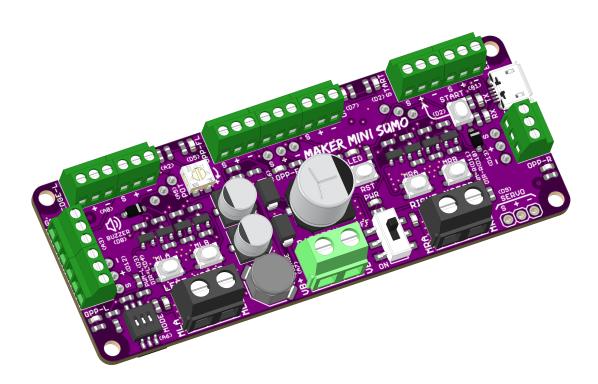


# MAKER-MSUMO Maker Mini Sumo Controller (Arduino Nano/Uno Compatible)



# **Datasheet**

Rev 1.0 November 2019

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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

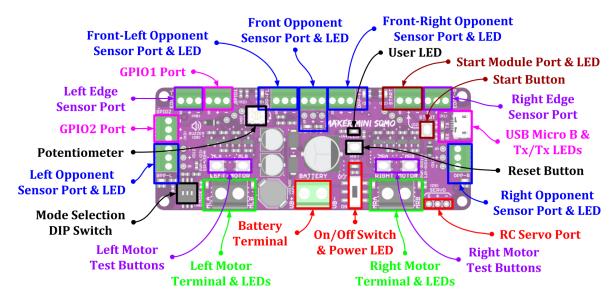


Figure 1: MAKER-MSUMO Board Functions (Top)

Function	Description		
<b>Battery Terminal</b>	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.		
<b>Motor Terminals</b>	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.		

Connect to edge/line sensors (Or any other analog inputs).  S: Analog Input Signal.  +: DC +5V Output.  -: Ground.		
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.		
Connect to RC servo.  S: Signal +:+5V: Ground.		
Used to upload Arduino program from PC. Can be used for debugging purpose too (Serial Monitor).		
<ul> <li>Turn on when data is transmitted/received via the serial port.</li> <li>Tx: Data transmitted from the microcontroller.</li> <li>Rx: Data received by the microcontroller.</li> </ul>		
Press to reset the microcontroller.		
Programmable button. Usually used as start button.		
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.		
Turn on when the start button is pressed or the start module signal is low (Active Low).		
Programmable LED. Can be turned on/off from the user program.		
Connected internally to analog input. Can be used to fine tune the robot speed, sensor threshold, etc		
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.

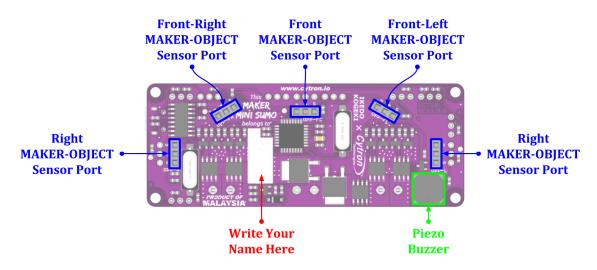


Figure 2: MAKER-MSUMO Board Functions (Bottom)

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

<sup>\*</sup> 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 <a href="CytronMakerSumo Library">CytronMakerSumo Library</a>. 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		РОТ	A5	
Mode Selection DIP Switch		MODE	A6	
Battery Voltage Sensor (Voltage Divider)		VBATT	A7	
Left Motor	PWM	PWM_L	D3	
	Direction	DIR_L	D4	
Pick March	PWM	PWM_R	D11	
Right Motor	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	
	Left	OPP_L	D12	
Opponent Sensor	Right	OPP_R	D13	
	Front-Center	OPP_FC	D6	
	Front-Left	OPP_FL	D5	
	Front-Right	OPP_FR	D7	
General Purpose	GPIO 1	GPI01	A2	
Input/Output (GPIO)	GPIO 2	GPIO2	A3	

## 4. SPECIFICATIONS

No	Parameters		Min	Max	Unit
1	Power Input Voltage (Vin)		7.0	18.0	VDC
2 Maximum Motor Cur	Maximum Motor Current (Dor Channel)	Continuous	-	3.0	A
	Maximum Motor Current (Per Channel)	Peak (< 5 seconds)	-	6.0	A
3	Motor PWM Frequency		DC	20	KHz
4 Digital Input Voltage	Digital Input Valtage	Low Level	0	0.5	V
	Digital input voltage	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

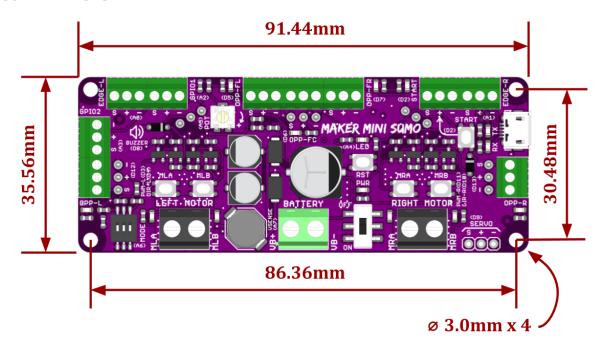


Figure 3: MAKER-MSUMO Dimension

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