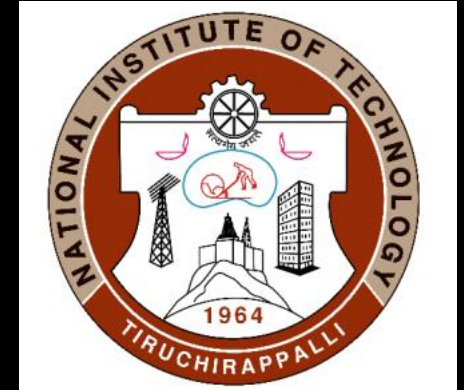


**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI – 620 015**

DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING

ECLR13 MICROPROCESSORS AND MICROCONTROLLERS
MINI PROJECT



Password based door lock system using 8051 microcontroller

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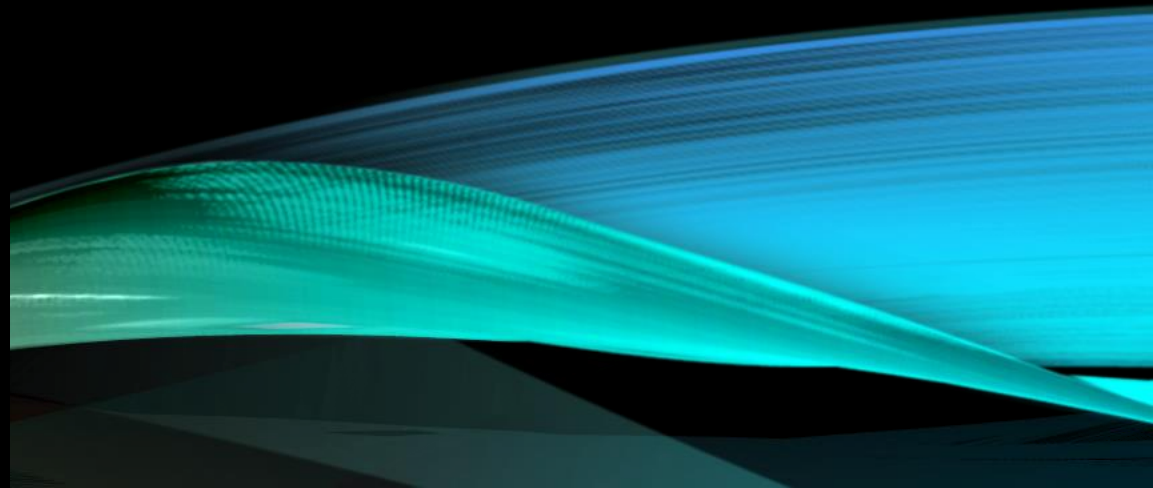
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INTRODUCTION

