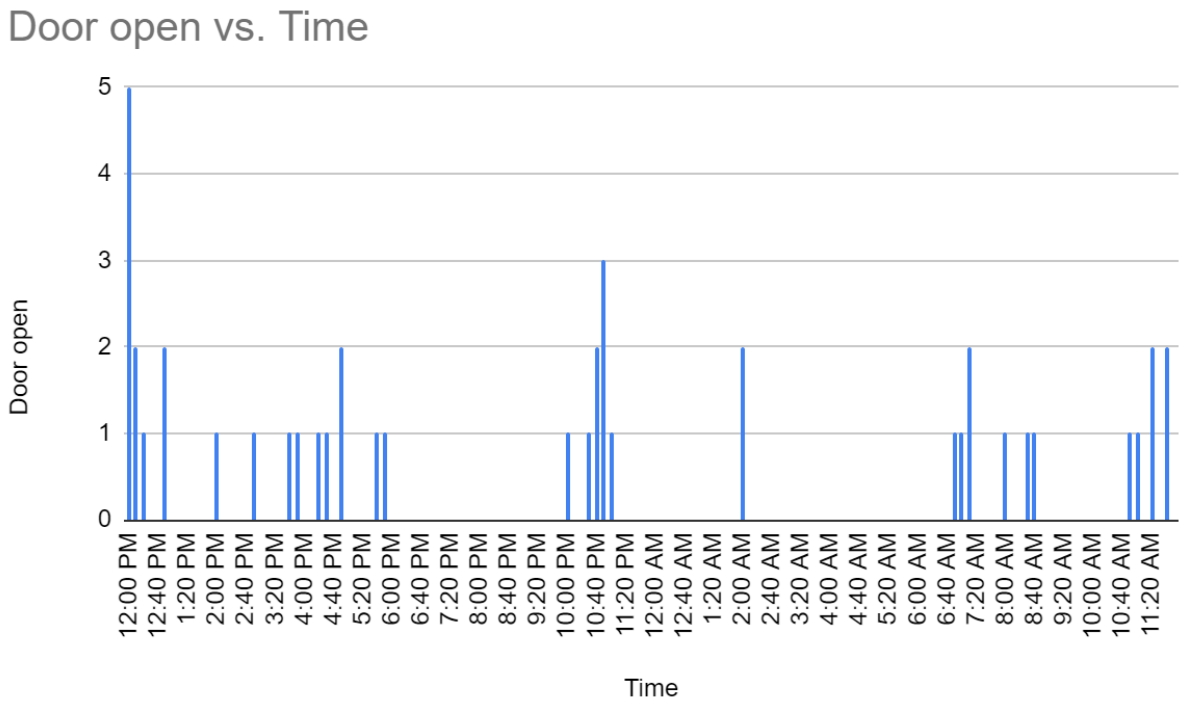
Summary

The following project was designed using the esp32 and a sonar sensor. As a very busy individual, I move in and out very frequently in my dorm room. So I have designed a code that will calculate how many times I leave my room for a day.

Similar to bats echo location this sonar sends out a “ping” and bounces off the nearest object and than bounces back. It does this process every second and shows the distance on inches and cm on the terminal. Using this measures the distance of the nearest object. In this case it would be my door. I have set up the sonar approximately 55 inces away from the door. It contuines to detect this measurement until the door is open. Once the door is open, the sensor starts trying to detect the next closet thing which would be the hallway. The hallway is approximately at 250 inches away. With this information I have set up my code to make a count of a variable (X, Which counts the amount of time the doors opens.) to increase it value by one anytime the value the senor detected over 65 inches. I chose 65 because sometimes the senor is off by an inch or two. Using this method would give 10 inches in case of human or technical error.

To sum up the order of operations in my design. My senor sends out a ping every second to decet the closet object, every ten minutes a notification on the terminal tell you how many times the door is open. It continues the sequence again and again until the full 24 hoursis complete. Which was 43 times in 24 hours

The following graph show the results of my project.



CODING

```
const int trigPin =5; //red pin 5
const int echoPin =18;//yellow pin 18
int val = 0; //store data
int tenMinDoor[144]; // 24 hour array
//define sound speed
#define SOUND_SPEED 0.034
#define CM_TO_INCH 0.393701
int idx = 0;
long duration;
float distanceCm;
float distanceInch;
float prevDist = 99;

int openDoors = 0;// var for doors openings

int timer = 0;// delcares timer

void setup() {
  // put your setup code here, to run once:
Serial.begin(115200); //starts the serial communtication
pinMode(trigPin, OUTPUT); // sets the trigPin as an output
pinMode(echoPin, INPUT); // sets the echoPin as an Input
}

void loop() {
  // put your main code here, to run repeatedly:
// clears trig pin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
//sets the trigPin on HIGH for 10 microseconeds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

 // Reads the echoPin, returns the sound wave travel time in
microseconds
  duration = pulseIn(echoPin, HIGH);
```

```
        // Calculate the distance
        distanceCm = duration * SOUND_SPEED/2;

          // Convert to inches
        distanceInch = distanceCm * CM_TO_INCH;

        // Prints the distance in the Serial Monitor
        Serial.print("Distance (cm): ");
        Serial.println(distanceCm);
        Serial.print("Distance (inch): ");
        Serial.println(distanceInch);
        Serial.println();

        // if door goes from closed to open
        if(prevDist > 65 && /*current distance*/distanceInch <= 65){
          openDoors++;
        }

        prevDist = distanceInch;

        if(millis() >= timer + 60000){   // timer for every 10 min
          timer = millis();
          tenMinDoor[idx]=openDoors;
          idx++;
          openDoors = 0;
          if(idx<144){
            Serial.print("[");
            for(int i = 0; i < idx; i++){     //for loop to put data in an
array
              Serial.print(tenMinDoor[i]);
              Serial.print(",");
            }
            Serial.println("]");
          }
        }
        delay(1000);
      }
```