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Smart and Secure Traffic Light Controller

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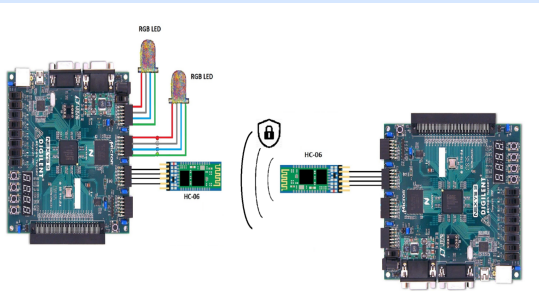
Methodology

- When an emergency vehicle approaches to the intersections, it encrypts its ID and sends this encrypted data to the traffic lights system via bluetooth.
- Normally Picoblaze controls the lights with the help of a counter module.
- Whenever any data is received from bluetooth module, it is decrypted. If this decrypted ID is already defined in block ram, then the lights will be changed to give priority to emergency vehicles.

System Overview



Introduction

- **Problem:** Emergency vehicles stuck in traffic too much and sometimes this situation causes car accidents due to some cars try to bypass traffic lights in order to give way to them.
- Our project utilizes FPGA, bluetooth, crypto hardware and leds in order to build smart and secure traffic light controller.

Challenges

- At first, we preferred to use AES encryption module, however Nexys 2 board does not have enough footprint to implement this module. So we used a lightweight crypto algorithm Boron.
- In order to enable communication of Bluetooth modules, they are synced in configuration mode.
- Shift_register and deshift_register modules are designed to communicate crypto module with UART.

Future Work

- To prevent man-in-the-middle-attacks, Diffie-Hellman key exchange method can be used with a random number generator module.

Block Diagram