Intelligent Door Lock

Wei Yang Ang (wya3), Zhili Luo (zhilil2), ECE 120, Srijan Chakraborty (srijanc2), ECE 110

Introduction

Statement of Purpose
In many University of Illinois at Urbana Champaign (UIUC) dorms, there are multiple students being locked out of their rooms just because they forget to bring their keys out when they are using the restroom, getting water, etc. Also, there are multiple cases of students leaving the doors unlocked while there is no one inside as the doors do not auto-lock once we close it. The primary goal of this project is to create an add on for existing door knobs that can be unlocked using the proximity I-cards or the phone’s NFC chip.

Background Research
From our personal experiences, many students almost never forgets to bring their phones out of their rooms but for some reasons chronically always forgets to bring in their keys out. This led to us trying to find a way to unlock a door knob using a phone. A few options was using the bluetooth or cellular technology, but we settled with radio-frequency identification (RFID) technology. RFID can only work in close proximities, which is a huge benefit for us as we do not want the doors to be accidentally unlocked when we are loitering around the hall away. We can also use the RFID chips in the proximity I-Cards to unlock the doors. The current ECE building is controlled by these wireless locks and it is extremely convenient for everyone as no one needs to fumble with lots of keys for different rooms and the University does not need to keep duplicating keys or change locks when keys are lost.

Design Details

Block Diagram / Flow Chart

System Overview
When Arduino receives the signal through receiver, it controls the servo motor system to lock/unlock the door. Batteries supply power for MCU and the servo motor system.

Parts
1. Door lock fabricated by the machine shop
2. Sparkfun RFID Reader Starter Kit
   https://www.sparkfun.com/products/13198

Possible Challenges
1. Phone compatibility. Since our project needs phone functionality, we may need to implement an user interface on the operating systems of smartphones.
2. Proximity I-Card Compatibility: We will need to figure out what frequency the RFID chips in our I-Cards are operating at and try to make it compatible with out RFID reader.