PROJECT REPORT

Group - 7

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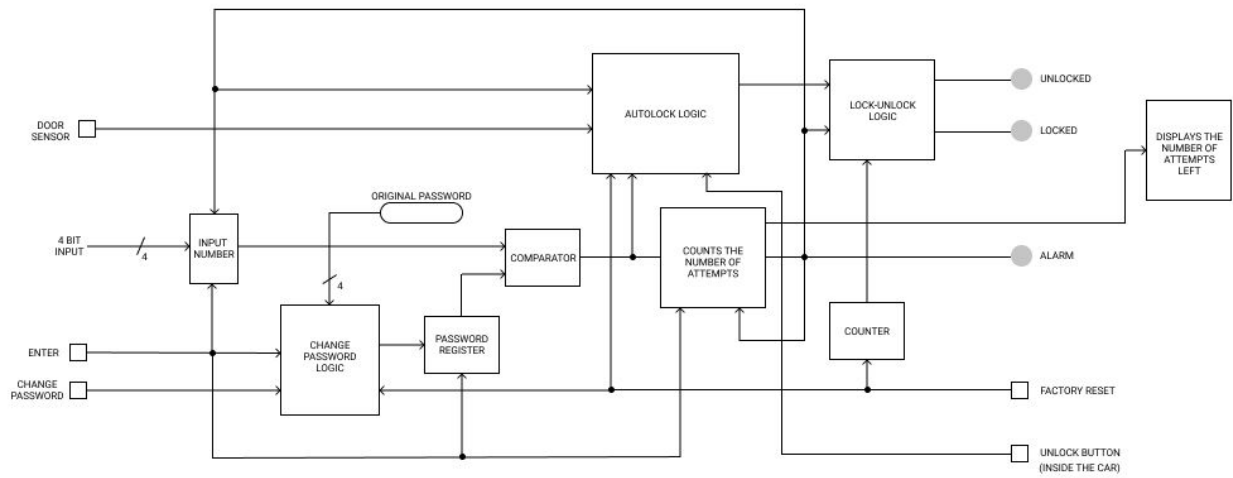
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Top Level Block diagram :

Assumptions in the circuit :

1. The original master password in the Register is already stored at the time of purchase of the car.

2. In a case of Factory Reset the company needs to reset the input register as well as disable the register from taking the inputs to avoid malfunction.

State Diagram :

