

## **Arduino Projects**

### **Light-Dependent Alarm**

One of the first projects I made was a light-based alarm system. One could keep the alarm near a window before sleeping, and it would go off as soon as there was sufficient light outside. I used a photocell combined with a buzzer and an LED to create this alarm, and it got me started on working with the Arduino board and writing programs in the Arduino IDE.

### **Automatic Play/Pause for Laptop Videos/Songs [\[GitHub\]](#)**

I used the photocell once again to create a system that would pause the video or song playing on my laptop as soon as the light was turned off, since that meant I was either leaving the room or going to sleep. The media was resumed once the light was turned on again, indicating that I had re-entered the room or woken up. This time, I combined the Arduino code with python code, using the pyserial library for serial communication, and the pyautogui library to trigger events on the computer. With slight changes in the code, this setup could also be used to detect a hand hover over the photocell and use that to play/pause media, since the hand caused a shadow over the photodetector.

### **Arduino based Clock [\[GitHub\]](#)**

Using a multiplexed 4-digit 7-segment display, I created a clock that showed time in the hh:mm, 24-hour format. The display I used had one pin for each of the 7 LEDs. Along with these 7 pins, I had 4 additional pins that controlled whether an entire digit was in the ON or OFF state. The challenge was to use multiplexing to display different numbers on the different digits of the display. To achieve this, my code turned on one digit at a time, displayed a number on it, and then moved to the next digit. By doing so fast enough, I was able to create a display that flickered faster than the persistence of vision, giving an illusion of a steady display.

## Hand Gesture Detection

With slight modifications to my automatic play/pause code, I used it to detect hand gestures and play/pause media based on that. I could stop media by a *stop* gesture, and play it again by doing the same. I used an ultrasonic sensor this time, and the same python code to trigger button events. My later step for this project would be to use more ultrasonic sensors (or infrared sensors) and detect more advanced hand gestures and show these gestures on a prettier UI, something like what the leap motion device does.

## Cube Movement using Ultrasonic Sensor [\[GitHub\]](#)

Having tried out the ultrasonic sensor for hand detection, I decided to use it to move around virtual objects. I used serial communication in the Unity3D game engine to move around a cube based on the distance detected by the sensor. I could then push or pull the cube by simulating a push/pull gesture in front of the monitor!

## Augmented Reality Cube with Gesture Control [\[GitHub\]](#)

I had worked on a simple augmented reality project before I started working with the Arduino. Now, I decided to combine the cube movement using the ultrasonic sensor and augmented reality to augment a virtual cube onto the real world and also make it move using gestures in front of an ultrasonic sensor. I could hold a card in front of the camera and a virtual cube would appear in front of it. Next, I could raise or lower my hand above the ultrasonic sensor on my table, and the cube would follow my hand movements! You can check out a simple video I made of this project [here](#).