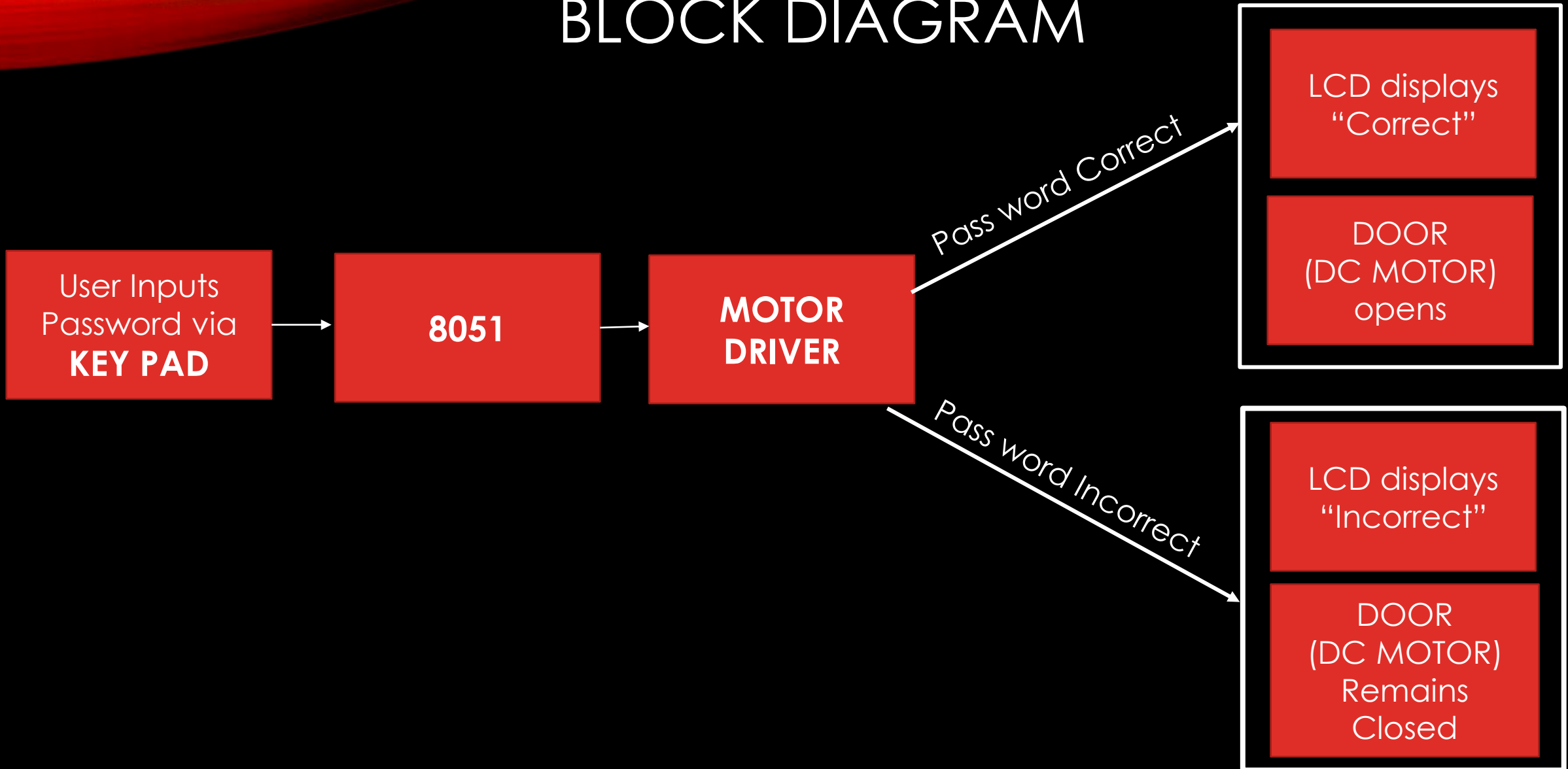
- Our project is a digital password-based door lock. The lock works by verifying the digitally inputted password with the predefined passcode. The digital door lock is operated by the help of 8051 microcontroller.
- In this project, we have designed the digital door lock using an 8051 microcontroller, a keypad, and a DC motor.
- The system collects 5 digit user input, compares the user input with the preset password inside the program, and if the user input and stored password matches, access will be granted



IMAGE OF A PASSWORD
BASED DOOR LOCK



BLOCK DIAGRAM



COMPONENTS OF CIRCUIT DIAGRAM

- **4*4 Keypad:** It is used to input the password which will be read and compared with the predefined password.
- **80C51:** It is used to send commands to all components of the circuit to execute the required functions.
- **20*4 LCD Module:** It is used to display the entered password and the status message of whether the password is correct.
- **MOTOR DRIVER(L293):** It controls the motor to be either on or off based on the result of comparing the entered and defined password.
- **DC MOTOR:** It acts as a substitute for the door in this circuit. The 'ON' state representing an open door and the 'OFF' state representing a closed door.

WORKING

- When the program is initialized, the LCD will prompt the user to enter the password through a 4*4 Keypad.
- After the user enters the 5 digit password, the LCD will display it on the screen and the program reads the user input and compares it with the predefined password.
- All the functions are executed in 80C51. If the entered password is correct then the status message "CORRECT" is displayed on a 20X4 LCD Module, and then using a Motor DRIVER(L293) the DC motor is made to rotate indicating that the door is unlocked.
- If the entered password is incorrect then the status message "INCORRECT" is displayed on a 20X4 LCD Module, the DC motor stays in its "OFF" state indicating that the door is locked and the LCD will prompt the user for new password.

CODE

There are 6 main subroutines we have used in this program.They are:

- MAIN: A base function where all the other subroutines are called to get executed in order.
- LCD_INIT : Commands in this subroutine are made for the initial setup of the LCD Module.
- SEND_DAT: sends the entire string character by character to the LCD Module.
- READ_KEYPRESS : is the subroutine to collect user inputs.
- KEY_SCAN : is the subroutine to identify a character entered by the user.
- CHECK_PASSWORD : is the subroutine to compare user input password.

