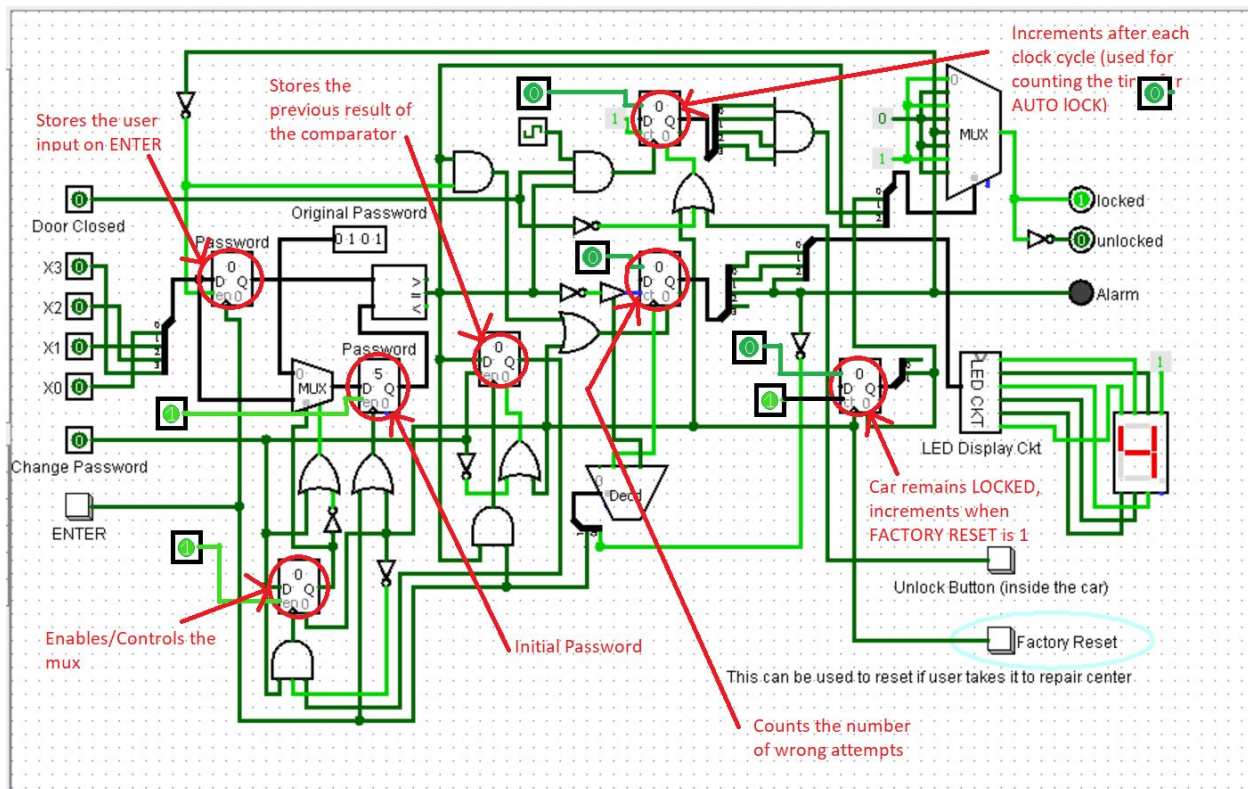# Output Summary

1. Initial Condition:

The whole circuit is in the reset state with the original password stored in the register named "Password" (which has been taken 5 as an example). Initially for every user, the number of attempts are 4.
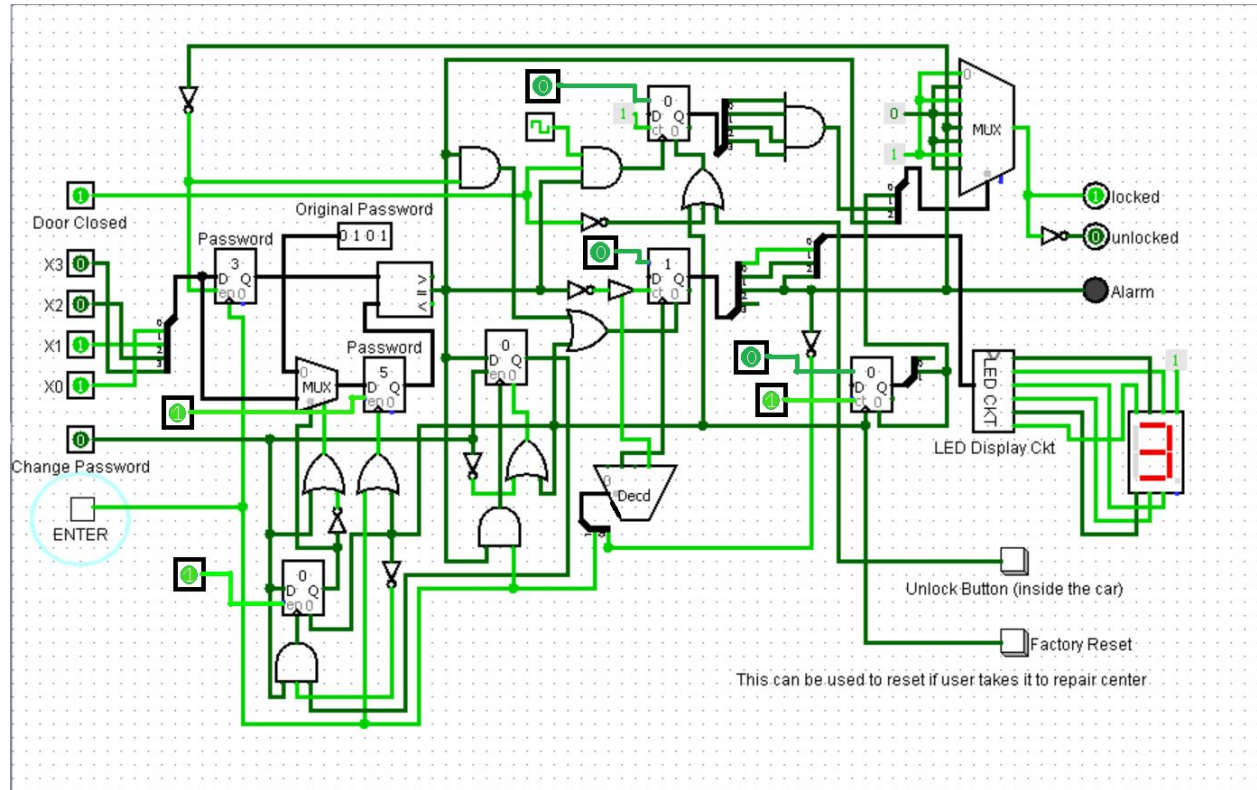