Due to our implementation of the given design being asynchronous in nature , we did not require a state diagram.
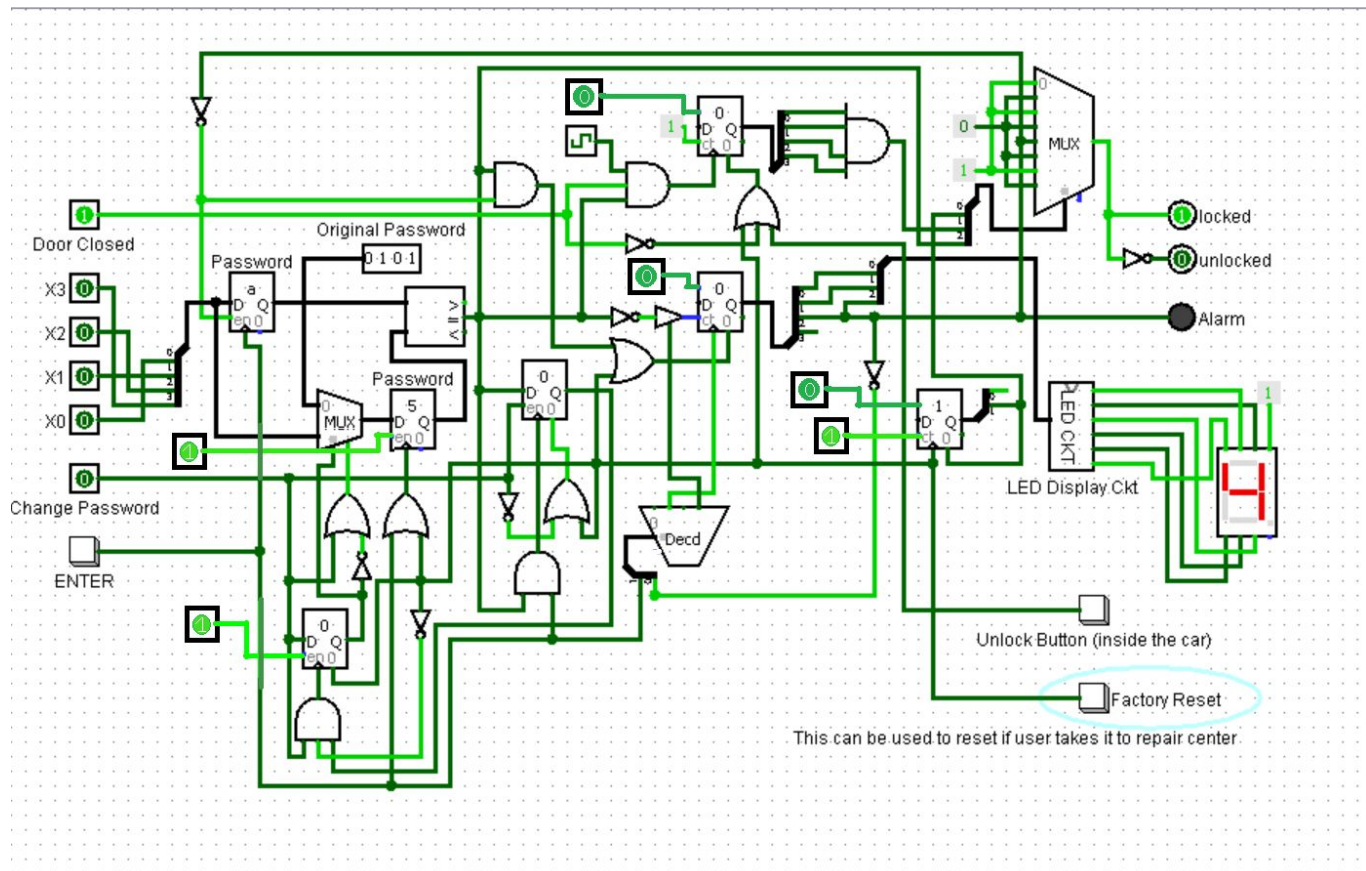
Pin Out Diagram :
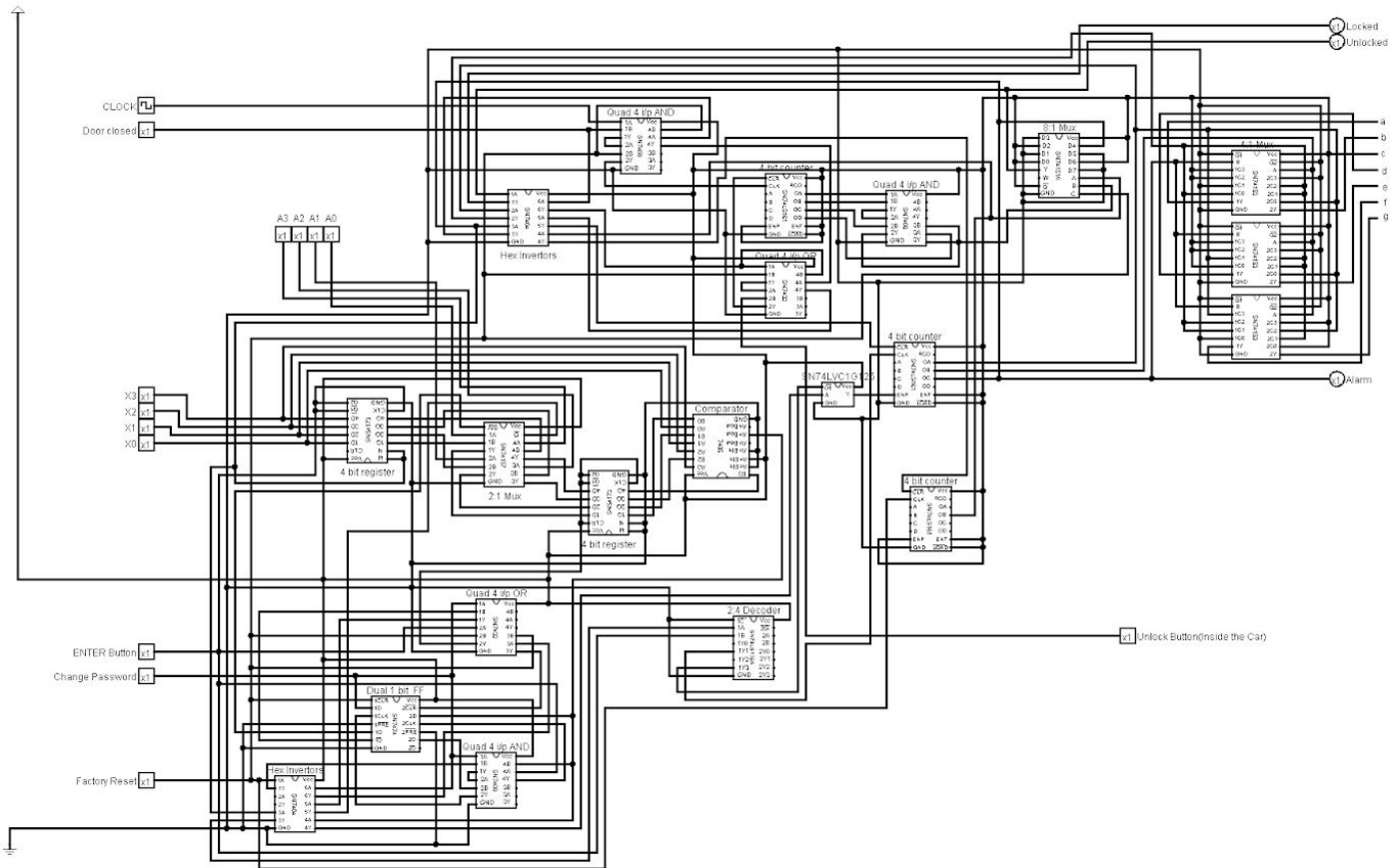
One Sample Input Output :