MAIN

- All the function calls are made in this subroutine. They are in order:
- First, the LCD_INIT function is called.
- Next the string stored in MYDATA is moved to DPTR.
- Next, SEND_DAT is called which send the entire string character by character.
- Next DELAY function is called.
- Followed by READ_KEYPRESS function, which reads the user input.
- Next DELAY function is called again.
- CHECK_PASSWORD is called finally to compare the user input with the predefined password.

```
MAIN:  
ACALL LCD_INIT  
MOV DPTR, #MYDATA  
ACALL SEND_DAT  
ACALL DELAY  
ACALL READ_KEYPRESS  
ACALL DELAY  
ACALL CHECK_PASSWORD
```

LCD INIT

LCD_INIT:- Commands in this subroutine are made for the initial setup of the LCD Module.

Commands such as 8H,0EH,01,06,80H,0 are called in this subroutine to initialise the LCD.

```

LCD_INIT:MOV DPTR,#MYCOM
C1:CLR A
MOVC A,@A+DPTR
ACALL COMNVRT
ACALL DELAY
INC DPTR
JZ DAT
SJMP C1
DAT:RET

```

SEND_DAT

- Before calling SEND_DAT function, the string stored in code memory is being moved to DPTR.
- Then DPTR is increased by 1.
- Then DATAWRT function is called to write the data character by character.

```
SEND_DAT:  
CLR A  
MOVC A, @A+DPTR  
ACALL DATAWRT  
ACALL DELAY  
INC DPTR  
JZ AGAIN  
SJMP SEND_DAT  
AGAIN: RET
```

READ KEYPRESS

It is the subroutine to collect user inputs. A counter is set up using register R0 to count 5 times (this will limit the user input collection to the first 5 key presses). Register R1 is assigned address location 160D. The collected user inputs are saved in address location starting from 160D.

```

READ_KEYPRESS:
MOV R0,#5D
MOV R1,#160D
ROTATE:ACALL KEY_SCAN
MOV @R1,A
ACALL DATAWRT
ACALL DELAY2
INC R1
DJNZ R0,ROTATE
RET

```


KEY SCAN

It is the subroutine to identify a keypress. The method of column scanning is employed in identifying the pressed key. The pressed key is identified and is assigned a decimal equivalent value (ASCII value) of the pressed key. Hex key pad is essentially a collection of 16 keys arranged in the form of a 4x4 matrix.

```

KEY_SCAN: MOV P1, #11111111B
CLR P1.0
JB P1.4, NEXT1
MOV A, #55D
RET

NEXT1: JB P1.5, NEXT2
MOV A, #56D

RET
NEXT2: JB P1.6, NEXT3
MOV A, #57D

RET
NEXT3: JB P1.7, NEXT4
MOV A, #47D

RET
NEXT4: SETB P1.0
CLR P1.1
JB P1.4, NEXT5
MOV A, #52D

RET
NEXT5: JB P1.5, NEXT6
MOV A, #53D

RET
NEXT6: JB P1.6, NEXT7
MOV A, #54D
RET
NEXT7: JB P1.7, NEXT8
MOV A, #42D

RET
NEXT8: SETB P1.1
CLR P1.2
JB P1.4, NEXT9
MOV A, #49D

RET

