PART 2

Idea 1: Door locking system controlled with keypad.

Concept of Operation:
This door locking system will lock/unlock the deadbolt of the door when the right code is entered on the keypad. There will be a keypad and screen outside the door which will be connected to a controller located inside of the apartment. When the correct code is entered, the controller will unlock or lock the door according to the status of the lock. If the incorrect code is entered, the user will be asked to try again until the right code is pressed. All different parts of the project will be wired together physically (no wireless communication between keypad module and microcontroller module or locking module). There will also be a push button inside the apartment to unlock/lock the door from the inside.
Sensors: Keypad and push button.
Controllers: ATmega328P and A4988 (stepper motor controller).
Actuators: Stepper motor and LCD screen.

Idea 2: Solar Panel Tracker.
Concept of Operation:
The solar panel tracker will track the sun throughout the day to improve the panel output and efficiency. There will be four photoresistors on each corner of the solar panel, inside a 1.5-inch box with the top open. When the photoresistors receive light it will have a low resistance and when it is dark it will have a high resistance. The controller will check the voltage of each photoresistor and depending on the least amount of voltage, the controller will make the servos move in the direction of the sun. If the right side of the solar panel is dark, the microcontroller will make it rotate to the left and vice versa. As the sun is rising or setting, the microcontroller will check which side of the panel is the darkest and tilt the servo towards the sun.
Sensors: photoresistors
Controller: ATMEGA328-PU
Actuator: 2 Servos

Idea 3: Gag Gift Box
Concept of Operation: When someone is given a gift, generally, the gift is placed on a flat surface. This is the perfect start to a gag gift. The gag gift box will be used to mess with your friends. When your friend reaches down to pick up the gag gift, the gift box will have a sudden boost of speed and move forward towards the friend reaching for the gift. Once the friend can grab the gift box, there is enough space inside for there to be a medium-sized gift, 12” x 12” x 12”.The primary user is someone trying to prank a friend and give their friend a gift of some sort. The secondary user is the person receiving the gift. This gag gift box can be used for any occasion, but would primarily be used for a holiday of any kind where gift-giving is prominent, birthdays, or housewarming gifts. The gag gift will need to have all of the electronics and components hidden so that the receiver will not suspect anything. To work, the IR receiver and

remote will be used to disable or engage the gift. This will allow the primary user to activate the gag gift before the secondary user picks up the gift. This is so someone mingling around the gift does not set it off. The ultrasonic sensors sense the distance the secondary user is from the gift and send the information to the DC Motor actuator to move the gift towards the secondary user.
Sensors: 3 HC-SR04 Ultrasonic Sensors, TSOP38238 IR Receiver
Controllers: Atmega32u4
Actuators: 4 DC Motors, IR Remote