MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Course Code : CSE-306

[GROUP_B4] Circuit Diagram for MPMC project

[Project name] "A Game of Pong"

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Level/Term : 3/1

Course : CSE-18B

Date of exp :
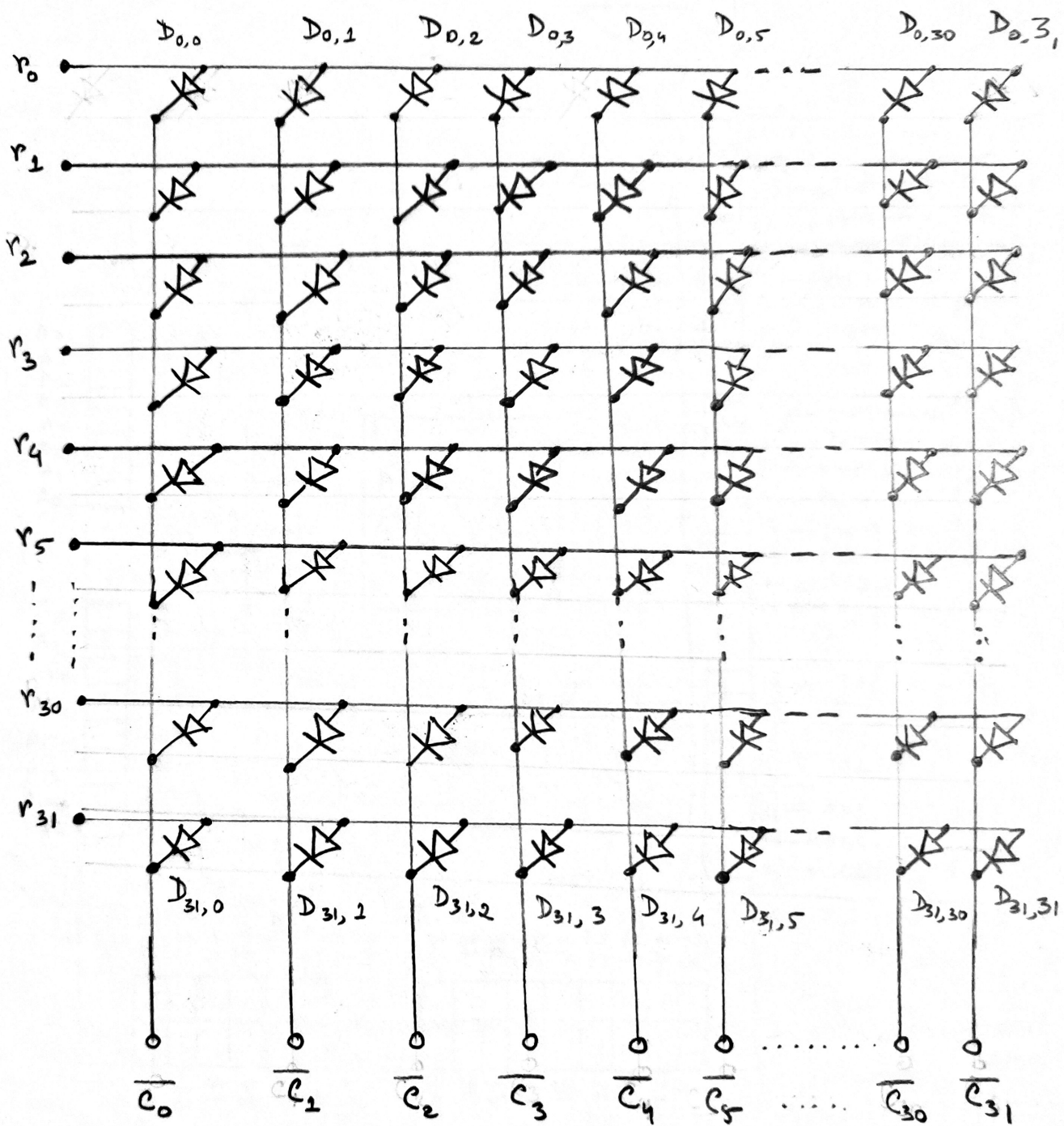
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Group : B4