```

CHECK PASSWORD

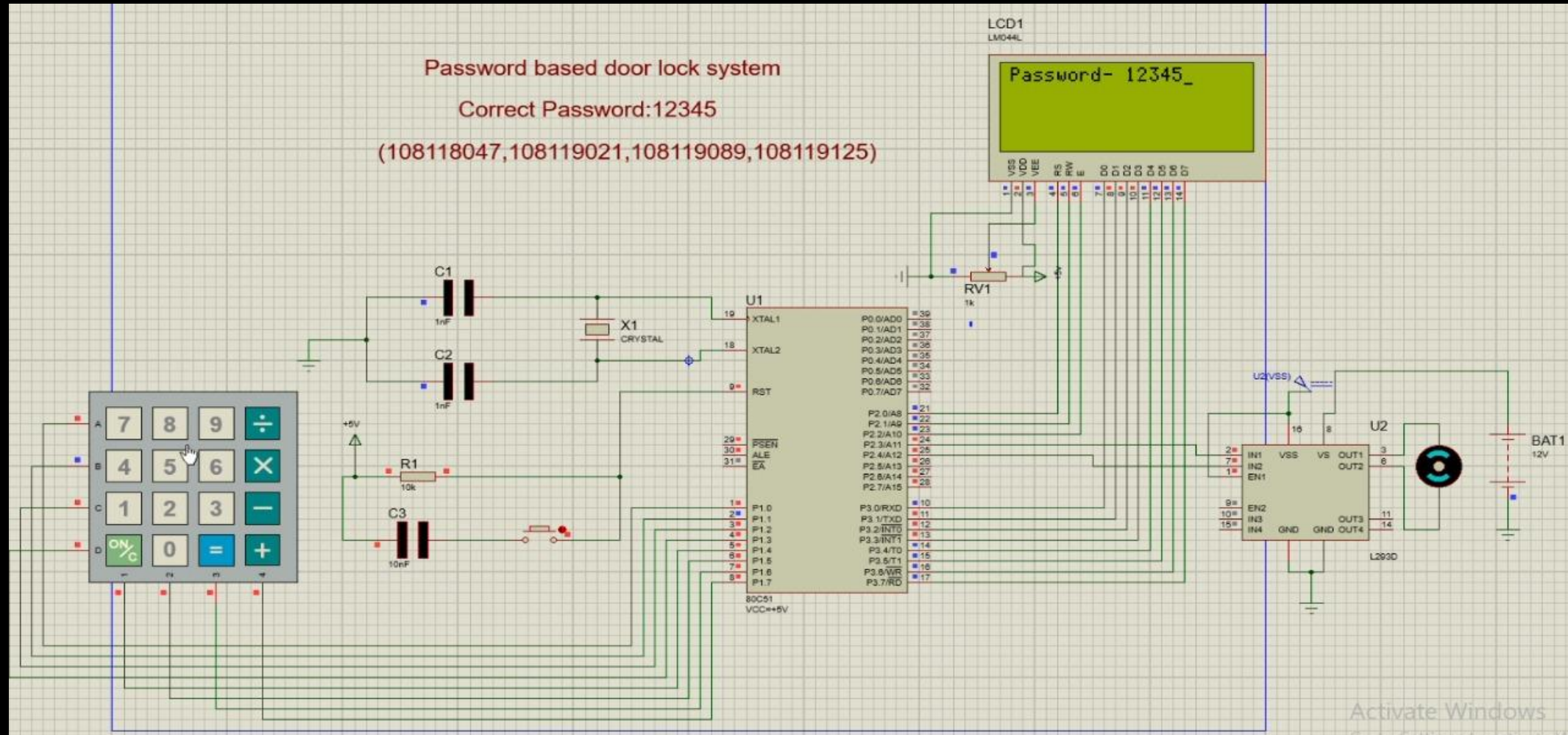
It is the subroutine to compare user input password (5 digits) with the actually stored password in the program. Comparison is made digit by digit by selecting each digit from stored password with the help of DPTR and loading it to Accumulator (with MOVC A,@A+DPTR). Each digit loaded to the accumulator is then compared with the corresponding digit stored as user input.

```

CHECK_PASSWORD:MOV R0,#5D
MOV R1,#160D
MOV DPTR,#PASSWORD
RPT:CLR A
MOVC A,@A+DPTR
XRL A,@R1
JNZ FAIL
INC R1
INC DPTR
DJNZ R0,RPT
ACALL LCD_INIT
MOV DPTR,#TEXT_S1
ACALL SEND_DAT
ACALL DELAY
SETB P2.3
CLR P2.4
SJMP GOBACK
FAIL:ACALL LCD_INIT
MOV DPTR,#TEXT_F1
ACALL SEND_DAT
ACALL DELAY
CLR P2.3
CLR P2.4
ACALL MAIN
GOBACK:RET

```

OUTPUT WHEN THE PASSWORD IS CORRECT



Password based door lock system

Correct Password:12345

(108118047,108119021,108119089,108119125)

