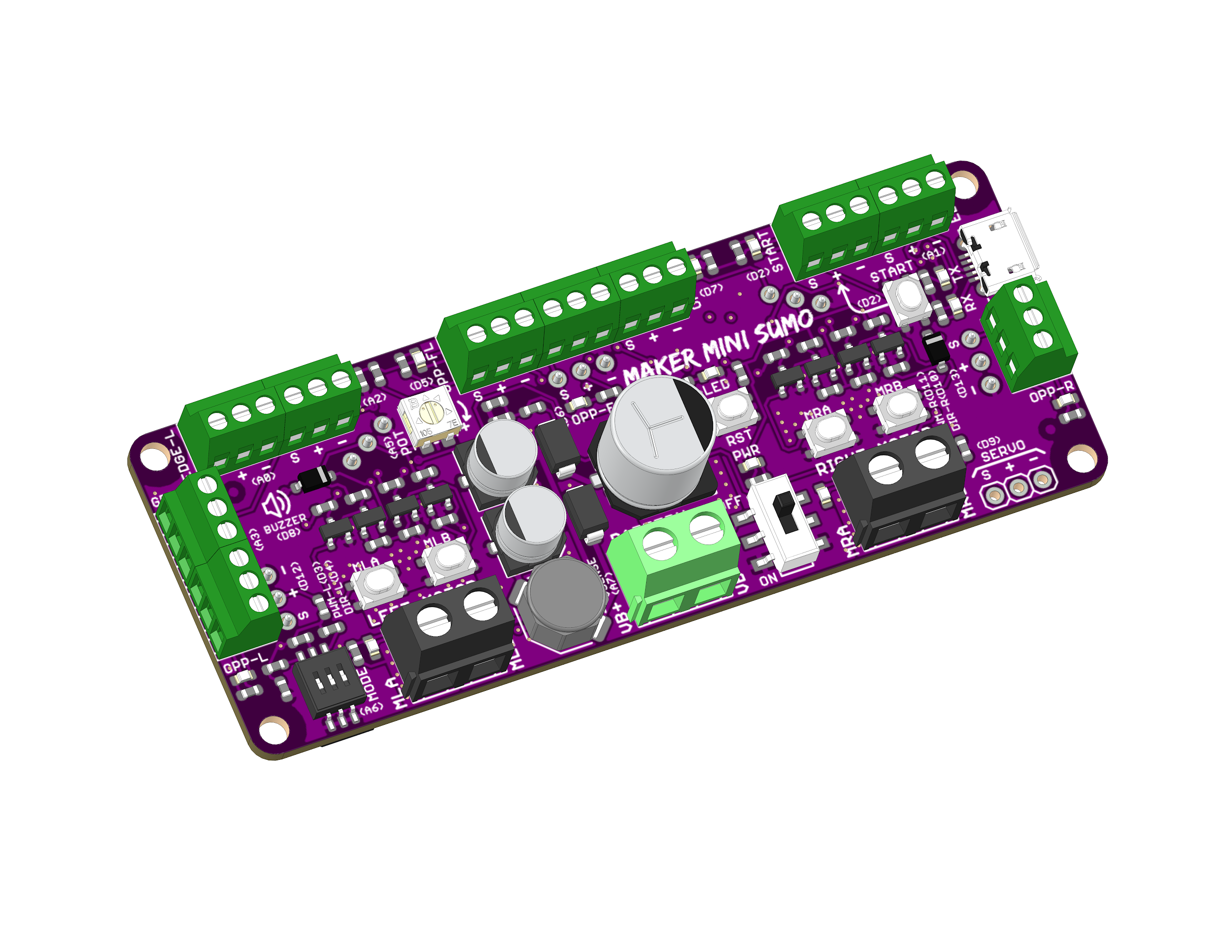


**MAKER-MSUMO**

**Maker Mini Sumo Controller**

**(Arduino Nano/Uno Compatible)**



Datasheet

Rev 1.0

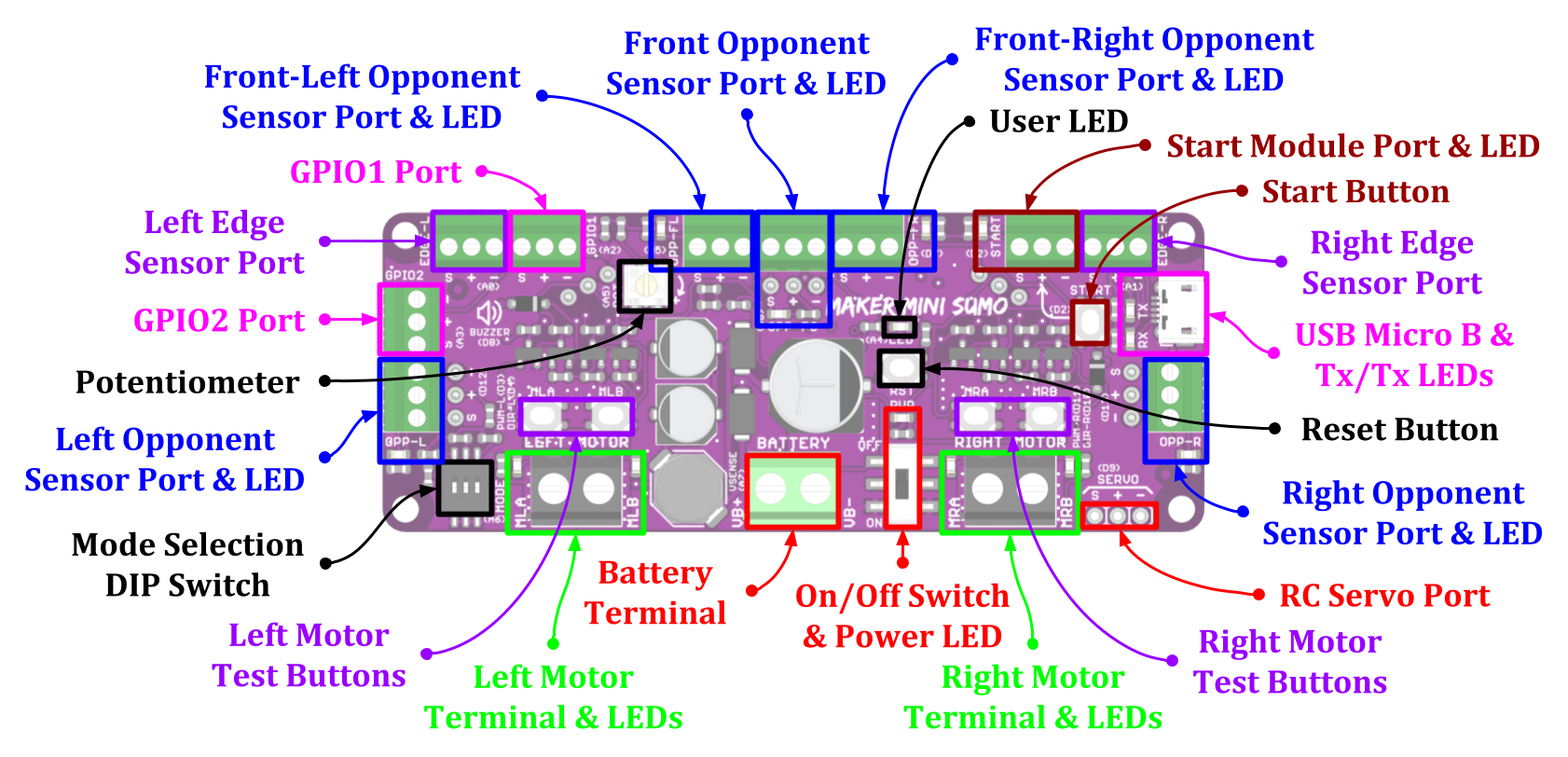
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# 1. FEATURES

* Arduino Nano/Uno Compatible (Powered by ATMEGA328P).
* Vin: 7V - 18V
* Reverse polarity protection on Vin.
* Vibration proof on/off switch with MOSFET latching circuit.
* Battery voltage can be read programmatically.
* Switching regulator for +5V reduce heat and increase efficiency.
* Motor: 3A continuous, 6A peak
* Test buttons and status LED for motors.
* 5 x Opponent Sensors Input (Digital) with LED state indicator.
* 2 x Edge Sensors Input (Analog/Digital).
* 2 x General Purpose Input Output (Analog/Digital Input or Digital Output).
* 1 x Start Module Input (Digital), with LED and onboard start button.
* 1 x Servo Output.
* 1 x Programmable LED.
* 1 x Onboard Potentiometer.
* 1 x Mode Selection DIP Switch (3 Ways).
* 1 x Piezo Buzzer (Able to play melody).