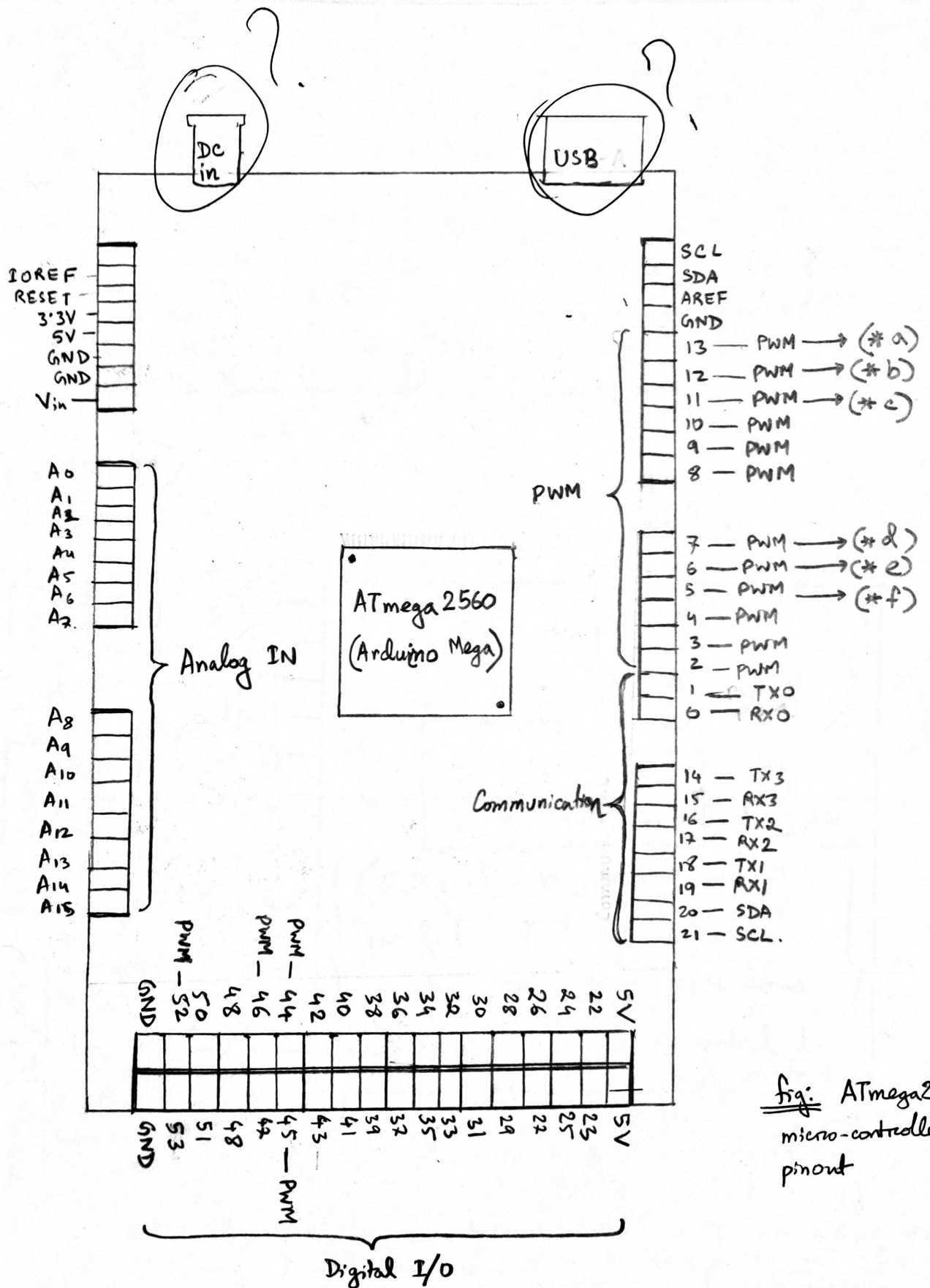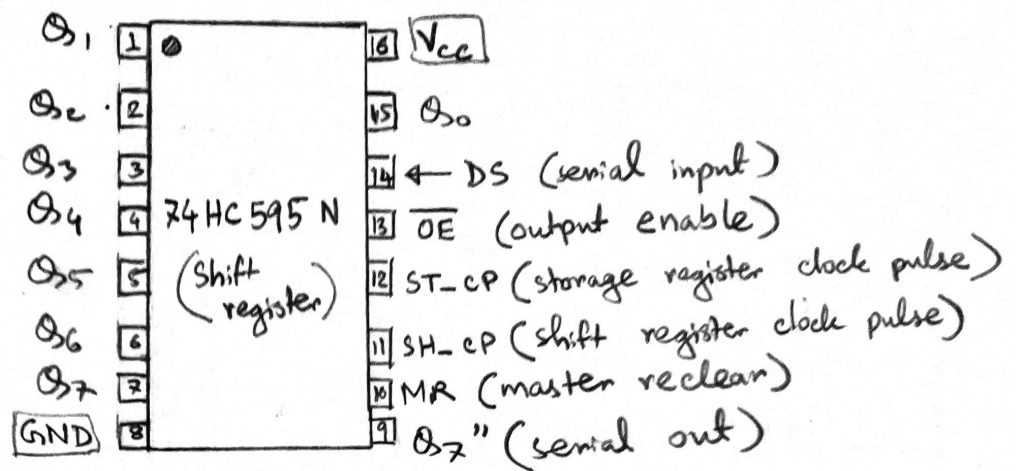Signature of Teacher :