CORRECT _

VSS VDD VEE RS RW E D0 D1 D2 D3 D4 D5 D6 D7

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

16 17 18 19 20 21 22 23 24 25 26 27 28

29 30 31 32 33 34 35 36 37 38 39

40 41 42 43 44 45 46 47 48 49 50

51 52 53 54 55 56 57 58 59 60 61

62 63 64 65 66 67 68 69 70 71 72

73 74 75 76 77 78 79 80 81 82 83

84 85 86 87 88 89 90 91 92 93 94

95 96 97 98 99 100 101 102 103 104 105

106 107 108 109 110 111 112 113 114 115 116

117 118 119 120 121 122 123 124 125 126 127

128 129 130 131 132 133 134 135 136 137 138

139 140 141 142 143 144 145 146 147 148 149

150 151 152 153 154 155 156 157 158 159 160

161 162 163 164 165 166 167 168 169 170 171

172 173 174 175 176 177 178 179 180 181 182

183 184 185 186 187 188 189 190 191 192 193

194 195 196 197 198 199 200 201 202 203 204

205 206 207 208 209 210 211 212 213 214 215

216 217 218 219 220 221 222 223 224 225 226

227 228 229 230 231 232 233 234 235 236 237

238 239 240 241 242 243 244 245 246 247 248

249 250 251 252 253 254 255 256 257 258 259

260 261 262 263 264 265 266 267 268 269 270

271 272 273 274 275 276 277 278 279 280 281

282 283 284 285 286 287 288 289 290 291 292

293 294 295 296 297 298 299 300 301 302 303

304 305 306 307 308 309 310 311 312 313 314

315 316 317 318 319 320 321 322 323 324 325

326 327 328 329 330 331 332 333 334 335 336

337 338 339 340 341 342 343 344 345 346 347

348 349 350 351 352 353 354 355 356 357 358

359 360 361 362 363 364 365 366 367 368 369

370 371 372 373 374 375 376 377 378 379 380

381 382 383 384 385 386 387 388 389 390 391

392 393 394 395 396 397 398 399 400 401 402

403 404 405 406 407 408 409 410 411 412 413

414 415 416 417 418 419 420 421 422 423 424

425 426 427 428 429 430 431 432 433 434 435

436 437 438 439 440 441 442 443 444 445 446

447 448 449 450 451 452 453 454 455 456 457

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524 525 526 527 528 529 530 531 532 533 534

535 536 537 538 539 540 541 542 543 544 545

546 547 548 549 550 551 552 553 554 555 556

557 558 559 560 561 562 563 564 565 566 567

568 569 570 571 572 573 574 575 576 577 578

579 580 581 582 583 584 585 586 587 588 589

590 591 592 593 594 595 596 597 598 599 600

601 602 603 604 605 606 607 608 609 610 611

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623 624 625 626 627 628 629 630 631 632 633

634 635 636 637 638 639 640 641 642 643 644

645 646 647 648 649 650 651 652 653 654 655

656 657 658 659 660 661 662 663 664 665 666

667 668 669 670 671 672 673 674 675 676 677

678 679 680 681 682 683 684 685 686 687 688

689 690 691 692 693 694 695 696 697 698 699

700 701 702 703 704 705 706 707 708 709 710

711 712 713 714 715 716 717 718 719 720 721

722 723 724 725 726 727 728 729 730 731 732

733 734 735 736 737 738 739 740 741 742 743

744 745 746 747 748 749 750 751 752 753 754

755 756 757 758 759 760 761 762 763 764 765

766 767 768 769 770 771 772 773 774 775 776

777 778 779 780 781 782 783 784 785 786 787

788 789 790 791 792 793 794 795 796 797 798

799 800 801 802 803 804 805 806 807 808 809

810 811 812 813 814 815 816 817 818 819 820

821 822 823 824 825 826 827 828 829 830 831

832 833 834 835 836 837 838 839 840 841 842

843 844 845 846 847 848 849 850 851 852 853

854 855 856 857 858 859 860 861 862 863 864

865 866 867 868 869 870 871 872 873 874 875

876 877 878 879 880 881 882 883 884 885 886

887 888 889 890 891 892 893 894 895 896 897

898 899 900 901 902 903 904 905 906 907 908

909 910 911 912 913 914 915 916 917 918 919

920 921 922 923 924 925 926 927 928 929 930

931 932 933 934 935 936 937 938 939 940 941

942 943 944 945 946 947 948 949 950 951 952

953 954 955 956 957 958 959 960 961 962 963

964 965 966 967 968 969 970 971 972 973 974

975 976 977 978 979 980 981 982 983 984 985

986 987 988 989 990 991 992 993 994 995 996

997 998 999 1000 1001 1002 1003 1004 1005 1006 1007

1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018

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1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106

