

Action	Bit3	Bit2	Bit1	Bit0	Motor#2	Motor#1	
	SSR#4	SSR#3	SSR#2	SSR#1	Digital Pot#2	Digital Pot#1	
	Bits 0-3	Right Rev	Right Fwd	Left Rev	Left Fwd	Right Speed	Left Speed
Stop	0	0	0	0	0	don't care	don't care
Fwd Pivot Right	1	0	0	0	1	don't care	>0
Rev Pivot Right	2	0	0	1	0	don't care	>0
Fwd Pivot Left	4	0	1	0	0	>0	don't care
Forward	5	0	1	0	1	>0 &=Left	>0 &=Right
Fwd Veer Right	5	0	1	0	1	>0	>Right
Spin CCW	6	0	1	1	0	>0 &=Left	>0 &=Right
Rev Pivot Left	8	1	0	0	0	>0	don't care
Spin CW	9	1	0	0	1	>0 &=Left	>0 &=Right
Reverse	10	1	0	1	0	>0 &=Left	>0 &=Right
Rev Veer Left	10	1	0	1	0	>Left	>0

	Wire	S/C Term	Pot	
Speed Control	<b>RED</b>	VREF	VH	5V
Pot Hookup	<b>YEL</b>	DC IN	VW	
	<b>BLU</b>	GND	VL	GND

### Motor Control Relays Wired to Center PCB Card Drive Through Digital Logic Circuits

	Color	PCB Term	Color	PCB Term
5VDC	Copper	1		
Left FWD (LF)	GRN+	5	BLK-	6
Left REV (LR)	BLU+	3	RED-	4
Right FWD (RF)	GRN+	10	BLK-	11
Right REV (RR)	BLU+	8	RED-	9
GND	Copper	22		

The bumper switches will be wired through latching logic that disables the respective motor control relays (i.e. The front bumpers will turn off either forward motor relay. The rear bumper will turn off either reverse motor relay.) The LATCH RESET will only be used if the corresponding sensor switch is Not activated.

PCB has 44 contact (1 to 22) and (A to Z)

Top				Bot			
5VDC	1	Vcc - Copper		A	Vcc - Copper		
	2			B			
<b>Left REV (LR)</b>	3	<-PCB Logic Output		C	MEGA Out	Left REV	<-Digital-Out
<b>Left REV (LR)-Rtn</b>	4	Gnd		D	MEGA Out	Left FWD	<-Digital-Out
<b>Left FWD (LF)</b>	5	<-PCB Logic Output		E	MEGA Out	Right REV	<-Digital-Out
<b>Left FWD (LF)-Rtn</b>	6	Gnd		F	MEGA Out	Right FWD	<-Digital-Out
	7			H			
<b>Right REV (RR)</b>	8	<-PCB Logic Output		J	Latch Reset	Right Front	<-Digital-Out IC6-pin 10
<b>Right REV (RR)-Rtn</b>	9	Gnd		K	Latch Reset	Left Front	<-Digital-Out IC6-pin 1
<b>Right FWD (RF)</b>	10	<-PCB Logic Output		L	Latch Reset	Cntr Front	<-Digital-Out IC6-pin 4
<b>Right FWD (RF)-Rtn</b>	11	Gnd		M	Latch Reset	Cntr Rear	<-Digital-Out IC6-pin 13
	12			N			
<b>Right Front Bumper</b>	13	Raw ->Digital-In	IC2-pin 1	P	Latch Out	Right Front	->Digital-In IC2-pin 3
<b>Left Front Bumper</b>	14	Raw ->Digital-In	IC1-pin 1	R	Latch Out	Left Front	->Digital-In IC1-pin 3
<b>Center Front Bumper</b>	15	Raw ->Digital-In	IC1-pin 13	S	Latch Out	Center Front	->Digital-In IC1-pin 11
<b>Rear Bumper</b>	16	Raw ->Digital-In	IC2-pin 13	T	Latch Out	Center Rear	->Digital-In IC2-pin 11
	17			U			
	18			V			
	19			W			
	20			X			
	21			Y			
Gnd	22	Gnd - Copper		Z	Gnd		

## Hookup Between Arduino MEGA I/O shield and PCB and other Circuit Cards

Description	I/O	Type	Wire	PCB Cont	Program I/O Point Name
	D0	RXD0			
	D1	TXD0			
	D2	PWM (int4)			
	D3	PWM (int5)			
	D4	PWM			
	D5	PWM			
	D6	PWM			
	D7	PWM			
	D8	PWM			
	D9	PWM			
Interrupt	D10	PWM			
Interrupt	D11	PWM			
Interrupt	D12	PWM			
<b>Built-in LED</b>	<b>D13</b>	<b>OUTPUT</b>			LED_BUILTIN
Serial coms	D14	TXD3			
Serial coms	D15	RXD3			
Serial coms	D16	TXD2			
Serial coms	D17	RXD2			
Serial com/Interrupt	D18	TXD1 (int3)			
Serial com/Interrupt	D19	RXD1 (int2)			
Serial com/Interrupt	D20	SDA (int1)			
Serial com/Interrupt	D21	SDL (int0)			
	D22				
	D23				
	D24				
Left Motor Encoder	D25	INPUT		N/A	LM_Speed
Right Motor Encoder	D26	INPUT		N/A	RM_Speed
Sonalert Beeper	D27	OUTPUT		N/A	Beeper

