

S.No.	Design Problem
1	Design a digital bank token number display. It should display the three-digit token number that can contain numbers and letters. You must have seen this in public places when people have to wait in line
2	Design a key operated gate locking system. Only those people who have the password can unlock the gate. The password must atleast be 4 BCD digits long
3	Design a system to count the number of people that enter a room. It should automatically close the doors when the pre-set number of people is reached. You can assume that there is only 1 exit and people can enter or exit from the same door.
4	Design a home automation project, where all switches in the home are controlled by specific pre-determined digital phrases. The phrase is made up of 3 BCD numbers. Assume that your room has 2 ceiling fans and 2 lights that need to be turned ON or OFF. Decide the code first before you begin the design.
5	Design a digital alarm clock, where the user can enter a time and date and the system will ring a buzzer at that time. Assume that the clock keeps time in a 24 hr format and that the alarm setting is done in a 24 hr format too.
6	Design a system for cooling by using a fan with variable speeds and a temperature sensor that measures the ambient temperature. Assume that the fan has four variable speeds when switched ON. The temperature sensor can be assumed to have 4 levels above and 4 levels below the set temperature of the room.
7	Design a street lighting system for a road, where the lights brighten when a car approaches a light post and progressively dims as the car moves away. Pay close attention to how many sensors do you want per light post and where you want to locate them. Assume the street lights are setup at constant intervals along one side of the road.
8	Design a automated vehicle that moves along a path in a grid with the roadways marked in black. The vehicle should be able change direction from vertical to horizontal or vice versa based on the final destination it needs to get to. Assume that the vehicle is controlled by servo motors which move one grid at a time.
9	Design a automated chessboard where the user selects the chess piece and inputs the final position. Based on user input design a system that moves the chess pieces. Assume that your chess board is only automated for the bishop and the knight pieces only. Assume that these pieces are automated by servo motors that move one box at a time in any direction.
10	Design a automated chessboard where the user selects the chess piece and inputs the final position. Based on user input design a system that moves the chess pieces. Assume that your chess board is only automated for the queen and rook only. Assume that these pieces are automated by servo motors that move one box at a time in any direction.
11	Design a system that works like a dot-matrix printer. The user inputs a hexadecimal number, the output is a 5x5 LED bank that gets "written" from left to right.
12	Design a traffic signal system at a junction of 2 roads, a highway and a side street. The signal system should be in designed in such a way so as to not impede traffic on the highway. The signal must switch only when a car shows up on the side street.
13	Design an elevator system in a 6 storey building. You can assume that the elevator moves in steps of 1 floor each.
14	Design a toy for infants which is made up of an array of LEDs , say minium 4x4. When an number from (0-9) is input into the system the number must scroll across this LED screen.

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15	Design an adaptive lighting system for your automobile, whose headlights turn on automatically as the ambient light reduces. Similarly the reverse should happen at day break. Feel free to pick on how many intensity setting you want for the headlight. Assume that the light sensor measures light to dark in 8 levels.
16	Design a display for a parking structure employed in a mall, that displays the number of open parking slots in each floor of the building so that customers may be directed to that particular floor. Each parking slot is made up of a IR sensor that senses if a car is parked in the slot or not. Minimum number of floors in the parking structure is 2.
17	Design a system that converts a serial input to a parallel input of 8 bits. For example, an input sequence of 16 bits should show up as an output sequence of 2 bits with $1/8$ th the frequency of the serial input.
18	Design a digital taxi fare meter. 300 full turns of the wheel equals a 500m and a fare change. The driver can update the fare/km is multiples of Rs.10 from Rs 10 to Rs 50. The final fare will be calculated for a distance rounded up to the nearest 0.5km.
19	Design a digital car lock which consists of 4 bit binary code. If the user inputs wrong code more than 3 times, an alarm must ring and the car should get locked.
20	Design a cash change machine that takes an input in Rupees for any value between 1 and 1000. Only whole numbers are allowed. The machine will then dispense change using Rs. 100, Rs 50, Rs. 10 and 1 rupee coins only. You can design the system so that the maximum number of 100 and 50 rupees notes are used.
21	A standard master combination lock has a dial with the numbers 0 to 39 on it. It works as follows. You reset it by spinning it clockwise past 0 a few times. Then you turn it anticlockwise to the first number in the combination, positioning the dial so that the number is directly under the arrow. Then you spin the dial clockwise again, past 0 once, to the second number of the combination. Finally you spin the dial anti-clockwise a second time directly to the last number of the combination. At this point the lock will open. Design the logic for this system.
22	Construct a sequential keypad decoder that supports alphanumeric characters in the same way as your cellphone does it. For example, pressing 2 once, gives an A, 2X gives a B and 3X gives a C. You can look at your cellphone and design the decoder - whose output is going to a number or a letter
23	Design a digital pipette to precisely deliver a preset volume of liquid into a vial. Assume that the least amount of pipette is 10ml. A digital pump is used to pull in or push out liquid in multiples of 10ml. The maximum volume of the pipette is 200ml.
24	Design a mechanism to control a chemical tank that must be maintained at a constant temperature and with a constant mixture of two chemicals A and B that need to be pumped from their storage tanks. The temperature gauge can read 2 levels above preset and 2 levels below preset. The heating system of the tank similarly has 2 levels of heater output. For concentration assume that the sensor can measure increase/ decrease of upto 4 units of chemical. The pump can supply the chemicals in the same units one at a time.
25	Design a signalling system at a railway station that has two digitally operated road crossing on either side of the station. Trains can pass in either direction, and all trains on this line call at this station. Assume that the trains are much longer than the railway crossing

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26	Design the irrigation logic for a precise agricultural system. The field is divided into a grid, with a soil moisture sensor in each block. Water must be supplied in each grid in response to the sensor measurements. The sensor can measure upto 8 levels of dryness. Each level of dryness needs one unit of water to be supplied. The farmer has the flexibility to pick at what optimal moisture level he wants the ground to be at based on the target crop he/she is growing.
27	Design an automated pill dispenser at a retirement home that dispenses a minimum of at least 3 pills. User selects the type and number of pills as an input alphanumeric code.
28	Design a sorting machine for a hatchery that sorts an incoming sequence of eggs from the coop by weight, so that they may be sold at different price points. You can assume that the weight of the eggs can be in the range of 16 units spread around the nominal weight of an average hen egg. You need to separate the eggs into 4 different groups based on their weight.
29	Design a system that measures the speed of a vehicle on a city road as it passes through two sensors separated by a known distance d . You can express the speed in levels 1-16 where 8 is the speed limit on the road.
30	Design an automated system for a garment factory that cuts an incoming steady stream of cloth into fixed lengths. The length is preset by the user. The user can also enter a pattern of lengths, up to 3 in a row. The machine should be able to cut those pieces in the same fashion.
31	Design a system that checks if a multi-digit BCD number input is a palindrome or not.
32	Design a power conservation system for a home that shuts off lights in a room if it detects that a person is not present. This time is user defined. The lights should be turned on if a person is detected after a small delay.
33	Design a scrolling display for text. The text can have a length of a minimum of 6 alphanumeric characters. Use a display such that at least six characters are displayed at a time.
34	Design a digital system that checks the quality of an object made up of 4 blocks of color each. The order in which the colored blocks should be arranged is user defined. The system should pick out any that do not match the user defined specifications.
35	Design a digital parking meter that allows increments of 10min of parking for every 5Rs coin that you feed into the machine. The maximum time the parking meter may be used for is a meter. The parking meter should display a red light when the time is up.