# 2. BOARD LAYOUT & FUNCTION



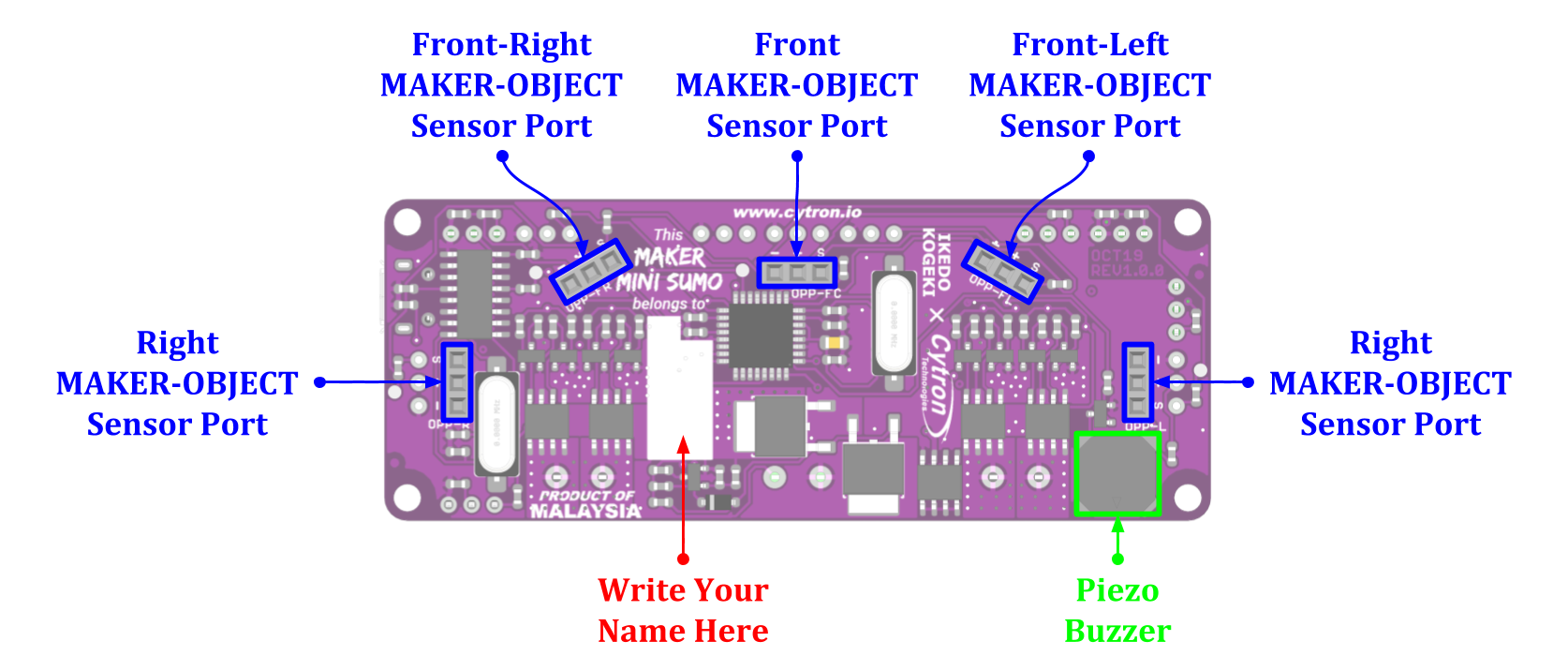
*Figure 1: MAKER-MSUMO Board Functions (Top)*

