## Definition of home automation:

Home automation is automation of the home, housework or household activity. Home [automation](http://en.wikipedia.org/wiki/Automation) may include centralized control of lighting, [HVAC](http://en.wikipedia.org/wiki/HVAC) (heating, ventilation and air conditioning), appliances, security locks of gates and doors and other systems, to provide improved convenience, comfort, energy efficiency and security.

A home automation system integrates electrical devices in a house with each other. The techniques employed in home automation include those in building automation as well as the control of home activities, such as [home activity systems](http://en.wikipedia.org/wiki/Home_cinema) devices may be connected through a [computer network](http://en.wikipedia.org/wiki/Computer_network) to allow control by a [personal computer](http://en.wikipedia.org/wiki/Personal_computer), and may allow remote access from the [internet](http://en.wikipedia.org/wiki/Internet). Through the integration of [information technologies](http://en.wikipedia.org/wiki/Information_Technology) with the home environment, systems and appliances are able to communicate in an integrated way which results in energy efficiency and safety benefits.

## What is our project?

If we look at the picture below, we can see immediately that it consists of very different types of building. These are mainly housing or office buildings (some of which have integrated shops or apartments “mixed construction”), schools, sports arenas, hospitals, and factories.

This project is home automation , is contain so many systems which related to A **Building Management System (BMS),** which is a computer-based control system installed in buildings that controls and monitors the building’s mechanical and electrical equipment such as [ventilation](http://en.wikipedia.org/wiki/Ventilation_%28architecture%29), [lighting](http://en.wikipedia.org/wiki/Lighting), [power systems](http://en.wikipedia.org/wiki/Power_systems), fire systems, and [security systems](http://en.wikipedia.org/wiki/Security_system). A BMS consists of software and hardware; the software program.

Our project contains the following systems:-

1. **HVAC system**

It is include a control room temperature and the amount of air inside it.

1. **Lighting control system**

Lighting Control refers to a system that controls the on/off condition of lighting in a building. Usually it detects the human occupancy and makes judgments based on that. A large amount of energy will be saved with this technology.

1. **Security systems**

Security systems are one of the most powerful tools that keep almost every building safe. The idea of this project is to provide security to a building.

1. **electronic sawmill laundry system**

The idea for these sawmill laundry is to protect laundry From getting wet due to rain. By placing a sensor which delicate rain on the sawmill laundry .So when rain falls sensor sends a signal to descend lid covering clothing.

1. **Garage door automation system**

Garage door automation system is the most important system in home automation. Because it protects the garage from entering strangers person

The concept for this system is to used RFID device which contain secret code to allow the door to open when the car receiving.

### To connect these systems together the Arduino chip was used .because it has many advantages such as it is inexpensive, simple, and it contain large number of input.

* **HVAC System :\_**

Refrigeration and air-conditioning system is Avery essential in the buildings, and it consist many part like duct system and refrigeration, heating system, fresh gases, and medical gases in the building such as hospitals.

the analysis of these system done by mechanical engineers .but here as Mechatronics engineering we make suitable controlling for these systems, in order to reduce the consumption of energy and give more suitable output from these systems.

The comfort condition in the place where the human person lives is giving by following parameter:

1. Temperature:

The range of suitable temperature is (20 – 25) °c.

2. Relative humidity (RH) (20 – 50)100%.

3. Pressure (slightly positive).

4. Ventilation (air quality).

So we use the (HVAC) systems in order to obtain these conditions.

* **Lighting control system**

Lighting control system **is the cornerstone of** **the** **home automation;** it iswidely used on both indoor and outdoor lighting of commercial, industrial, and residential spaces.

The term lighting controlsystem refers to an intelligent networked system of devices related to lighting control. These devices may include relays, occupancy sensors, [photocells](http://en.wikipedia.org/wiki/Photocells), light control switches or touch screens.

Lighting control systems are employed to maximize the [energy savings](http://en.wikipedia.org/wiki/Energy_conservation) from the lighting system, satisfy building codes, or comply with [green building](http://en.wikipedia.org/wiki/Green_building) and [energy conservation](http://en.wikipedia.org/wiki/Energy_conservation) programs. Lighting control systems are often referred to under the term [Smart Lighting](http://en.wikipedia.org/wiki/Smart_Lighting).

**Advantages:**

1. The ability to control any light, group of lights, or all lights in a building from a single [user interface](http://en.wikipedia.org/wiki/User_interface) device.
2. Lighting control system is reduced energy consumption.
3. Wireless lighting control systems provide additional benefits including reduced installation costs and increased flexibility over where switches and sensors may be placed.
* Components:-
1. Passive infrared.
* **Automated garage door:-**

Advantages

Almost any garage door can take advantage of the benefits afforded by automation

1. **Increased Reliability with Automated Doors**

Automated doors are a lot more reliable than old manual doorways because they are operated by machines and electricity and these machines cannot wear easily. You do not need to move an inch from your place to open and close these doors.

1. **Versatility and Style with Automated Garage Doors**

Manual car port doors were not very stylish in nature because at that time, garages were made in the back yard and people did not pay much attention towards its looks. These days, garages are made in front and garage door has become an icon of exterior.

1. **Automated Garage Doors Can Increase**

The Property Value Of Your House If you can install an automated garage door with all the above mentioned features then, it can also increase the overall property value of your house. People these days look for two basic things in any house and these two things are security and beauty. Garage door represents both of these things because security is primary feature of these doors while being in front has forced them to be attractive. So if you still have a manual garage entry way then, replace it with an automated version.

1. **Safety**
This is one of the main benefits of electric garage doors. These doors have special sensors that stop the door from closing when they sense some hindrance in its path. This is a great feature if you have kids or pets at home. You’ll have peace of mind about their safety.

## Sensors needed:

1. RFID
2. [infrared](http://www.wisegeek.com/what-is-infrared-radiation.htm) sensor (IR)
* **Sawmill laundry system**

## Equipment needed:-

For this system, we need a little amount of the equipment. But we get a lot of advantages; this system does not need a lot of money, its need cheap component, and it saves money for the person who uses it. This main thing needs to focus on it.

1. **DC Motor**

This motor used to raise the umbrella and lowered it according to sensor pulse. It use as actuator, to move the umbrella up or down according to weather .This means if the rain fell the motor move umbrella down towards the laundry to protect it from water, and if the sun rises it moves the umbrella away from laundry to allow the sunlight to dray it.

1. **Water sensor here we use capacitor.**

There are no water sensors can do this job as wanted, therefore capacitive transducer was made it is contain two parallel plates from Conductive material and between them dielectric material.

1. **Umbrella.**