BAZLA BILQUEES

U3312671

INTRODUCTION TO INFORMATION TECHNOLOGY

**WEEK 3 TUTORIAL**

**TUTORIAL EXERCISE**

**STEP # 01 UNDERSTAND & DEFINE THE PROBLEM STATEMENT:**

Design a system that operates an alarm whenever the seat belt is not fastened either by the passengers or by the driver and seats are occupied when the engine is in working condition.

**STEP # 02 ORGANISE & DESCRIBE THE DATA:**

|  |  |  |  |
| --- | --- | --- | --- |
| **SYMBOLS** | **DESCRIPTION** | **TYPE** | **LOGIC EXPLANATION** |
| DRIV | Driver seat is occupied | Input | High (1 that show the seat is occupied) |
| PASS | Passengers seat are occupied | Input | High (1 that show the seat is occupied) |
| IGN | Ignition switch is ON | Input | High (1 that show the car engine is start) |
| BELTD**-** | Driver’s seat belt is not fastened | Input | Low (0 that show the seat belt is not fastened) |
| BELTP**-** | Passenger’s seatbelt is not fastened | Input | Low (0 that show the seat belt is not fastened) |
| ALARM | LOW=sounds when 0 | Output | Low = ON |

**Step 3: PLAN THE SOLUTION (DESIGN THE ALGORITHM)**  
3.1: Algorithm:

1. Monitor ignition status: IGN must be 1 or HIGH.
2. Check if the driver is seated and its belt is fastened or not.
3. If the driver seat belt is not fastened, then send alarm.
4. Check if the passenger is seated and their seat belt is fastened or not.
5. If the passenger seat belt is not fastened, then send alarm.
6. Otherwise, alarm remains HIGH (OFF)

3.2: Truth Table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DRIVER** | **PASSENGER** | **BELTD^** | **BELTP^** | **IGNITION** | **ALARM** |
| 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 |

3.3 Boolean Expressions (SOP):

A. Driver . Pass . BELTD . BELTP . Ing

B. Driver . Pass. BELTD . BELTP .Ing

C. Driver . Pass . BELTD . BELTP .Ing

D. Driver . Pass . BELTD . BELTP .Ing

E. Driver . Pass . BELTD . BELTP .Ing

ALARM = A + B + C + D + E

3.4 Pseudocode:

IF (DRIVER.(PASSENGER).(BELTD).(BELTP).ING) OR

(DRIVER. (PASSENGER). (BELTD).(BELTP).ING) OR

(DRIVER. (PASSENGER). (BELTD).(BELTP).ING) OR

(DRIVER. (PASSENGER). (BELTD).(BELTP).ING) OR

(DRIVER. (PASSENGER). (BELTD).(BELTP).ING)

THEN ALARM = 0 (ON)

ELSE ALARM = 1 (OFF)

3.4 Flowchart:



**STEP 4: IMPLEMENT THE SOLUTION**  
4.1 Logic Circuit