fig-1: The LED matrix
(32 rows, 32 columns)

DC in ? **USB** ?

Left header:
IOREF
RESET
3·3V
5V
GND
GND
Vin

A0
A1
A2
A3
A4
A5
A6
A7

Analog IN

A8
A9
A10
A11
A12
A13
A14
A15

Center: ATmega 2560 (Arduino Mega)

Right header:
SCL
SDA
AREF
GND
13 — PWM → (*a)
12 — PWM → (*b)
11 — PWM → (*c)
10 — PWM
9 — PWM
8 — PWM

PWM

7 — PWM → (*d)
6 — PWM → (*e)
5 — PWM → (*f)
4 — PWM
3 — PWM
2 — PWM
1 — TX0
0 — RX0

Communication
14 — TX3
15 — RX3
16 — TX2
17 — RX2
18 — TX1
19 — RX1
20 — SDA
21 — SCL.

Bottom header (Digital I/O):
GND | PWM — 52 | 50 | PWM — 48 | 46 | PWM — 44 | 42 | 40 | 38 | 36 | 34 | 32 | 30 | 28 | 26 | 24 | 22 | 5V
GND | 53 | 51 | 49 | 47 | 45 — PWM | 43 | 41 | 39 | 37 | 35 | 33 | 31 | 29 | 27 | 25 | 23 | 5V

Digital I/O

fig: ATmega 2560 micro-controller pinout

(*a), (*b), (*c) ⟹ PWM pins 13, 12, and 11 are to be used for shift clock pulse, store clock pulse, and serial input pins of the first shift register in the shift register array [row shift register array]

(*d), (*e), (*f) ⟹ Similar purpose as above, but for column shift register array.