| **Function** | **Description** |
| --- | --- |
| **Battery Terminal** | Connect to battery.   * VB+ : Positive * VB- : Negative/Ground   VB+ is connected to analog input via voltage divider and the voltage can be read by the microcontroller. |
| **On/Off Switch** | Turn on/off the power to the board. |
| **Power LED** | Turn on when power up. |
| **Motor Terminals** | Connect to motors.  Motor direction is dependent on the polarity. |
| **Motor Status LEDs** | Turn on when the motor is running.   * MLA / MRA : Forward\* * MLB / MRB : Backward\* |
| **Motor Test Buttons** | Test the functionality of the motor driver without programming.  Motor will run at full speed.   * MLA / MRA : Forward\* * MLB / MRB : Backward\* |
| **Opponent Sensor Ports** | Connect to opponent sensors (Or any other digital inputs).  Internally pulled up to +5V.   * S : Digital Input Signal. * + : DC +5V Output. * - : Ground. |
| **Opponent Sensor**  **Status LEDs** | Indicate the status of opponent sensor.  Turn on when the signal is low (Active Low).  For MAKER-OBJECT, LEDs turn on when opponent is detected. |
| **Edge Sensor Ports** | Connect to edge/line sensors (Or any other analog inputs).   * S : Analog Input Signal. * + : DC +5V Output. * - : Ground. |
| **GPIO1 / GPIO2 Ports** | General Purpose Input/Output.  Can be used as a digital input/output or analog input.   * S : Digital Input/Output or Analog Input Signal. * + : DC +5V Output. * - : Ground. |
| **RC Servo Port** | Connect to RC servo.   * S : Signal * + : +5V. * - : Ground. |
| **USB Micro B Connector** | Used to upload Arduino program from PC.  Can be used for debugging purpose too (Serial Monitor). |
| **Tx/Rx LEDs** | Turn on when data is transmitted/received via the serial port.   * Tx : Data transmitted from the microcontroller. * Rx : Data received by the microcontroller. |
| **Reset Button** | Press to reset the microcontroller. |
| **Start Button** | Programmable button.  Usually used as start button. |
| **Start Module Port** | Connected in parallel with the start button.  Can be used to connect external start button or IR start module.  Signal pin is internally pulled high to +5V.   * S : Digital Input Signal. * + : DC +5V Output. * - : Ground. |
| **Start LED** | Turn on when the start button is pressed or the start module signal is low (Active Low). |
| **User LED** | Programmable LED.  Can be turned on/off from the user program. |
| **Potentiometer** | Connected internally to analog input.  Can be used to fine tune the robot speed, sensor threshold, etc... |
| **Mode Selection**  **DIP Switch** | 3-Ways DIP switch provides up to 8 configuration.  Can be used to select different tactic/mode for competition. |

*Table 1: MAKER-MSUMO Board Functions (Top)*

* *Actual motor direction is dependent on the motor connection.*

*Swapping the connection (MxA & MxB) will reverse the direction.*



*Figure 2: MAKER-MSUMO Board Functions (Bottom)*

| **Function** | **Description** |
| --- | --- |
| **MAKER-OBJECT**  **Sensor Ports** | Connect to MAKER-OBJECT opponent sensors.  Connected in parallel with top layer opponent sensor ports.  Internally pulled up to +5V.   * S : Digital Input Signal. * + : DC +5V Output. * - : Ground. |
| **Piezo Buzzer** | Programmable piezo buzzer.  Can be used to play tone or melody. |

*Table 2: MAKER-MSUMO Board Functions (Bottom)*

| **PWM-L/PWM-R** | **DIR-L/DIR-R** | **MLA/MRA** | **MLB/MRB** | **Motor** |
| --- | --- | --- | --- | --- |
| **Low** | **X (Don’t Care)** | Low | Low | Brake |
| **High** | **Low** | High | Low | Forward\* |
| **High** | **High** | Low | High | Backward\* |

*Table 3: Input Truth Table*

* *Actual motor direction is depending on the motor connection.*

*Swapping the connection (MxA & MxB) will reverse the direction.*

# 3. ARDUINO PIN MAPPING

All the pins of ATMEGA328P on MAKER-MSUMO are already pre-defined in the [CytronMakerSumo Library](https://github.com/CytronTechnologies/CytronMakerSumo). Please refer to the GitHub page on how to install the library.