INPUT	ALARM	LOCK
0000	0	1

[Note: User hasn't entered any input.This is just the initial condition]

2. When User Enters Wrong Password:

If the user enters the wrong input combination for the password, the circuit decreases the number of attempts by 1. And this count is further reduced if the wrong password combination is imputed again.
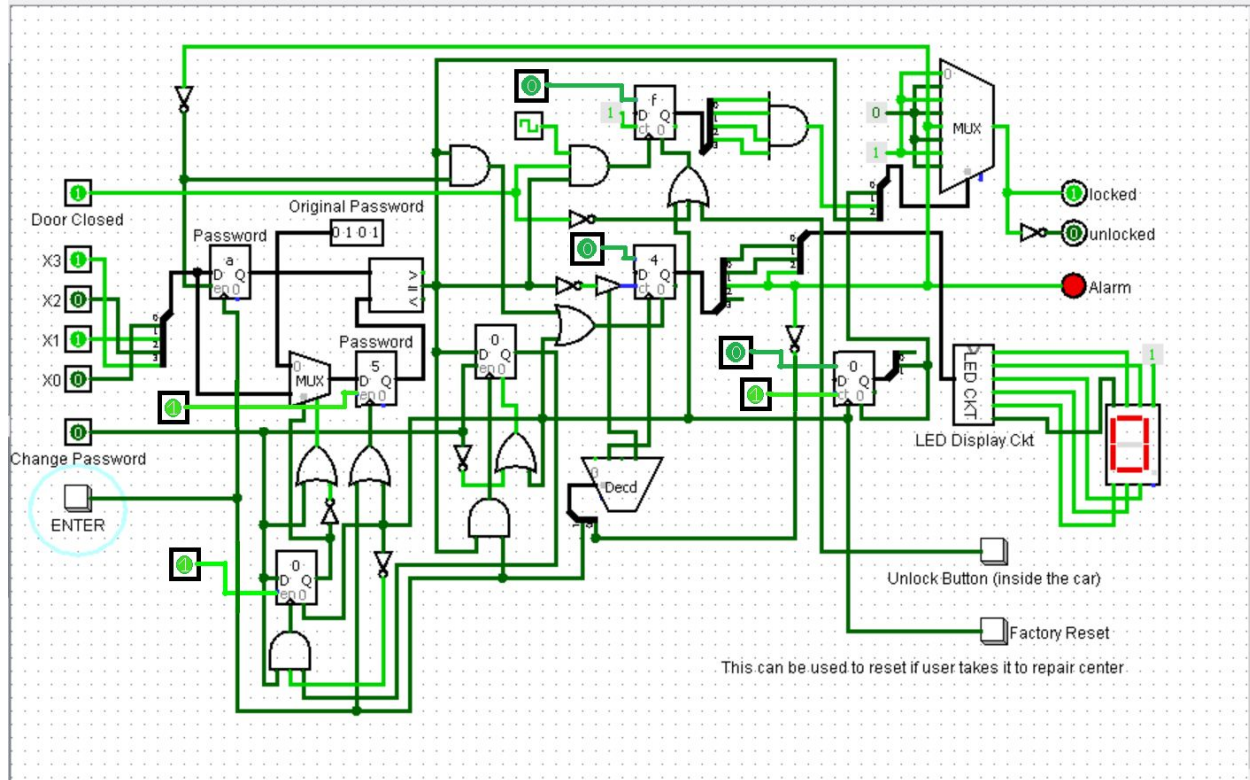

INPUT	ALARM	LOCK
0011	0	1

[Note: User has entered the input 0011, correct password is 0101]

3. Alarm Rings when Attempts get Exhausted:

If the user enters the wrong password for more than three times, the alarm of the car starts glowing indicating that the car is locked forever and cannot be opened again unless it is factory reset.