74HC595N (Shift register) pin diagram:
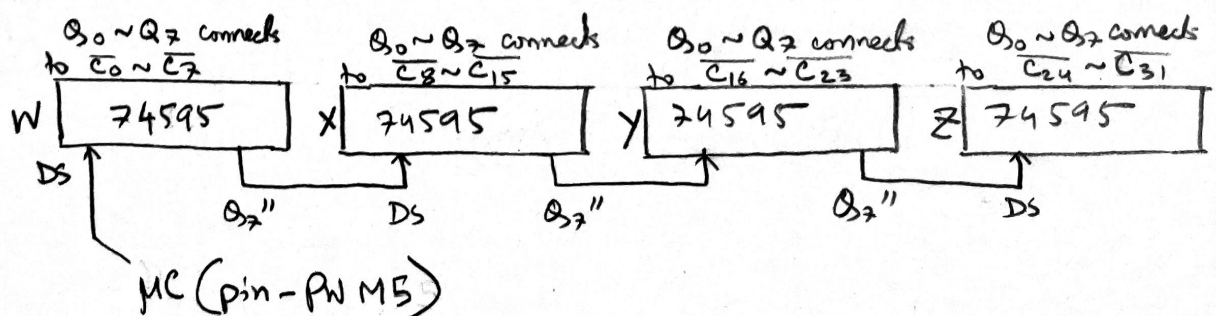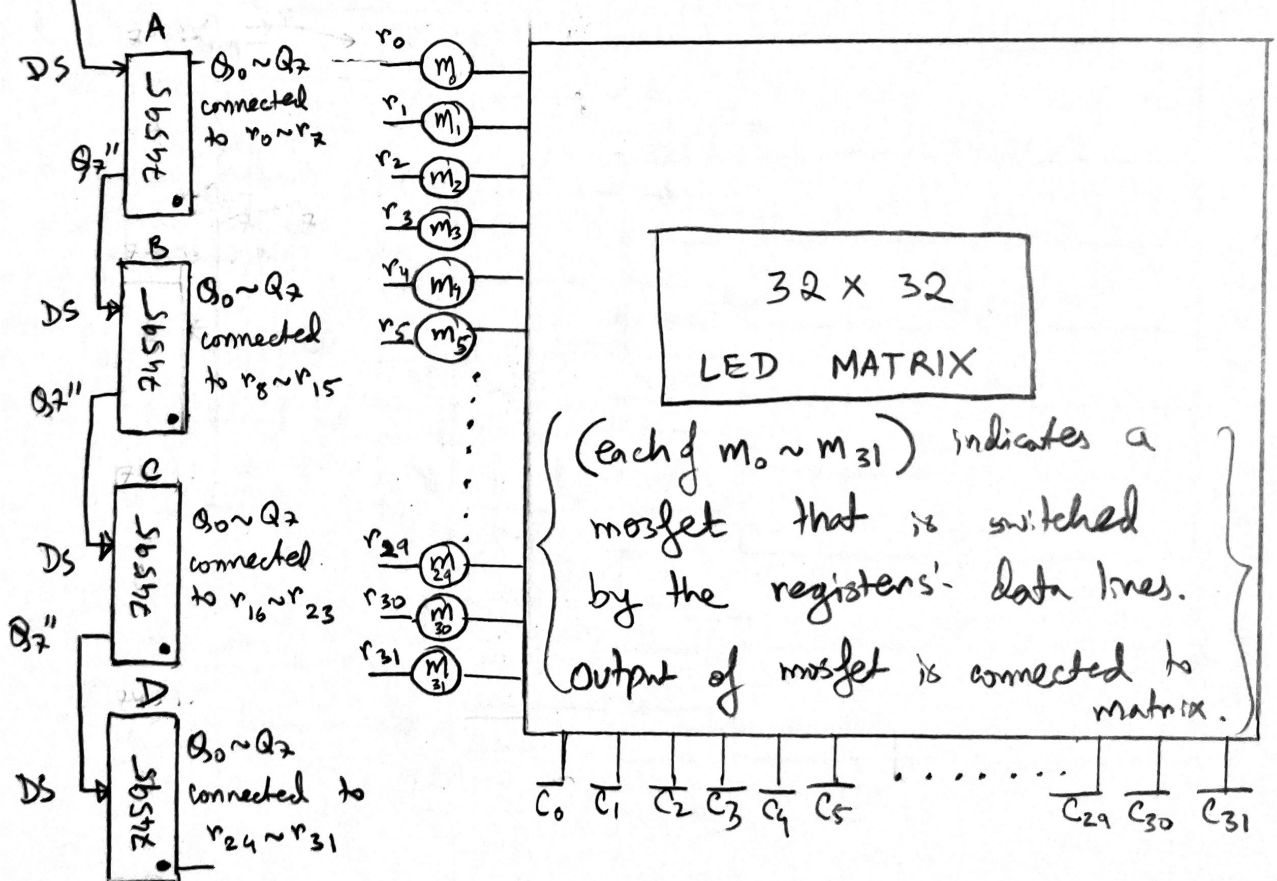
Pin	Label	Pin	Label
1	Q_1	16	V_{CC}
2	Q_2	15	Q_0
3	Q_3	14	DS (serial input)
4	Q_4	13	$\overline{OE}$ (output enable)
5	Q_5	12	ST_CP (storage register clock pulse)
6	Q_6	11	SH_CP (shift register clock pulse)
7	Q_7	10	MR (master reclean)
8	GND	9	Q_7'' (serial out)

