

Padiddle Design Notes

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Abstract:

Padiddle is the name of a game aimed quickly identifying cars with a burnt out headlight by punching the ceiling. The goal of this project is to create an easy to use hardware/software solution that facilitates the playing of padiddle in a vehicle. The design is composed of an Arduino Uno, two piezoelectric sensors to detect when a user punches the ceiling, and a custom PCB that acts as the user interface.

Parts Lists:

Generic Name	Vender	Vender Code	Quantity	Unit Price	Total
Arduino Uno	Sparkfun	DEV-11021	1	\$29.95	\$29.95
10mm Red LED	Sparkfun	COM-00528	4	\$0.95	\$3.80
10mm Green LED	Sparkfun	COM-08285	2	\$0.95	\$1.90
Red Button	Sparkfun	COM-10442	1	\$1.95	\$1.95
Green Button	Sparkfun	COM-10440	1	\$1.95	\$1.95
Shift Register	Sparkfun	COM-00733	2	\$1.50	\$3.00
Resistors (200 Ω)	DigiKey	0805 Resistor	9	--	--
Female Headers	Sparkfun	PRT-00115	1	\$1.50	\$1.50
7-Segment LED	Sparkfun	COM-08546		\$0.95	
Printed Circuit Board	OSH Park	--	3	\$24.45	\$24.45*
TOTAL					\$68.50

*For set of three boards

Design:

A table of the shift registers, their names, and corresponding data is shown below in Table 1.

Table 1 – Shift Register Summary

Shift Register Name	IC	Data
SR-A	74HC595	Left 7-Segment Display
SR-B	74HC595	Right 7-Segment Display

Each shift register is oriented in the same direction (right facing). Table 2 describes the relationship between the pins of THE shift registers and their corresponding functions.

Table 2 – SR-A & SR-B Wiring Table

Shift Register Label	Shift Register Pin #	LED	LED Pin #
QA	15	DP	5
QB	1	G	10
QC	2	F	9
QD	3	E	1
QE	4	D	2
QF	5	C	4
QG	6	B	6
QH	7	A	7
QH*	9	SR-A: Ser_in of SR-B SR-B: Ser_in of SR-C	--

Table 3 provides a detailed description of the pinout for the JP1 connector. The table specifies the function of each pin as well as its corresponding Arduino pin and Arduino variable.

Table 3 – JP1 Connections

JP1 Pin Number	Function	Arduino Pin	Arduino Variable
1	GND	14 (GND)	--
2	Serial	13	SERIAL_PIN
3	CLK	12	CLOCK_PIN
4	LATCH	11	LATCH_PIN
5	Score Button	10	SCORE_PIN*
6	Penalty Button	9	PENALTY_PIN*
7	Left Score LED	8	LEFT_SCORE_LED
8	Left Penalty 1 LED	7	LEFT_PENALTY_1_LED
9	Left Penalty 2 LED	6	LEFT_PENALTY_2_LED
10	Right Score LED	5	RIGHT_SCORE_LED
11	Right Penalty 1 LED	4	RIGHT_PENALTY_1_LED
12	Right Penalty 2 LED	3	RIGHT_PENALTY_2_LED
13	Button LED	2	BUTTON_LED
14	VCC	Power 5V	--

* Pin is an INPUT pin. All other pins are OUTPUT pins.

JP1 is connected to the Arduino with a series of short jumper wires that connect Arduino pin 14 (GND) to Arduino pin 3. A slightly longer jumper wire is then required to connect JP1 pin 14 to VCC (5V).

The left and right piezoelectric sensors are connected to analog inputs A0 and A1 respectively as well as being connected to ground. It is also required to wire a 10M Ohm resistor in parallel with the positive of each sensor and ground. This is accomplished by connecting a resistor between A0 and to ground. An additional resistor is required for A1.