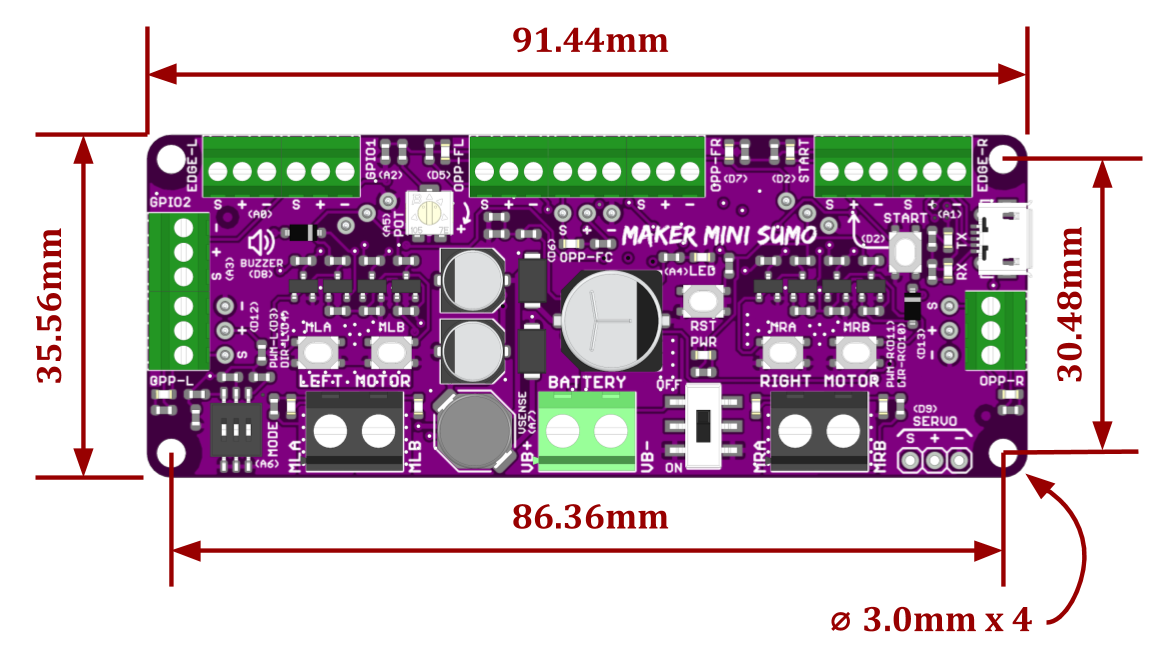
| **Port** | | **Constant Defined in Library** | **Arduino Pin** |
| --- | --- | --- | --- |
| User LED | | LED | A4 |
| Piezo Buzzer | | BUZZER | D8 |
| Potentiometer | | POT | A5 |
| Mode Selection DIP Switch | | MODE | A6 |
| Battery Voltage Sensor (Voltage Divider) | | VBATT | A7 |
| Left Motor | PWM | PWM\_L | D3 |
| Direction | DIR\_L | D4 |
| Right Motor | PWM | PWM\_R | D11 |
| Direction | DIR\_R | D10 |
| RC Servo | | SERVO | D9 |
| Edge/Border Sensor | Left | EDGE\_L | A0 |
| Right | EDGE\_R | A1 |
| Start Button / Start Module | | START | D2 |
| Opponent Sensor | Left | OPP\_L | D12 |
| Right | OPP\_R | D13 |
| Front-Center | OPP\_FC | D6 |
| Front-Left | OPP\_FL | D5 |
| Front-Right | OPP\_FR | D7 |
| General Purpose Input/Output (GPIO) | GPIO 1 | GPIO1 | A2 |
| GPIO 2 | GPIO2 | A3 |

# 4. SPECIFICATIONS

| **No** | **Parameters** | | **Min** | **Max** | **Unit** |
| --- | --- | --- | --- | --- | --- |
| 1 | Power Input Voltage (Vin) | | 7.0 | 18.0 | VDC |
| 2 | Maximum Motor Current (Per Channel) | Continuous | - | 3.0 | A |
| Peak (< 5 seconds) | - | 6.0 | A |
| 3 | Motor PWM Frequency | | DC | 20 | KHz |
| 4 | Digital Input Voltage | Low Level | 0 | 0.5 | V |
| High Level | 1.7 | 5.0 | V |
| 5 | Analog Input Voltage | | 0 | 5.0 | V |
| 5 | DC +5V Output Maximum Current (Total) | | - | 500 | mA |

*Table 3: MAKER-MSUMO Absolute Maximum Ratings*

# 5. DIMENSION



*Figure 3: MAKER-MSUMO Dimension*

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