INPUT	ALARM	LOCK
0011	0	1
0110	0	1
1101	0	1
1100	1	1

4. 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.
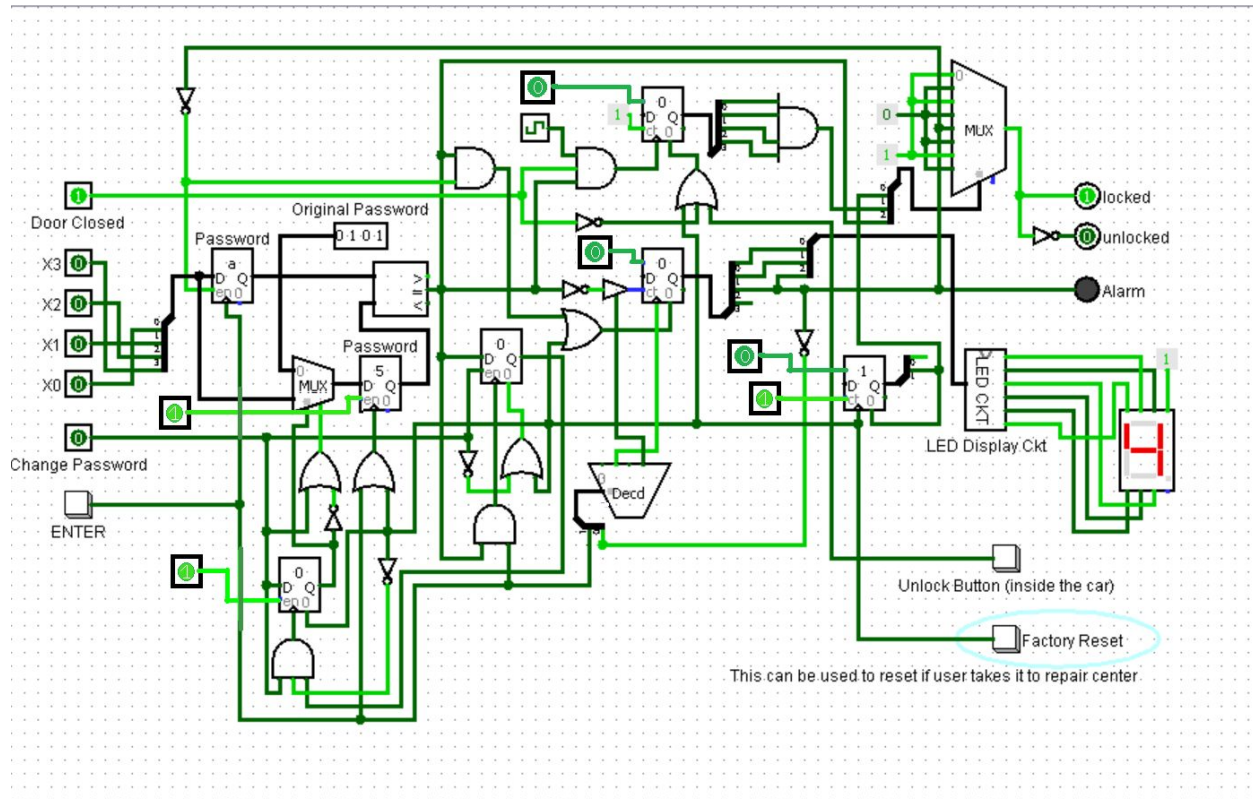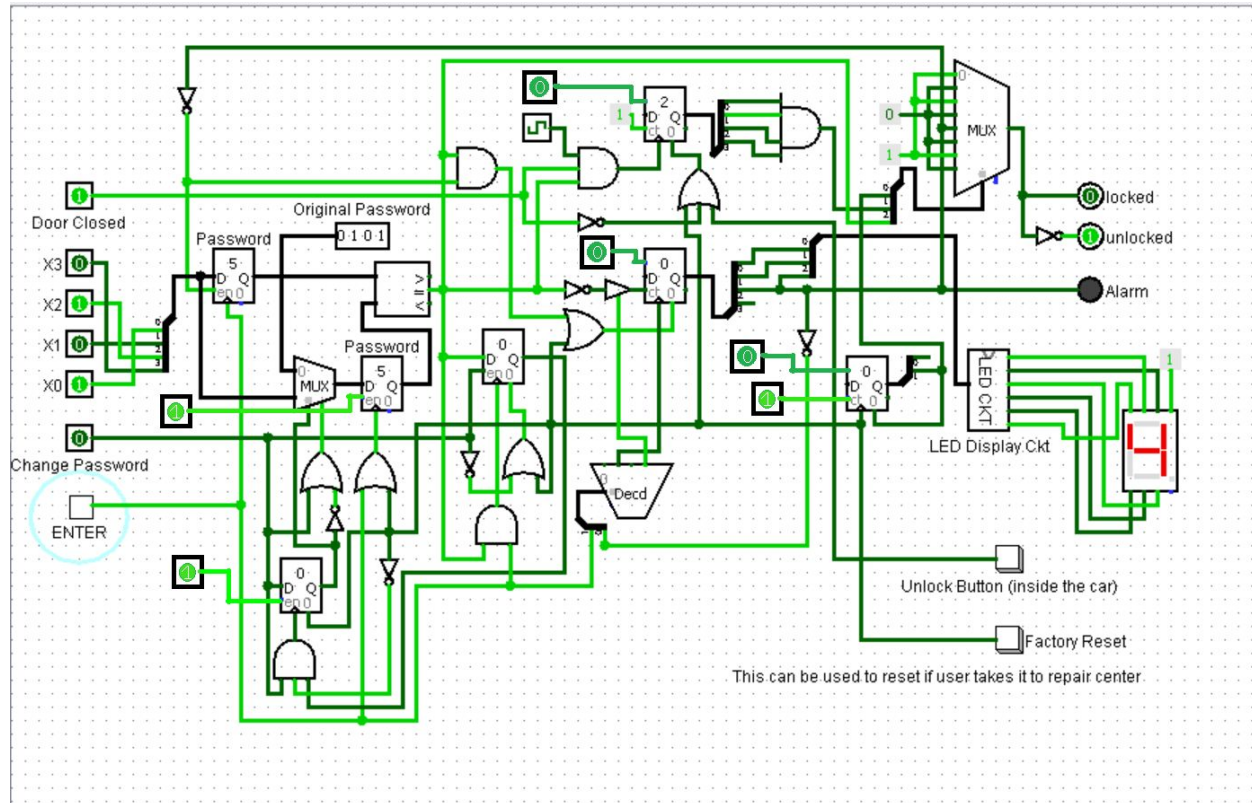

