

## **PROJECT DETAILS**

**1. Name of the Project** : Home Automation

**2. Brief description** :

**The basic aim of our project is home automation using beaglebone black.**

The popularity of home automation has been increasing greatly in recent years due to much higher affordability and simplicity through smartphone and tablet connectivity. The concept of the "Internet of Things" has tied in closely with the popularization of home automation.

**Home Automation** is a term used to describe the working together of all household amenities and appliances. For example, a centrally-controlled LCD panel can have the capability to control everything from heating, air conditioning, security systems, audio systems, video systems, lighting, kitchen appliances, and home theatre installations.



It is essential that the different controllable appliances be interconnected and communicate with each other. The basic aim of Home automation is to control or monitor signals from different appliances, or basic services. A smart phone or web browser can be used to control or monitor the home automation system.

**3. Technical Details** :( Pictures, Principles, Circuit/block diagrams, Drawings, etc.)

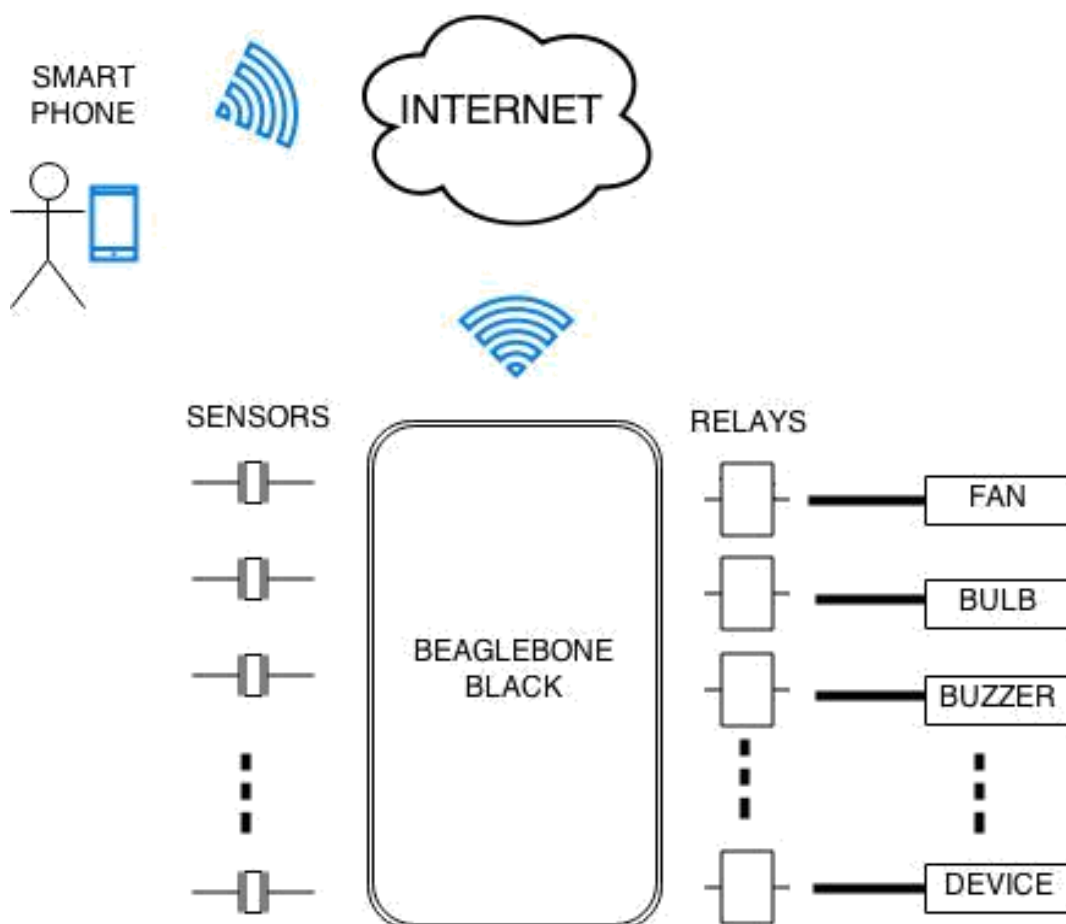
There are several reasons one might opt to use a single board computer.