Right Fwd Enable	D28	OUTPUT	VIO/ORG	F	RightFwdEnable
Right Rev Enable	D29	OUTPUT	VIO/GRN	E	RightRevEnable
Left Fwd Enable	D30	OUTPUT	VIO/BRN	D	LeftFwdEnable
Left Rev Enable	D31	OUTPUT	VIOLET	C	LeftRevEnable
RF Bumper Latch Reset	D32	OUTPUT	GRN/VIO	J	RF_BumpReset
LF Bumper Latch Reset	D33	OUTPUT	GRN/BRN	K	LF_BumpReset
CF Bumper Latch Reset	D34	OUTPUT	GRN/YEL	L	CF_BumpReset
RE Bumper Latch Reset	D35	OUTPUT	GRN/BLK	M	RearBumpReset
RF Bumper Switch	D36	INPUT	ORG/VIO	13 / BRN	RF_BumpSw
LF Bumper Switch	D37	INPUT	ORG/WHT	14 / GRN	LF_BumpSw
CF Bumper Switch	D38	INPUT	ORG/RED	15 / RED	CF_BumpSw
RE Bumper Switch	D39	INPUT	ORG/BLK	16 / BLK	RearBumpSw
RF Bumper Latch State	D40	INPUT	YEL/GRN	P	RF_BumpLatch (01)
LF Bumper Latch State	D41	INPUT	YEL/ORG	R	LF_BumpLatch (02)
CF Bumper Latch State	D42	INPUT	YEL/GRY	S	CF_BumpLatch (04)
RE Bumper Latch State	D43	INPUT	YEL/BLU	T	RearBumpLatch (08)
Left Motor Spd Select	D44	OUTPUT	RED/GRY	CS	LM_SpdSel
Left Motor Dir Select	D45	OUTPUT	RED/GRN	U/D	LM_SpdUpDown
Left Motor Step Pot	D46	OUTPUT	RED/BRN	INC	LM_SpdStep
Ground	GND	-	RED/BLU	22, Z	
Right Motor Spd Select	D47	OUTPUT	BRN/RED	CS	RM_SpdSel
Right Motor Dir Select	D48	OUTPUT	BRN/WHT	U/D	RM_SpdUpDown
Right Motor Step Pot	D49	OUTPUT	BRN/VIO	INC	RM_SpdStep
Ground	GND	-	BRN/BLK	22, Z	
Serial Peripheral I/F	D50	MISO			
Serial Peripheral I/F	D51	MOSI			
Serial Peripheral I/F	D52	SCK			

Serial Peripheral I/F	D53	/SS			
Analog Input	AIN0	INPUT	YEL/GRN	VW	LM_SpdPot (0~997 cnts)
Analog Input	AIN1	INPUT	YEL/ORG	VW	RM_SpdPot (0~997 cnts)
Analog Input	AIN2	INPUT		OUT	LM_Current (0-XXX cnts)
Analog Input	AIN3	INPUT		OUT	RM_Current (0-XXX cnts)
Analog Input	AIN4	INPUT			
Analog Input	AIN5	INPUT			
Analog Input	AIN6	INPUT			
Analog Input	AIN7	INPUT			
Analog Input	AIN8	INPUT			
Analog Input	AIN9	INPUT			
Analog Input	AIN10	INPUT			
Analog Input	AIN11	INPUT			
Analog Input	AIN12	INPUT			
Analog Input	AIN13	INPUT			
Analog Input	AIN14	INPUT			
Use to mix up choices	AIN15	INPUT		N/A	RollTheDice

LF_BumpLatch	bit 2
CF_BumpLatch	bit 1
RF_BumpLatch	bit 0

RearBumpLatch	bit 3
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	Binary	Decimal	Sensors Affected	What Should the Robot Do?
Scenario#0	B0000	0		
Scenario#1	B0001	1	Right Front	Back away, veer to the left, stop.
Scenario#2	B0100	4	Left Front	Back away, veer to the right, stop.
Scenario#3	B0010	2	Center Front	Back away, straight back, stop, pivot L or R, stop.
	B0101	5	Left and Right Front	Same
	B0111	7	Left, Center, and Right Front	Same
Scenario#4	B0011	3	Center and Left Front	Back away, veer to the left, stop, pivot right, stop.
Scenario#5	B0110	6	Center and Right Front	Back away, veer to the right, stop, pivot left, stop.
Scenario#6	B1000	8	Rear Only	Drive forward, stop, turn L or R, stop.
Scenario#7	1yyy	>8	Rear and Any (y) Front	Stop, sound alarm (assume trapped or pranked).

	IN1	IN2	OUT
Two-Input AND Gate	0	0	0
74XX08	0	1	0
	1	0	0
	1	1	1

	IN1	IN2	OUT
Two-Input OR Gate	0	0	0
74XX32	0	1	1
	1	0	1
	1	1	1

	IN1	IN2	OUT
Two-Input NAND Gate	0	0	1
74XX00	0	1	1
	1	0	1
	1	1	0

	IN1	IN2	OUT
Two-Input NOR Gate	0	0	1
74XX02	0	1	0
	1	0	0
	1	1	0

	IN	OUT
One-Input NOT Gate	0	1
74XX04	1	0

	IN1	IN2	OUT
Two-Input XOR Gate	0	0	0
74XX86	0	1	1
	1	0	1
	1	1	0