Sample Password: 0101 (5-Base10)

| INPUT	ALARM	LOCK
0000	0	1
0001	0	1
0010	0	1
0011	1	1

INPUT	ALARM	LOCK
0000	0	1
0101	0	0

Additional Functionalities Developed :

1. Factory Reset:

Once the alarm rings, the car cannot be opened again. The user can contact the car service center personnel. They can then factory reset the lock once which enables the mux and the number of attempts are also restored back to 4 and the original password id again stored into the Password register.

2. AutoLock (Additional Feature):

Once the user enters the correct password the auto-lock feature is enabled which starts counting on every clock pulse of frequency of 0.25Hz till the counter stores f(Base16-Hexadecimal) or 1111(Base2-Binary). Once the counter reaches f,this implies that a time span of 1 minute has passed and thus the feature auto-locks the car.
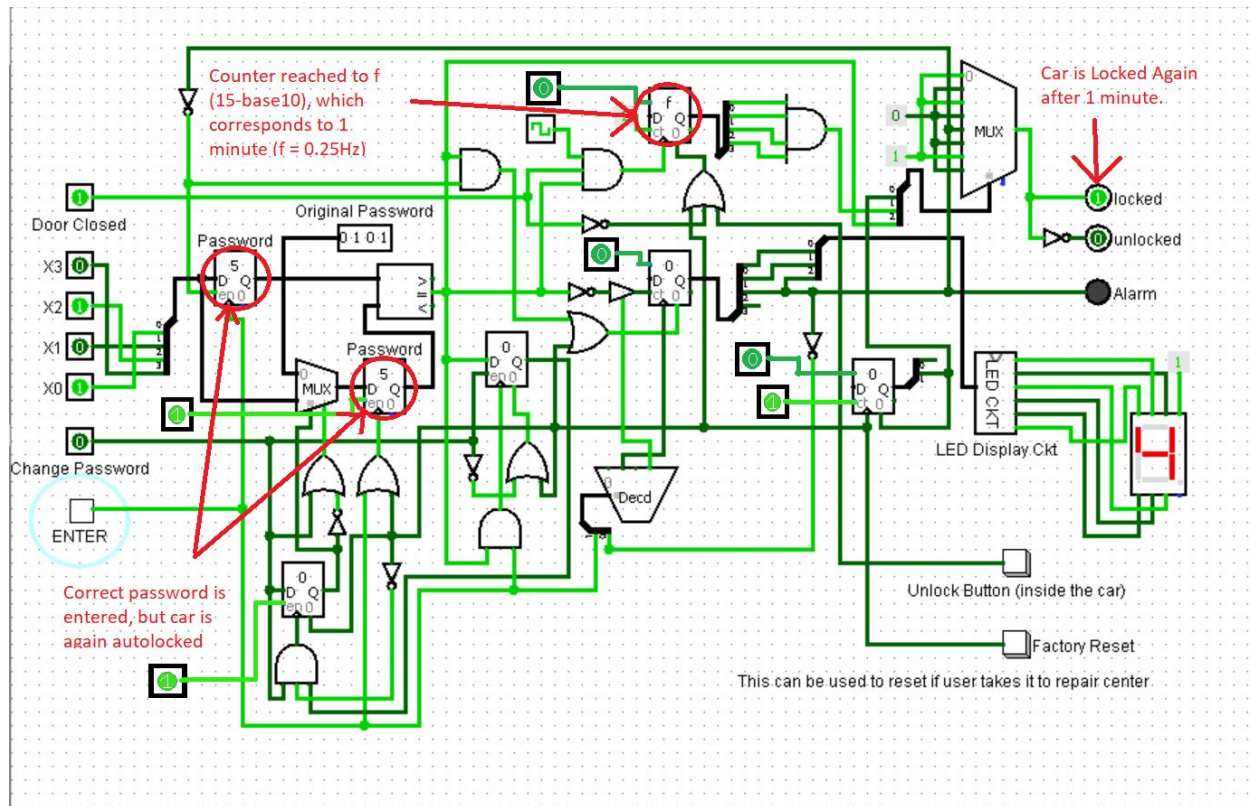
3. Change Password (Additional Feature):

The Change Password Pin is activated so that the user may enter the correct password and then change the password as per his convenience.The Initial Password stored in the register shown in the circuit is 5.
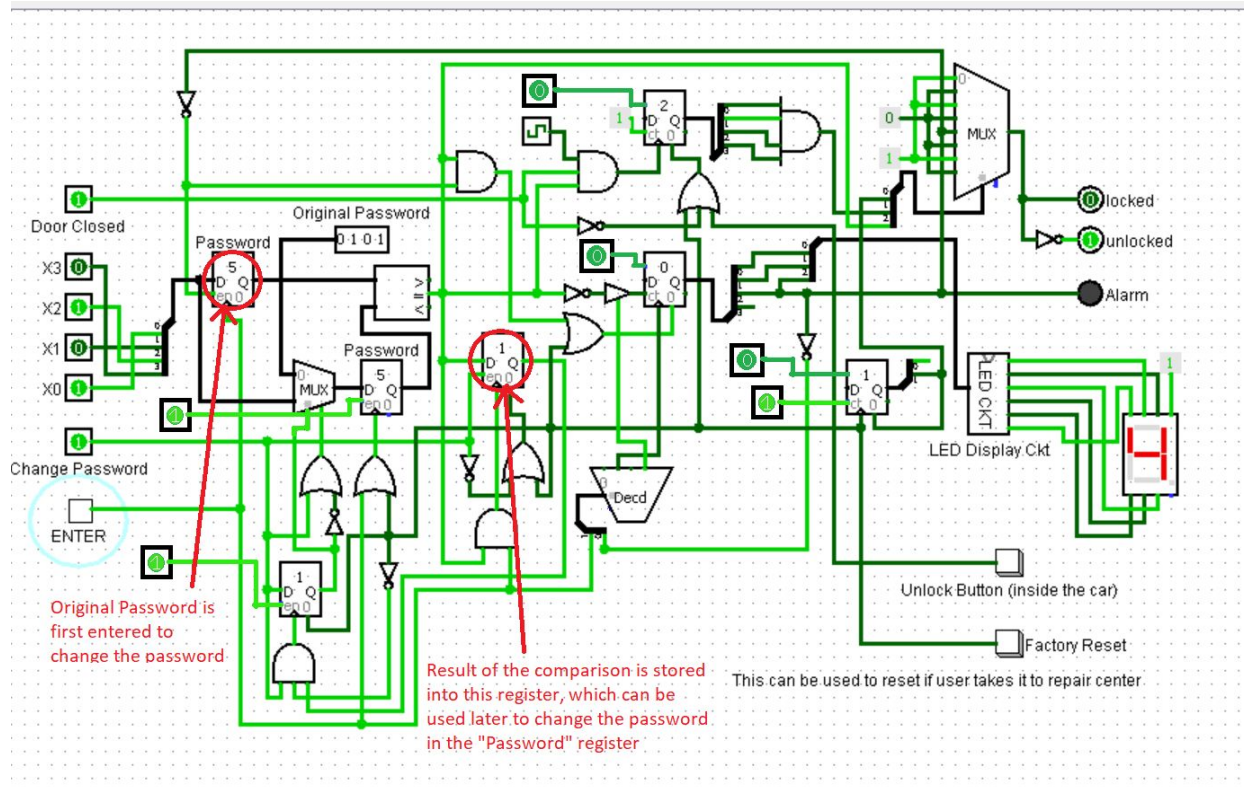