INPUT	ALARM	LOCK
0000	0	1

[Note:Input disconnected thus 0000 is the input]
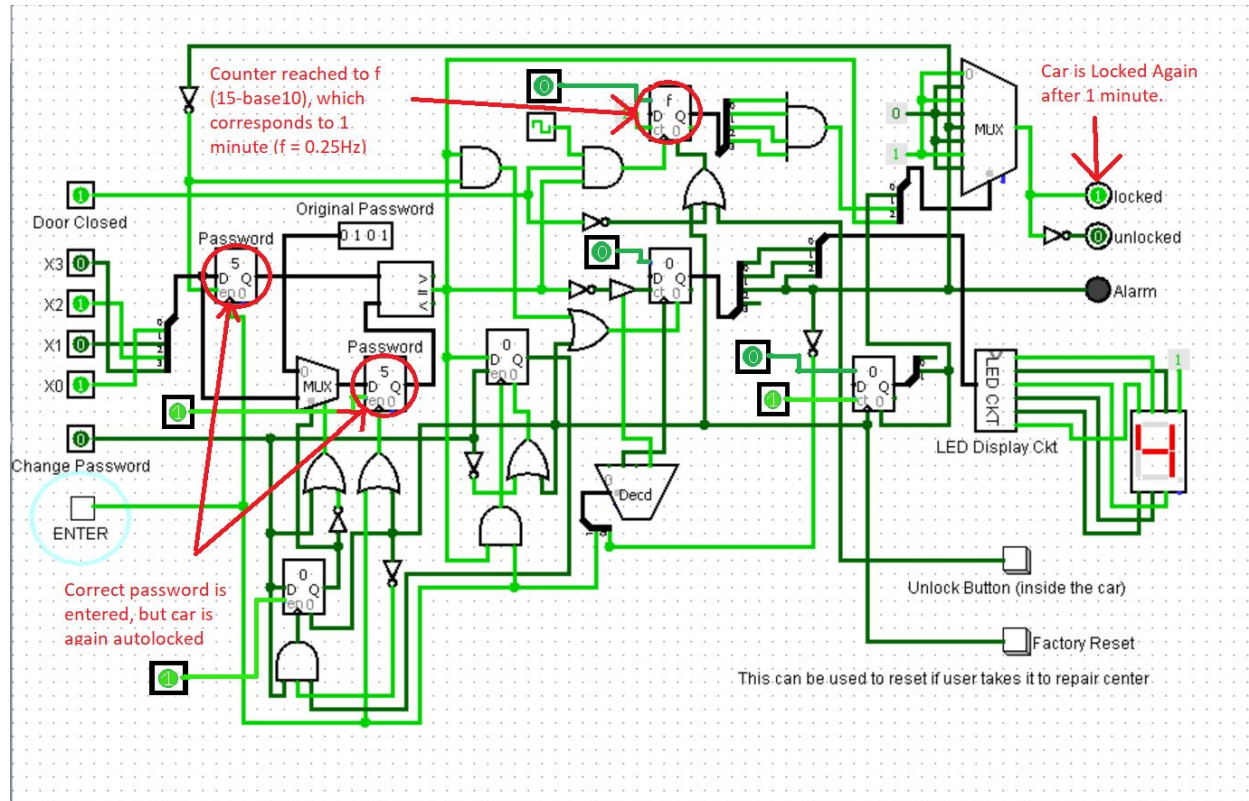
5. Correct Password Entered:

If the user enters the correct combination of the password, the car is unlocked and the alarm is not raised. However, as he/she has unlocked the car, the number of attempts are again restored back to 4.

| INPUT	ALARM	LOCK
0101	0	0

6. 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.

