

# Lab 3 Report

Sathvik Kanuri

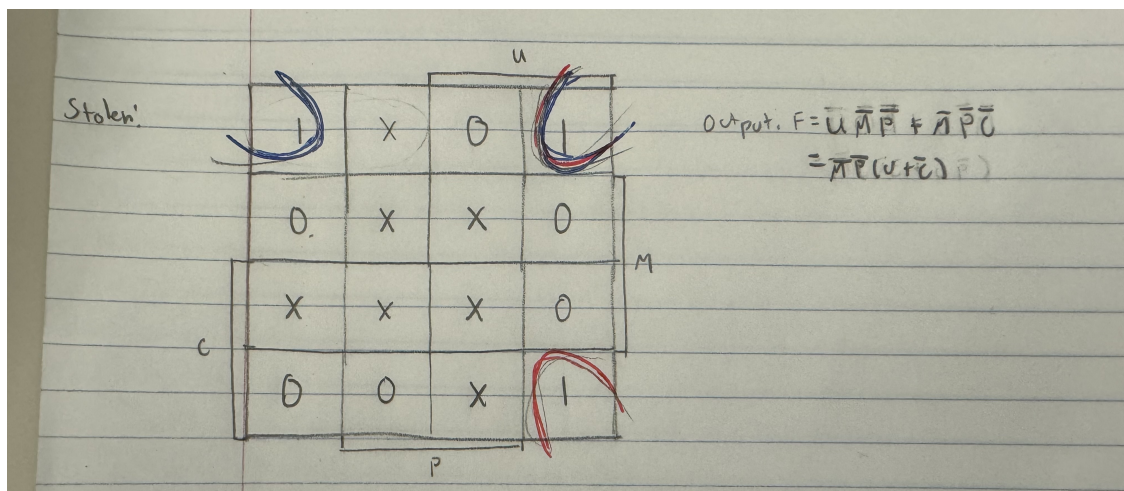
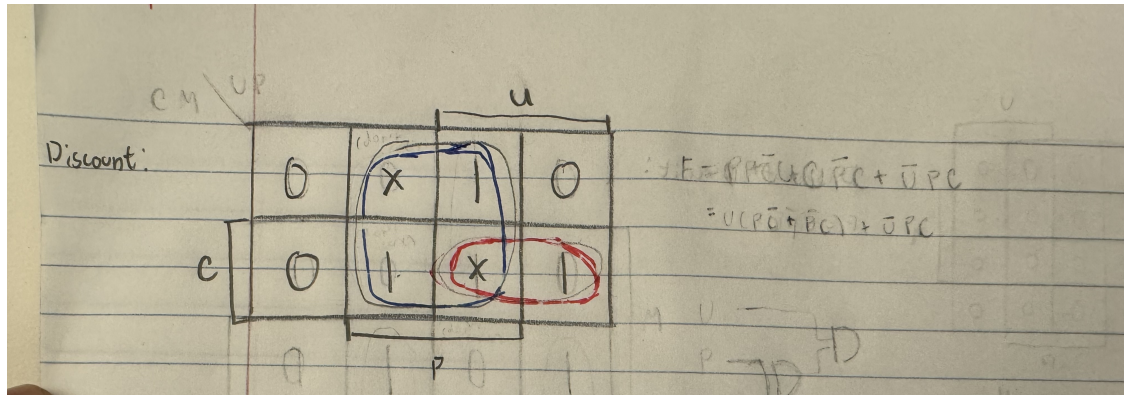
CSE 369: intro to Digital Design

October 23 2024

## Task 1 – Multi-level Logic on the FPGA

### Question:

The K-maps or Boolean simplification you did to create your design (Discounted and Stolen).



The top K-Map uses 3 inputs, the UPC, and outputs the value of the discount LED. Simplified using 2 groups, with the largest group involving the 2 don't cares. Results in an output of  $F = P + UC$

The bottom K-Map uses 4 inputs, taking into account M this time, and outputs the value of the stolen LED. Simplified using two groups, overlapping the top left one value. Results in an output of  $F = !M!P(U + !C)$