1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117

1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128

1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139

1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150

1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161

1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172

1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183

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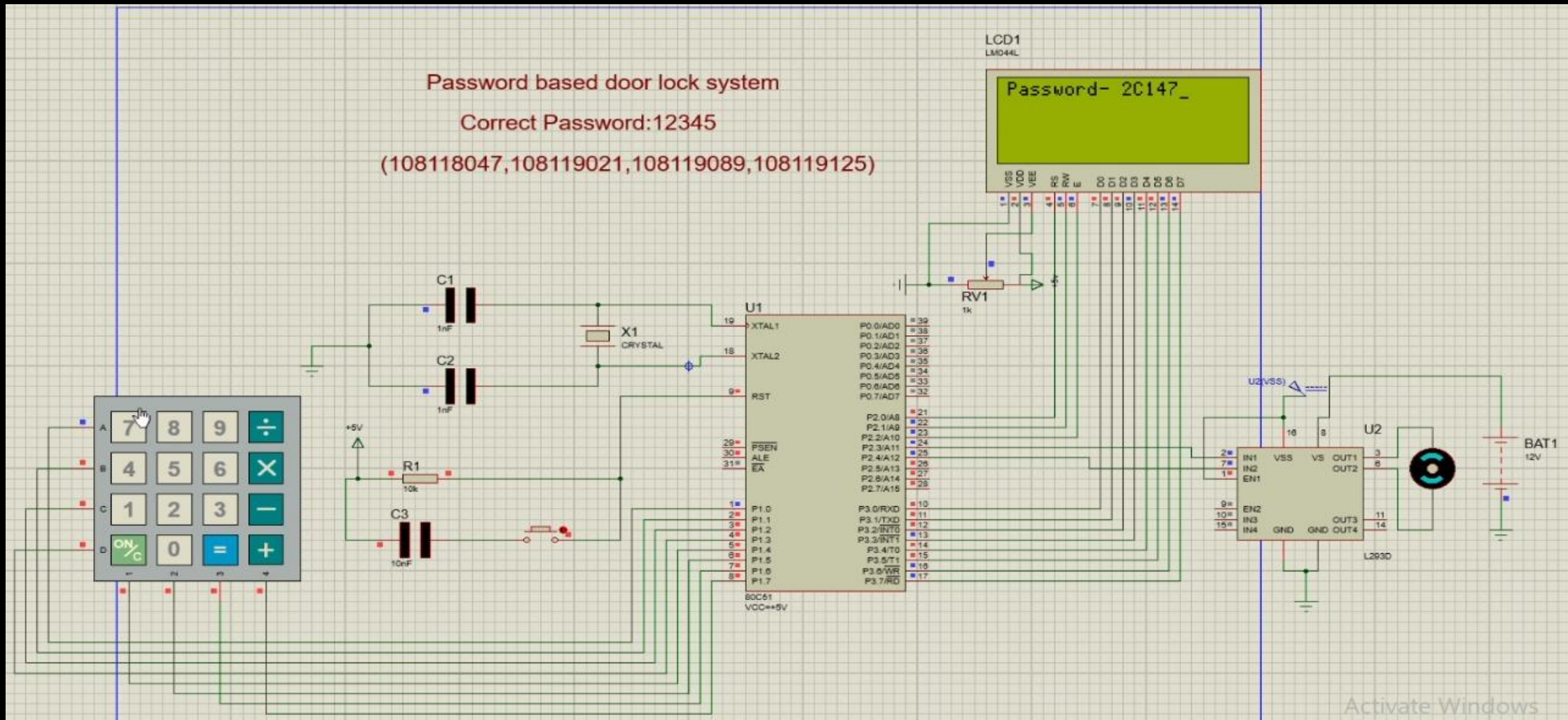
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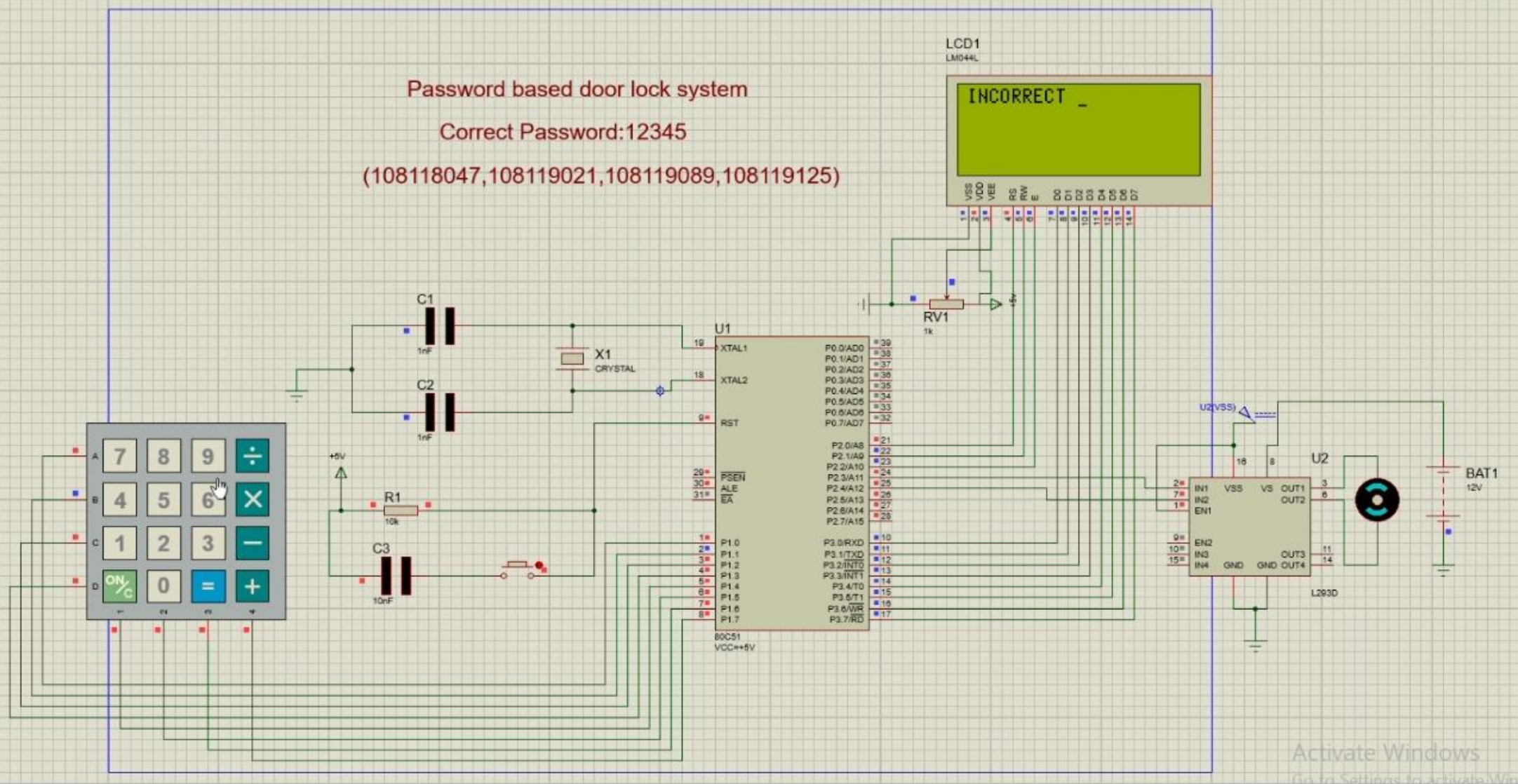
OUTPUT WHEN THE PASSWORD IS INCORRECT



Password based door lock system

Correct Password:12345

(108118047,108119021,108119089,108119125)



ADVANTAGES AND APPLICATIONS

Advantages:

- This project provides security.
- Power consumption is less.
- Uses commonly available components.

Applications:

- This simple circuit can be used at residential places to ensure better safety.
- It can be used at organizations to ensure authorized access to highly secured places.

CONCLUSION & FUTURE SCOPE

- The digital door lock is constructed in proteus simulation software and its executed successfully.
- This door lock can not be operated remotely, it has to be operated manually. In future, it could be developed so that it can be operated remotely with a handheld device.
- There is no method to recover the password if the user forgets it. So it could be developed in future to have a recovery method if you forget the password like an OTP can be sent to the mobile phone of the user in order to reset the password

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