7. 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.
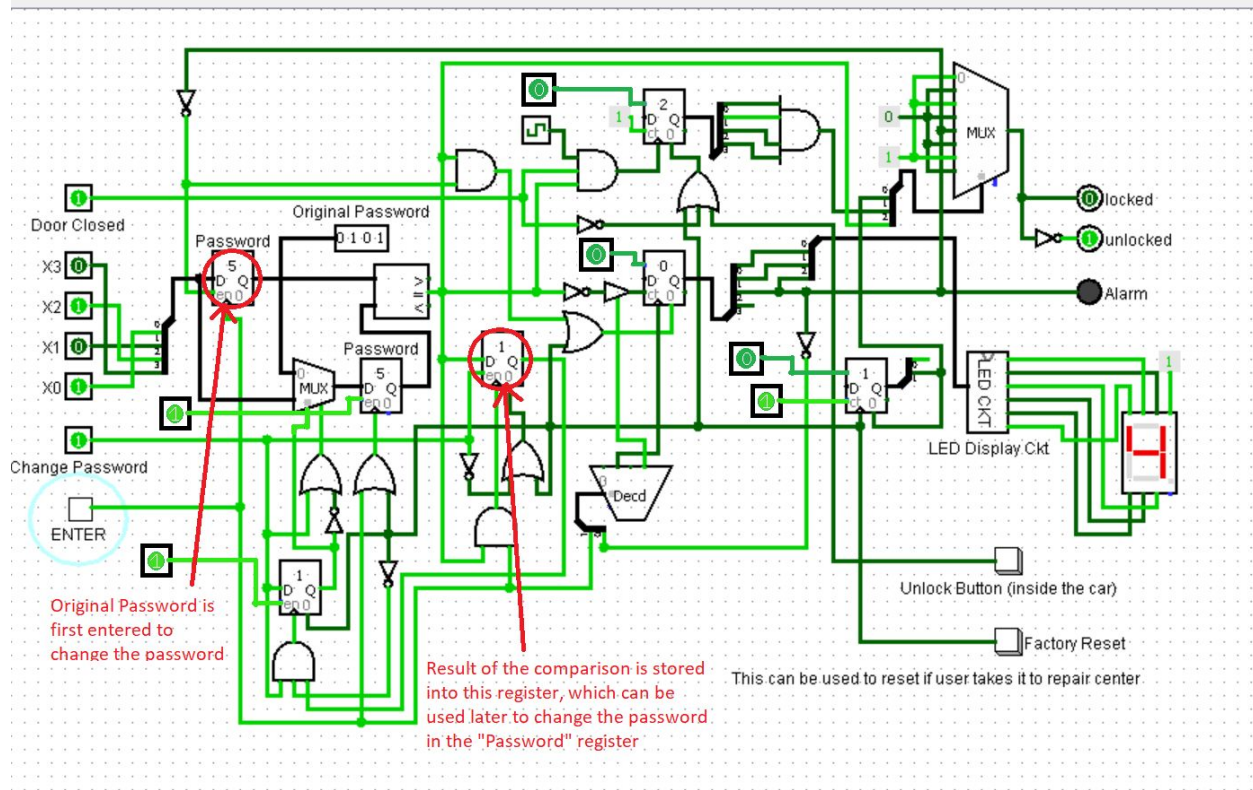
8. Password Changed:

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).

New Password has been stored into the register
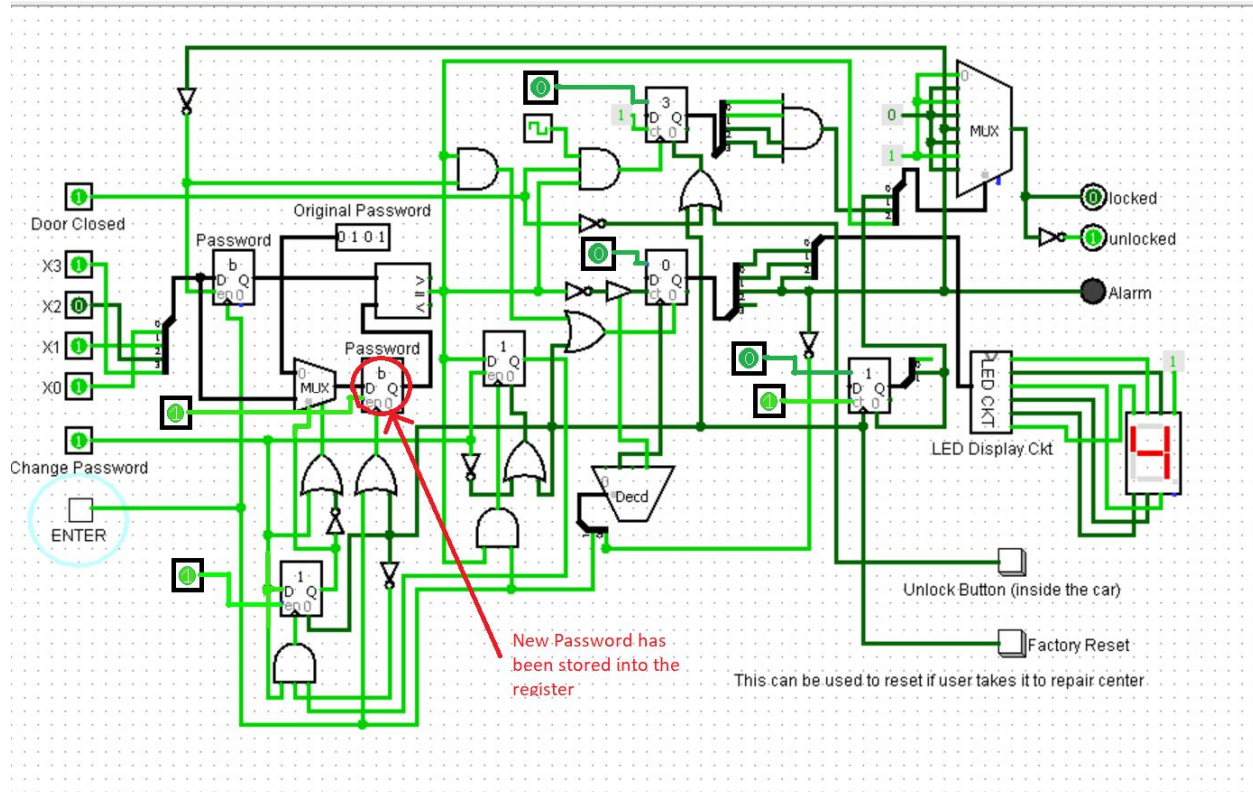
9. Original Password Not Working:

