

ECE 153B Final Project: Semi-Autonomous Light Switch

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<https://sites.google.com/view/ece153b-semi-auto-light-switch/home>

Overview:

My project will turn a manual light switch into a semi-automatic one, which will turn on the light upon entry to the room if the room is too dark, as well as having remote control functionality through Bluetooth to remotely turn on and off the light. To accomplish this, I will use the STM32L476 board with a combination of an ultrasonic sensor to detect the door opening, a light sensor to detect the light levels inside the room, a Bluetooth module to remotely connect to a phone, and a servo to press the physical light switch. As time permits, I will add a light dimming functionality to the remote, using another servo and a 3D printed part that will allow the servo to move the slider on the light switch up and down.

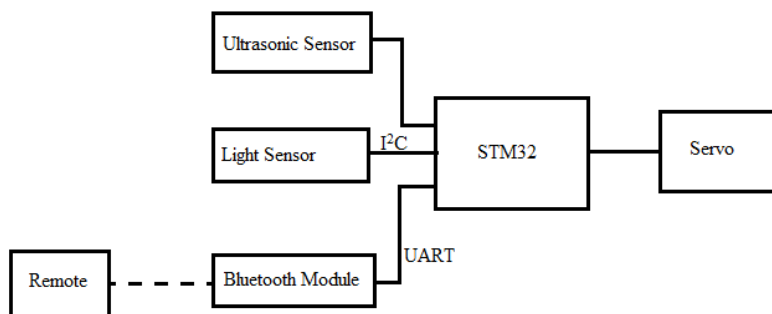
Peripherals:

- 1 Ultrasonic Sensor
- 1 Light Sensor
- 1 Bluetooth Module & Receiver
- 2 Servo Motors

Serial Interface Protocols:

- UART (Bluetooth Module)
- I²C (Light Sensor)

Block Diagram:



Software Structure:

The software will generate an interrupt when the ultrasonic sensor reads a different value than default (door has been opened), then will check the light sensor's values to check for brightness within the room already. The Bluetooth remote will have the ability to enable and disable the sensors (to prevent the lights from automatically turning on if someone leaves the room in the middle of the night). Enabling the sensors will check the light levels in the room as if the door was opened in the initialization sequence, and disabling the sensors will turn off the lights. The software will keep track of whether the light switch has been turned on or off, and using the buttons on the STM32 board, a manual sensor enable/disable will also be implemented for convenience.