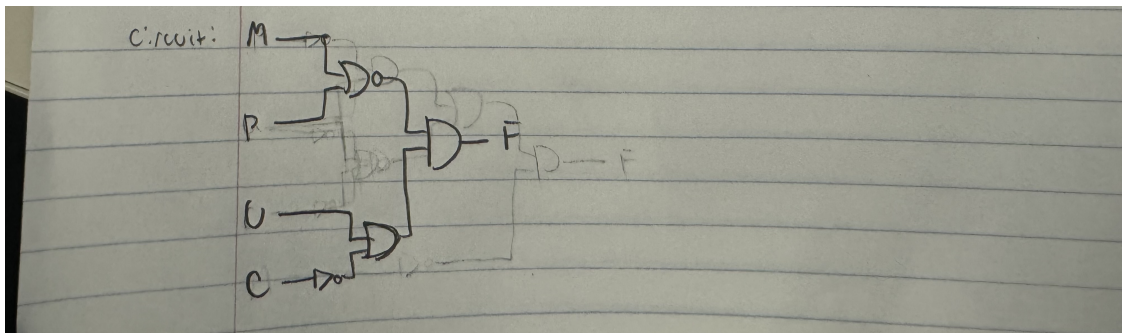
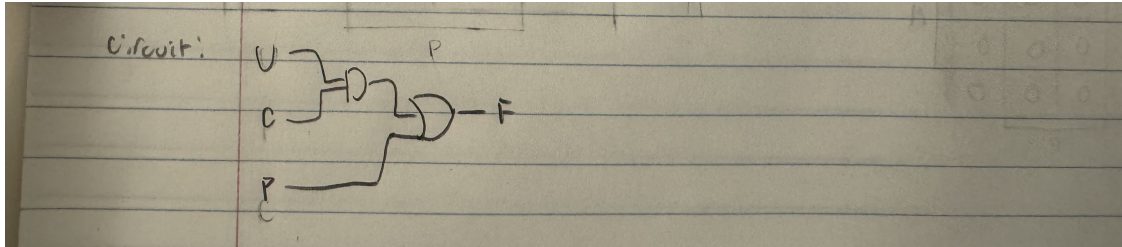
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## Task 1 – Multi-level Logic on the FPGA

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### Question:

Your circuit diagrams (separate) for Discounted and Stolen.



The top circuit diagram represents the diagram for the discount LED based on the simplified output from the K-Map.

The bottom circuit diagram represents the diagram for the stolen LED based on the simplified output from the K-Map.

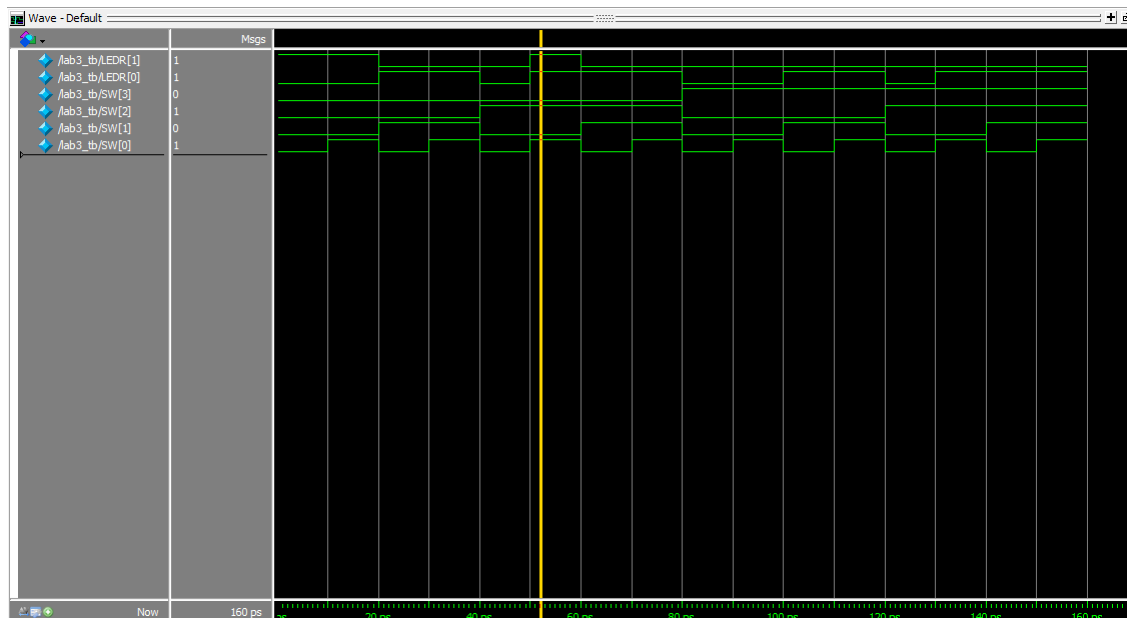
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## Task 1 – Multi-level Logic on the FPGA

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### Question:

A screenshot of the ModelSim simulation with explanation.



Represents the output for both the discount and stolen LEDs. SW[0] corresponds to U, SW[1] corresponds to P, SW[2] corresponds to C, and SW[3] corresponds to M.

The LED[0] value represents the discount LED, which is equal to 1 or ON when the UPC is equal to 011, 101, 110, or a don't-care value (invalid UPC). These values correspond to discounted items. The LED is 0 or OFF otherwise.

The LED[1] value corresponds to the stolen light. This light ONLY turns on when corresponding to the expensive UPC's (000, 100, 101), AND when the marked value is 0 or not marked.

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**Reflection**

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**Question:**

How long did it take you?

Completing all of the lab took me around 1-1.5 hours