Smart Library

Introduction: -

idea

System Design: -

Fig architecture

explanation

Set-up and Implementation: -

SW and HW structure

Working

people count

To efficiently control the Lighting and Heating of a Building we should first be aware of the number of people inside the building. Here we use Ultrasound sensors placed at the all the Entry and Exit points of a building to sense the People flow. Ultrasound sensor gives the distance to an object in front of it. This principle is used to detect if there is any object in front of the sensor that is less than the threshold. For example: The door width is 1 meter. The Sensor is placed on one side of the door and if no object is in between the Sensor and other side of the Door the distance read from the sensor will be approx. 1m and if anybody enters or leave the door the sensor reading will reduce. This reduction in the distance is detected and used to count the number of people crossing the door. Assumption here is that we have two separate doors for entry and one only person at a time can go through the door.(Since we had only one Ultrasound sensor the same sensor is used to detect both Entry and Exit by assuming the Doors are adjacent to each other and at any point of time only one person is allowed to enter and exit.)

Light

Lighting is a very important factor for the People in the Library. If the Lighting is not properly controlled, then it can cause uneasiness for the users and might have negative effects on the health. General Light Intensity recommended for a Library is around 500 Lux[1]. Lights are switched ON or OFF only if there are people inside the Library and the Library is Open otherwise by default all the Lights are switched OFF. We use an analog Light Sensor to sense the Current Light Intensity and the raw value received is classified into 4 levels namely Dark, Low, Medium and High. The threshold used for this classification can be customised based on the lighting conditions naturally available in the room. We Assume the Lighting used is a dimmable light with 4 fixed setting namely Off, Low, Medium and High Brightness. These four brightness levels are mapped to the Light sensor detected Intensity values to have optimal Lighting conditions always. In this Logic the sensor placement plays an important role, the assumption made here is the Library Reading Room is very well naturally illuminated and the sensor gives the intensity of the light coming from outside. If this light Intensity is Dark that means there is no outside light, then we turn on the Light with full brightness and by doing this we get the recommended Lux level. If the Sensed light intensity is Low or Medium Intensity, we turn on the Light with Medium or Low brightness respectively. If the Sensor reading is Hight intensity that means the outside light is enough to reach the recommended Lux level then we turn Off the Light completely. An Internal Schedule algorithm which is synchronised with the Opening and Closing Time is used to know the Library Status.

<https://www.noao.edu/education/QLTkit/ACTIVITY_Documents/Safety/LightLevels_outdoor+indoor.pdf>

HVAC

Burglar

Database and GUI

Discussion and Conclusion: -