μC (pin-PWM11)

A — 74595 — DS → $Q_0 \sim Q_7$ connected to $r_0 \sim r_7$ — Q_7''
B — 74595 — DS → $Q_0 \sim Q_7$ connected to $r_8 \sim r_{15}$ — Q_7''
C — 74595 — DS → $Q_0 \sim Q_7$ connected to $r_{16} \sim r_{23}$ — Q_7''
D — 74595 — DS → $Q_0 \sim Q_7$ connected to $r_{24} \sim r_{31}$

r_0 m_0, r_1 m_1, r_2 m_2, r_3 m_3, r_4 m_4, r_5 m_5 ... r_{29} m_{29}, r_{30} m_{30}, r_{31} m_{31}

32 × 32 LED MATRIX

(each of $m_0 \sim m_{31}$) indicates a mosfet that is switched by the registers' data lines. Output of mosfet is connected to matrix.

$\overline{C_0}$ $\overline{C_1}$ $\overline{C_2}$ $\overline{C_3}$ $\overline{C_4}$ $\overline{C_5}$ ...... $\overline{C_{29}}$ $\overline{C_{30}}$ $\overline{C_{31}}$

W: 74595 — $Q_0 \sim Q_7$ connects to $\overline{C_0} \sim \overline{C_7}$
X: 74595 — $Q_0 \sim Q_7$ connects to $\overline{C_8} \sim \overline{C_{15}}$
Y: 74595 — $Q_0 \sim Q_7$ connects to $\overline{C_{16}} \sim \overline{C_{23}}$
Z: 74595 — $Q_0 \sim Q_7$ connects to $\overline{C_{24}} \sim \overline{C_{31}}$

DS ... Q_7'' ... DS ... Q_7'' ... DS ... Q_7'' ... DS

μC (pin-PWM5)

fig: shift registers and LED matrix.

GND +5V

GND

Vcc(+5V)

μC

PWM pin 11
PWM pin 12

PWM pin 13

Vcc

Vcc | MR | Q_5
$\overline{OE}$ | Q_6
Q_7'' | Q_7

Vcc | Q_0
GND | Q_1
DS | Q_2
ST_CP | Q_3
SH_CP | Q_4

Vcc
GND
DS
ST_CP
SH_CP
MR
$\overline{OE}$
Q_7''