- **Portability**
- **Intuitive**
- **Less power**
- **Cost effective**

Based upon ARM based processors from Texas Instruments, the Beagles are a bunch of single board computers aimed at open source computing with beaglebone black being the latest release. They offer scalable performance to fulfil multiple applications that demand reliable operation and industrial grade design and quality.

With the help of BeagleBoard, currently working as gateway, we can control, command, operate and observe the end devices. Here we are considering end devices like fan, bulb, TV, fire alarms, doors, thermostat etc. with the single gateway, the system can control entire home irrespective of number of rooms or boundaries where each room will be connected with single receiver.

For our project we are considering a single room and its various appliances. The beaglebone will be placed centrally and connected with rf modules. We will be creating a web socket which will have different toggle buttons for different appliances. The command will be sent by the user through smartphone as per the requirement to the beaglebone which will be transmitted further to the rf modules that will work according to the given command.



## FEASIBILITY

Till now we have been able to successfully control LEDs , various sensors like LDR and temperature sensors and door lock (using servo motor). We have created a web socket containing toggle buttons for these appliances. The web socket can be operated both on laptop and android base smartphones using any mode of internet connections by just typing the IP address of the web socket.

Similarly it can be applied on various other home appliances like TV, fan, Thermostat, etc mentioned above.

### **6. Applications of the project : (Expose innovation and commercial applicability)**

Here are the few applications which we will try to show through our project for a particular room.

1.     **Security** – With home automation, in case of fire emergency, the temperature sensor can detect a rise in the temperature in its vicinity and ring the alarm. In case the alarm goes off, the authorities can be alerted and a message can be sent to our cell phone by the system.
2.     **Thermostat** – This is programmed to run the central heating and cooling system as per our own required settings. For example, air conditioner is set to an energy saving setting when the house is vacant and sets back to the normal setting when the resident is about to return home.
3.     **Lighting** – This can be set as per our own required settings for dim and bright light by using relays. The lights can be turned off and on as per its use thereby reducing energy consumption.
5.     **Audio/Video** – The home automation system can turn on the stereo and play music or can also turn on the television to any channel.
6.     **Lawn sprinklers** – The sprinkler system can be activated as per the moisture content of the soil. The moisture content can be measured by the moisture sensor and appropriate message could be sent to the user to activate the sprinklers.
7.     **Doors**- Door can be opened and closed with the use of motors. The motor will be attached to the bolt and as the motor moves in a particular direction so does the bolt and the door can be opened or locked.

### **What makes our model better from what is available in the market.**

- **Design:** For future prototypes and improvements - a microcontroller and Wi-Fi module bundled by manufacturers to achieve faster communication between the transmitter and receiver will be utilized.  
Also, a triac based circuit can be used in the switching module implementation in place of the relays.
- **Cost Effectiveness:** It will help to achieve faster switching speeds and less power consumption. BeagleBone is a low-cost, high-expansion, hardware-hacker-focused BeagleBoard. It is small and comes with the high-performance ARM capabilities you expect from a BeagleBoard. BeagleBone Home Automation is an example of an Internet-age home automation solution.  
There are a number of expensive solutions that allow you to remotely control the lights within your house, but Beaglebone black is a much cheaper and more customizable solution. With a few simple tools, users can hook up their Internet-connected Beaglebone black boards to their house's power loads to control the lights via a mobile device.
- **Implementation:** Appliances can be constructed to have intelligent control features, for instance, the fan may not come on when the temperature is low in the night or the weather is cool during the day.
- **Environmental Impact:** Real time implementation and deployment of the system has a huge potential of minimizing energy wastage in both domestic and industrial electrical installations. This promises to be a relevant energy conservation model both for the developing and developed countries.