Electrical Engineering and Computer Science
EECS 373 - Design of Microprocessor-Based Systems

Knocker Unlocker

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Introduction

Need access to a lab or a room, but have no key?

The Knocker Unlocker allows users to get in by knocking in a unique sequence along with presenting an RFID tag.

Problem Description: Providing a Knock-Based Approach for Unlocking

- Knocks need to be detected and converted into a digital signal
- The tempo of the knocks needs to be disregarded
- RFID tags need to be detected and verified
- Need to indicate to users the unlock status
- The lock must be electronically controlled
- Users must be able to reprogram their sequence

Proposed Solution: From the Knock to the Unlock

The Knock

- Piezoelectric sensor converts knock to an analog signal
- Threshold Circuit converts analog signal to digital signal
- The digital signal is sent into SmartFusion through a GPIO pin
- The digital signal causes an interrupt routine to listen for a knock sequence
- The routine ‘auto-bauds’ the sequence to disregard tempo

The Tag

- RFID Sensor detects an RFID tag in close proximity
- The sensor sends a digital signal to SmartFusion through a UART port
- An interrupt routine compares incoming tag with known tags

The Unlock

- Door unlocks upon verifying the knock sequence and the RFID tag
- A tri-state buffer allows the electronic lock to be ‘unlocked’
- The knock sequence is reprogramed by pressing a button and knocking in the new sequence twice; the second serves as confirmation