp#HW

This is the microcontroller the core of the process, it has two functions.

First function: it reads the input of the switch and according to that input it produces different wave forms with pulse width modulation (PWM).

Second function: The microcontroller reads the output voltage of the voltage divider to make sure that only the desired voltage range is delivered to motor driver.