3. (contd) Password Changed:

After the correct password is entered the user enters the new password and presses enter so that the new password gets stored inside the register. The new password stored in the register is b(1011-base2).
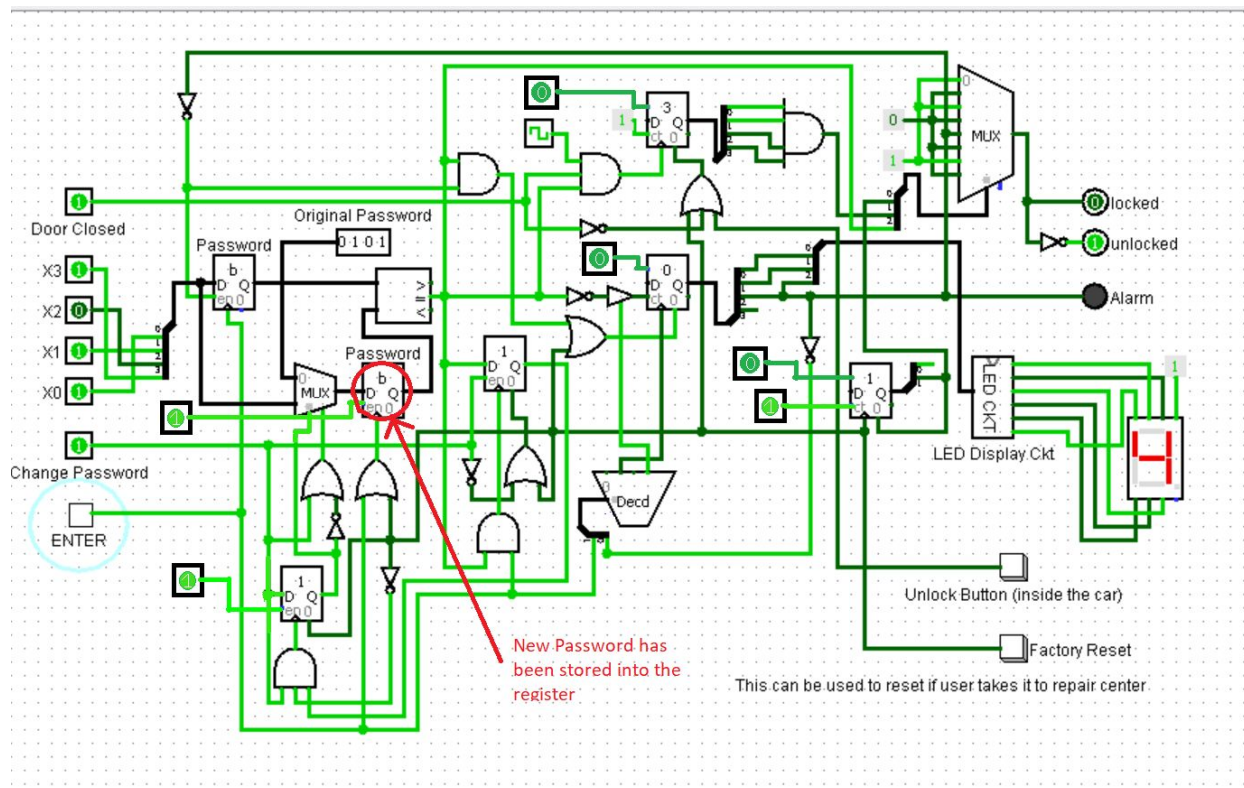
4. First Factory Reset:

Once the alarm rings the user can contact the service centre personnel.They can then factory reset the lock once which enables the mux and causes the select line of the mux to carry a logical LOW -> '0'.At the same time the register carrying the comparison is reset. All the registers/counters are reset except for the register storing the password.
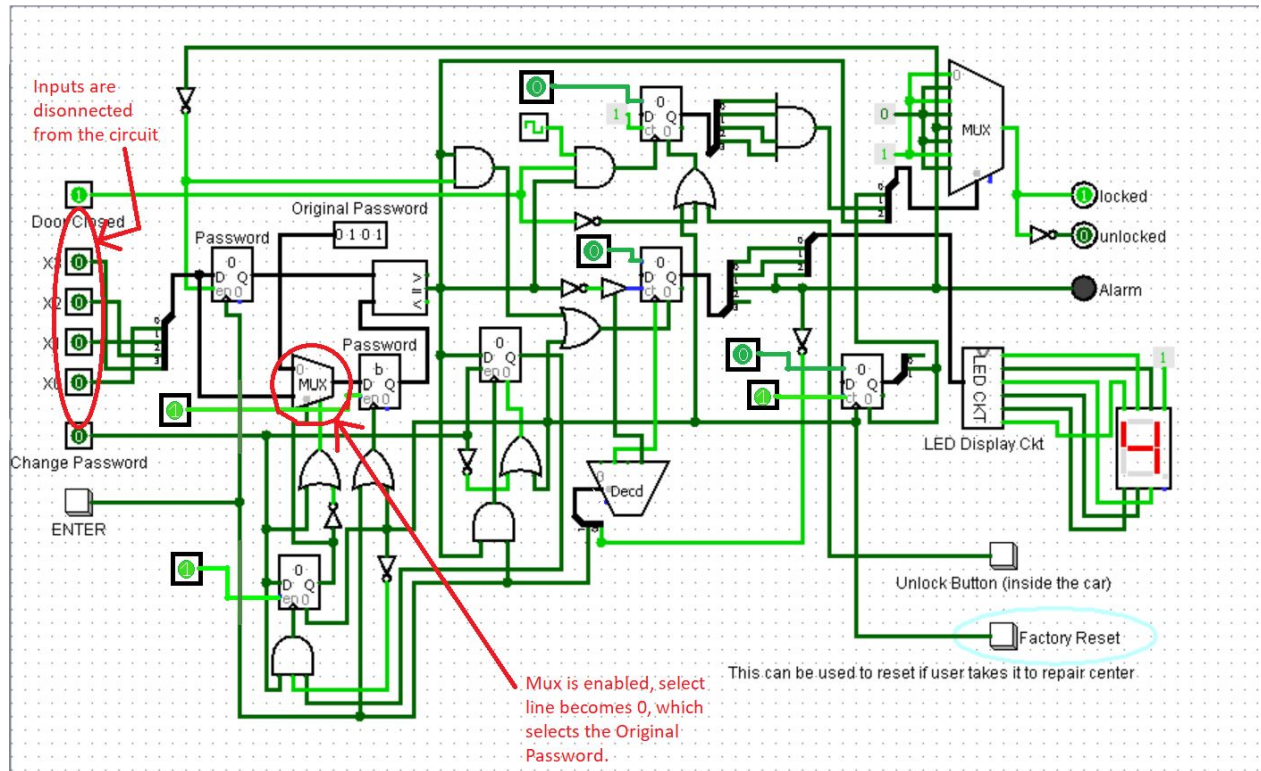
4. (Contd) Second Factory Reset:

At the second factory reset the factory reset acts like a clock and loads the register with the original master password which the user will have in his/her car documents.
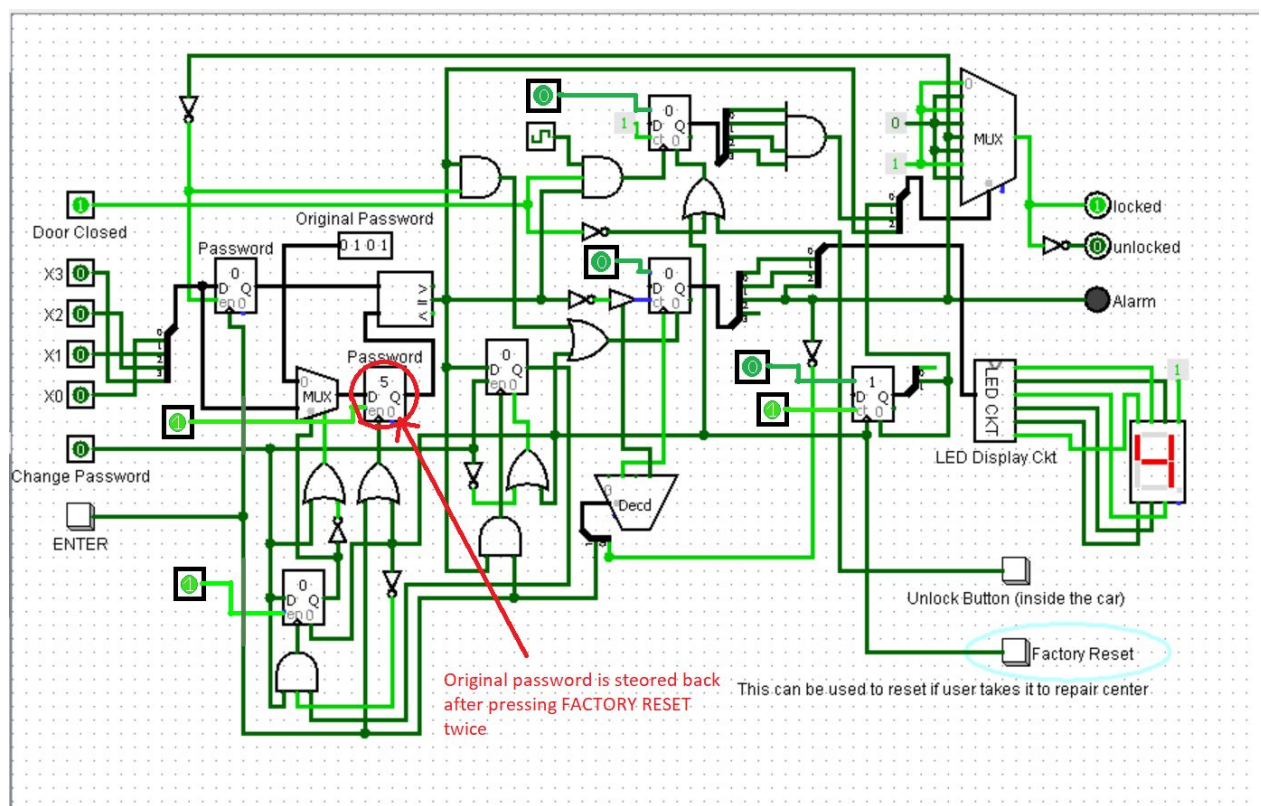
5. LED 7 Segment Display:

We have used the display to show the user the number of attempts left for him to input the correct password.The 7 segment display is reset to 4, everytime the user inputs the correct password indicating that he has 4 chances to input the correct password.The alarm rings as soon as the display indicates 0 which means the user has exhausted all of his attempts to enter the correct password.