Q_0
Q_1
Q_2
Q_3
Q_4
Q_5
Q_6
Q_7

GND +5V

PWM pin 12

PWM pin 13
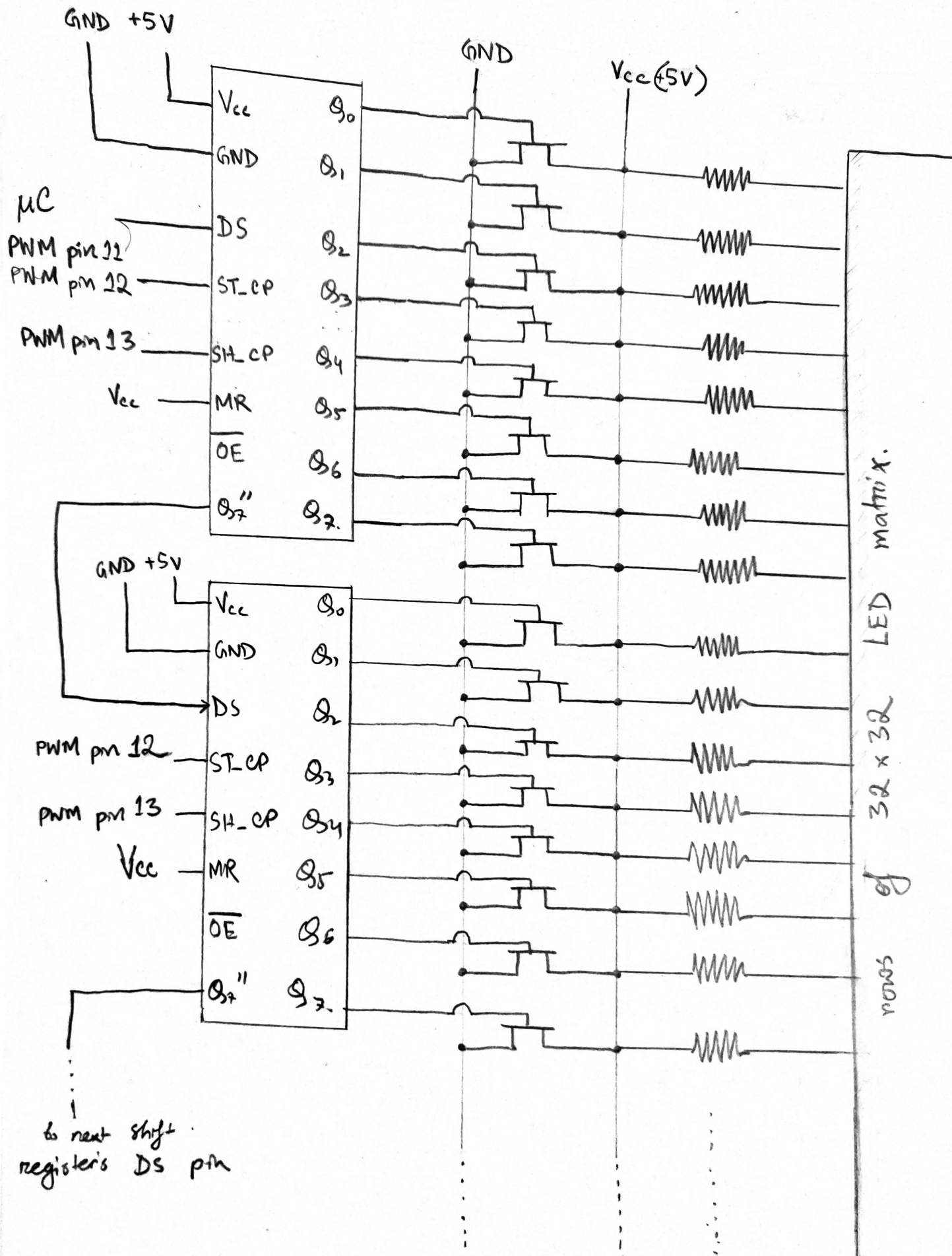
Vcc

to next shift
register's DS pin

32 × 32 LED matrix.

rows

fig. Shift register and MOSFET
connections.