Now the user disables the change password pin and tries to enter the original master password stored before. It is found that the original password doesn't unlock the digital car lock but decreases the attempts left for the user to unlock the car.
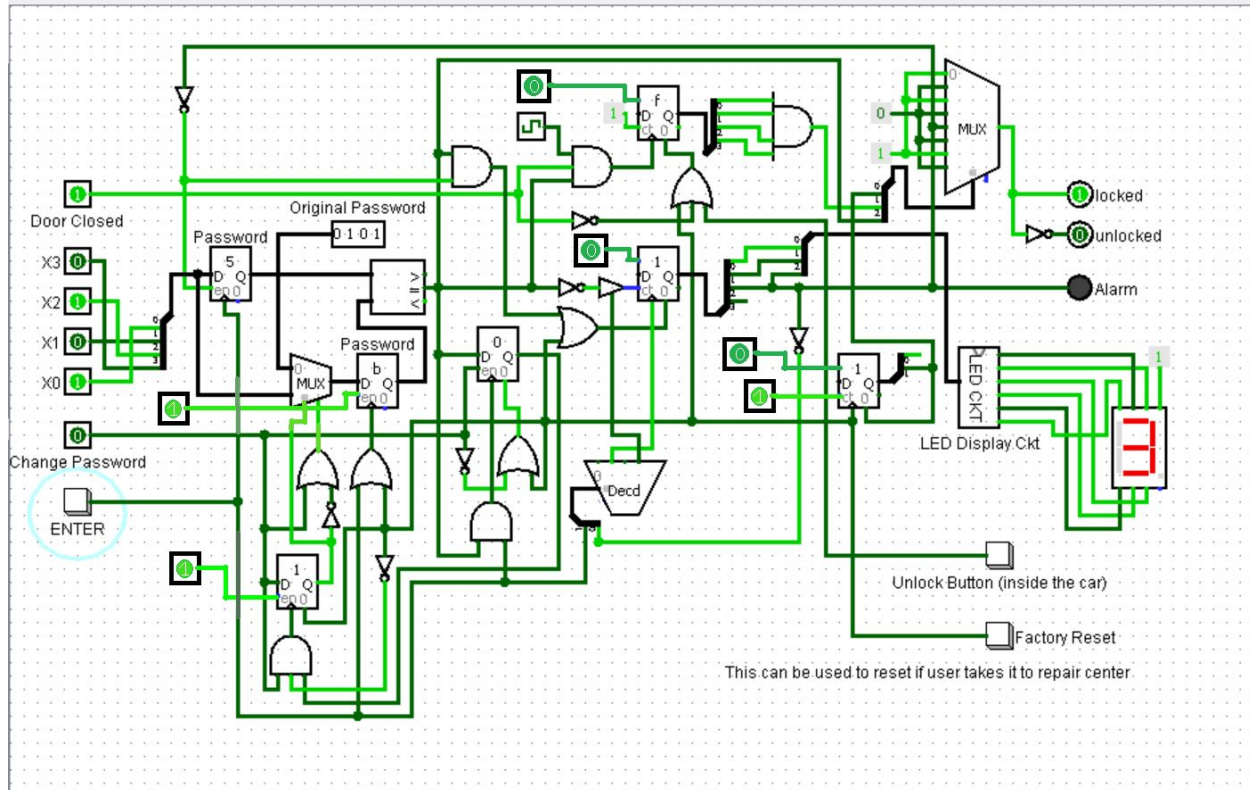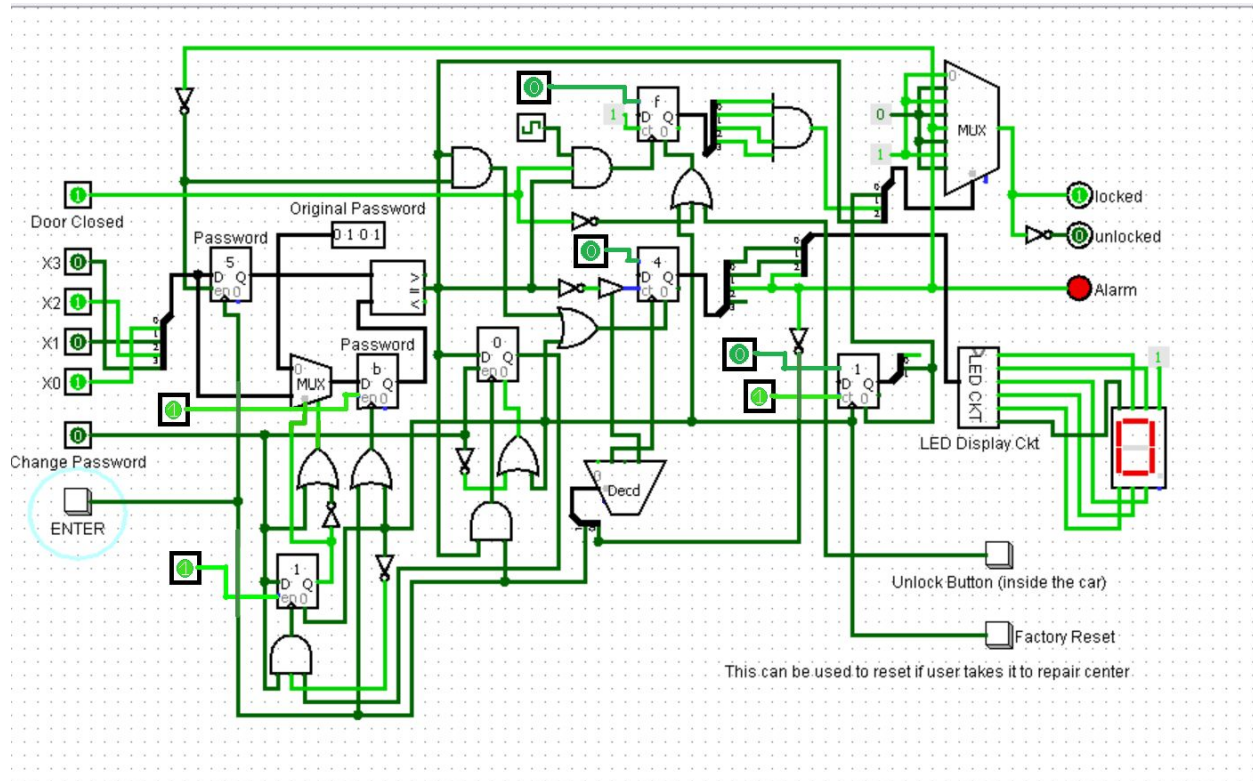