[In implementing these additional features we have taken into account many combinations and cases which the user may face and have prioritized car safety and password secrecy which differentiates us from the rest of the submissions.]

Bill of materials :

S.No	IC Number	Name of Component	Number of Components
1	SN7404	Hex Inverters	2
2	SN7474	Dual D-type Positive-Edge Trigger Flip-Flop	1
3	SN7408	Quadruple 2-Input Positive -And Gates	3
4	SN74153	Dual 4-Line To 1-Line Data Selectors/ Multiplexers	3
5	SN74161	Synchronous 4-Bit Counters With Asynchronous Clear	3
6	SN74151A	8-Line To 1-Line Data Selectors/ Multiplexers	1
7	SN7432	Quadruple 2-Input Positive-Or Gate	2
8	SN74S139A	Dual 2-Line To 4-Line Decoders	1
9	SN74F157A	Quadruple 2-Line To 1-Line Data Multiplexers	1
10	SN74LVC1G125	Single Bus Buffer Gate	1
11	SN7485	4-bit Magnitude Comparators	1
12	SN74173	4-bit D-type registers	1
13		Alarm	1
14		Button	3

<u>Appendix :</u>

- **HEX INVERTERS:** SN7404 (2)
  https://www.ti.com/lit/ds/symlink/sn74ls04.pdf

- **DUAL D-TYPE POSITIVE-EDGE TRIGGER FLIP-FLOP:** SN7474 (1)
  https://www.ti.com/lit/ds/symlink/sn74ls74a.pdf?ts=1605727782006&ref_url=https%253A%252F%

- **QUADRUPLE 2-INPUT POSITIVE-AND GATES:** SN7408 (3)
  https://www.ti.com/lit/ds/sdls033/sdls033.pdf?ts=1605674395265&ref_url=https%253A%252F%252Fwww.google.com%252F

- **DUAL 4-LINE TO 1-LINE DATA SELECTORS/ MULTIPLEXERS:** SN74153 (3)
  https://www.ti.com/lit/ds/symlink/sn74ls153.pdf

- **SYNCHRONOUS 4-BIT COUNTERS WITH ASYNCHRONOUS CLEAR:** SN74161 (3)
  https://www.ti.com/lit/ds/symlink/sn54ls161a-sp.pdf?ts=1605704449140&ref_url=https%253A%252F%252Fwww.google.com%252F

- **8-LINE To 1-LINE DATA SELECTORS/ MULTIPLEXERS:** SN74151A (1)
  https://www.ti.com/lit/ds/symlink/sn74ls151.pdf?ts=1605692261816&ref_url=https%253A%252F%252Fwww.ti.com%252Fproduct%252FSN74LS151
  252Fwww.google.com%252F

- **QUADRUPLE 2-INPUT POSITIVE-OR GATES:** SN7432 (2)
  https://www.ti.com/lit/ds/symlink/sn54ls32-sp.pdf?ts=1605729232898&ref_url=https%253A%252F%252Fwww.google.com%252F

- **DUAL 2-LINE TO 4-LINE DECODERS:** SN74S139A (1)
  https://www.ti.com/lit/ds/sdls013a/sdls013a.pdf?ts=1605704254369&ref_url=https%253A%252F%252Fwww.google.com%252F

- **QUADRUPLE 2-LINE TO 1-LINE DATA MULTIPLEXERS:** SN74F157A (1)
  https://www.ti.com/lit/ds/symlink/sn74f157a.pdf?ts=1605729989738&ref_url=https%253A%252F%252Fwww.google.com%252F

- **SINGLE BUS BUFFER GATE:** SN74LVC1G125 (1)
  https://www.ti.com/lit/ds/symlink/sn74lvc1g125.pdf?ts=1605682895686

- **4-BIT D-TYPE REGISTERS:** SN54173
  https://www.ti.com/lit/ds/sdls067a/sdls067a.pdf

- **4-BIT MAGNITUDE COMPARATORS:** SN5485
  https://www.ti.com/lit/ds/symlink/sn74ls85.pdf?ts=1605742715395&ref_url=https%253A%252F%252Fen.m.wikipedia.org%252F

- **BUTTON:** 3

- **ALARM:** 1