INPUT	ALARM	LOCK
0101	0	1

[Note: User has entered original password (0101), but the new password is 1011]

## 10. Alarm Rings on Inputting Original Password:

If the user attempts the wrong password more than 3 times then the alarm starts ringing. Thus, the user has exhausted all his attempts to unlock the car.

INPUT	ALARM	LOCK
0101	0	1
0101	0	1
0101	0	1
0101	1	1

11. 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.
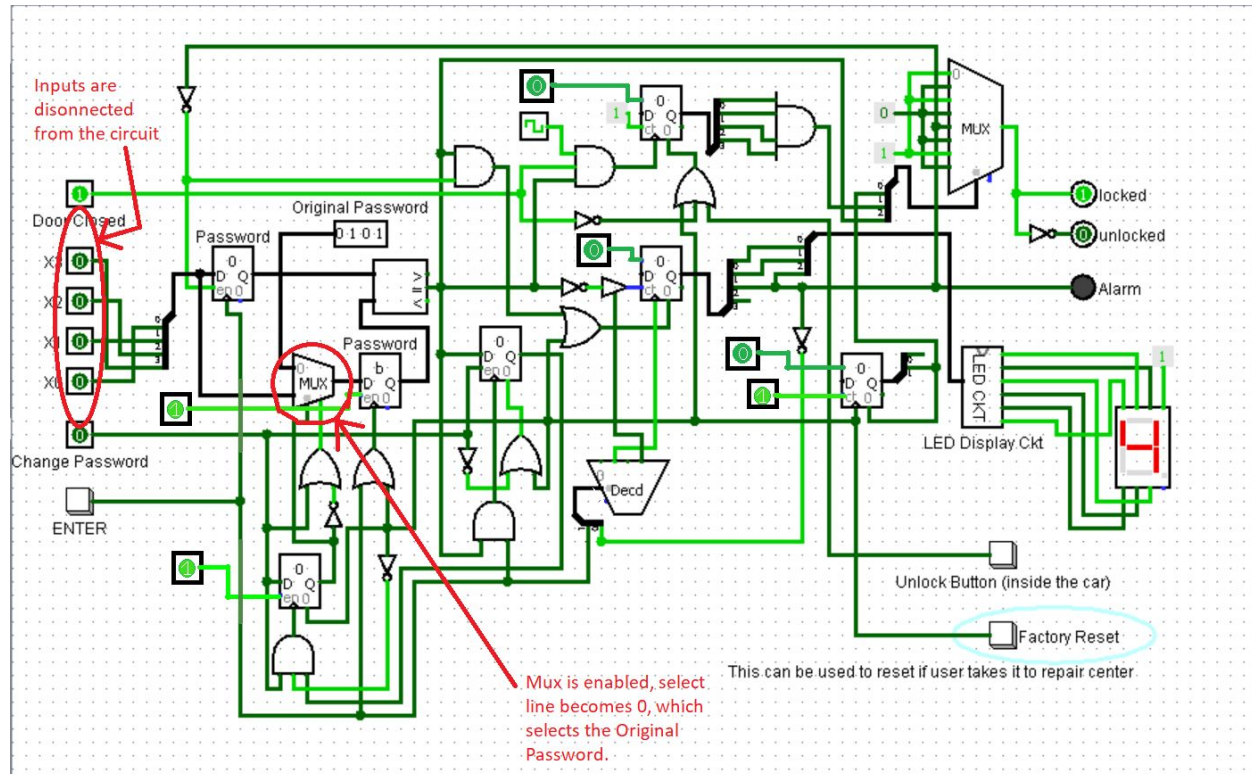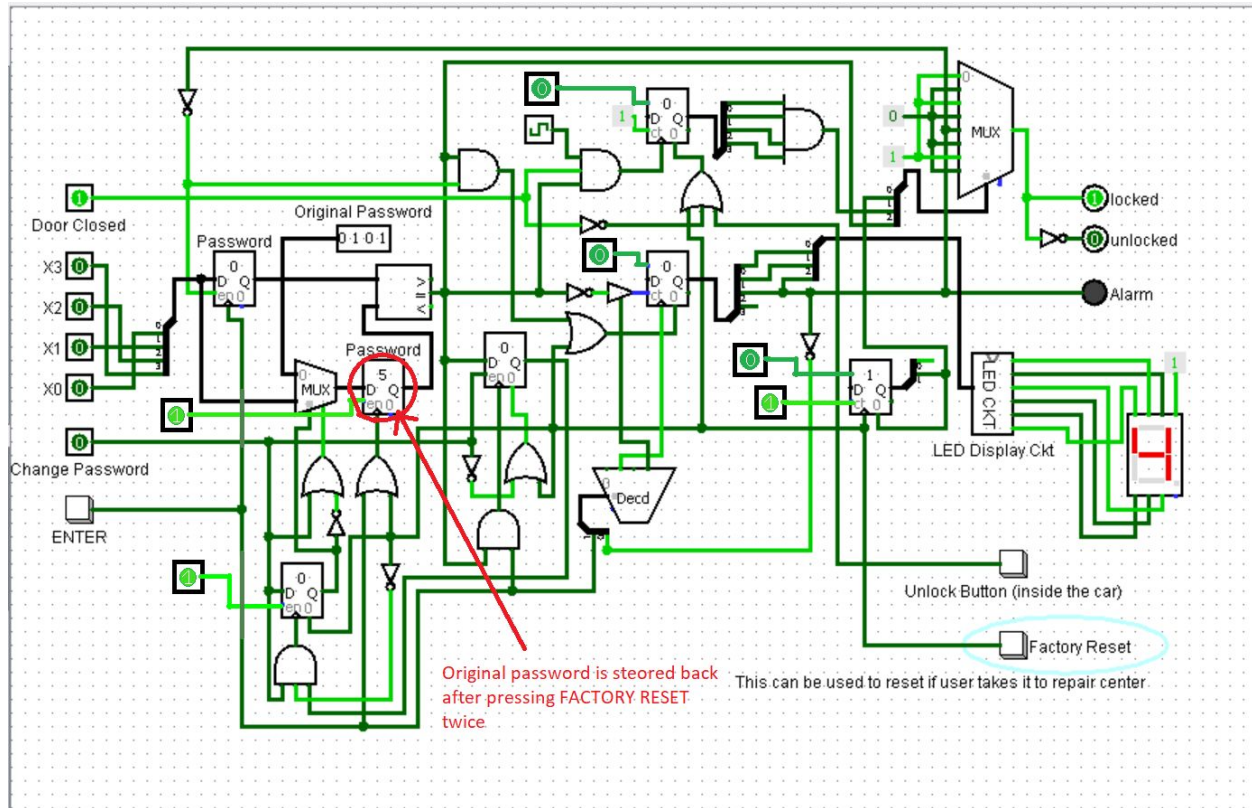

INPUT	ALARM	LOCK
0000	0	1

[Note:Input disconnected thus 0000 is the input, password here is still 1011]

12. 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.

Original password is steored back after pressing FACTORY RESET twice

This can be used to reset if user takes it to repair center.

INPUT	ALARM	LOCK
0000	0	1

[Note:Input disconnected thus 0000 is the input, password here is restored back to 0101]