Deliverable B

GNG1103, Section # D Team # 3

Team Members:

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Throughout the interview, the client expressed the need to have a fully functional, modular, and portable house while being extremely efficient. In order to create a house that is very efficient, it must be automated in terms of lighting, heat, power, and obtaining water.

Heat:

The client expressed concerns that the house must require heat and cooling to the house at all times so that the person living in this space is comfortable and livable. To make this efficient, a discussion was performed throughout the group in charge of automation, and they suggested that to provide heat through the entire house as efficiently as possible is to have an automated thermostat. This automated thermostat is designed to turn on the heat and make the temperature of the house as comfortable as possible for the homeowner when they are inside it. At the same time, when the homeowner is out of the house or is sleeping under covers where heat is less of a necessity, the thermostat will lower the temperature of the house to save energy and make the house more efficient. The same ideology will be executed for the air conditioner where it cools the heat when needed and saves power when it can. Furthermore, to make the house even more efficient, a fan can be implemented to also circulate the air within the house so that it can stay cool without all the work needed to be provided be the air conditioning unit which uses much more power than the fan. With the help of these two ways to cool the house down, it can be even more efficient. Therefore, by automating the thermostat to turn on at specific times in the day, the house can become even more efficient in saving the limited power that the house has. This will most certainly please the client as all of there requirements are met if this plan was to be performed.

Power systems:

Due to the fact that the house will be powered just by using solar, a battery will be used to store power for the nights and cloudy days where the panel won't be as efficient. This battery will likely become full at some points so power will be wasted. This power can be potentially sold to the grid for money or sent to other places, to make this possible a option to automatically divert power from the battery and toward the grid should be implemented. Another way to

encourage power saving will be to make a battery monitor that will be mounted on the wall to tell the user how much power is currently left. The purpose of this will be to encourage whoever is living in the house to save power. Over time solar panels can become very dirty and as a result less power will be delivered to the house. A system should be created to monitor the incoming power and notify the person living in the house that the solar panels require cleaning.

Lighting:

It is obvious that this house will need to have some form of lighting and even if it wasn't something the client wanted we would have added it. This part of the project isn't too complicated as we decided to include lighting that has an automatic (on/off) and manuel (on/off) aspect to it. The reason we want to have both is because the automatic lights might not work well during the night so a manual switch to turn it off will be really helpful. Having automatic lights help in terms of saving energy because the lights will only be on when an individual is present in the space. It might be hard for the sensor to detect the individual during the night, hence why the manual aspect was added as well. Overall having both of these present will be very helpful to whoever stays in the house and it will be very beneficial towards saving energy.

Water:

Since we now know that the house will be located in a residential area with other houses of its kind, we will assume we are getting our water from the municipal water system. With where we are getting the water from now solved, the problems we will still need to solve include how/if we will filter the water, how we will heat the water and where to store it, by what method will we create and store ice, and how we will automate this whole process to make it simple and easy for the resident(s). If the water comes from the municipal water system it will not be necessary to filter it, but we still can. To do this we can use a simple filter that can be found at any home hardware store (ex. A Brita filter). To solve the heating issue we could use the heat from the sun on the solar panels to heat the water by placing the storage tank underneath the panels. Another more simple option is to use a normal heating tank that can be found in any house. For ice we can simply use an automated ice machine that creates ice and drops them into a container with a weight sensor on the floor which will tell the ice machine to turn off when its full. Lastly, to automate this whole process we could create a master control center that would give full control over all the settings of this system to the resident. Also, we could use motion sensors on the faucet so that this process is completely automated and clean.

Problem Statement:

The client requires us to build a Modular Net Zero home which will have water, lighting, a power system and heating. The client specifications are listed above. The purpose of this house is to help shelter women who have been oppressed by their husbands. The house is to be completed by the week of the 25th of March, 2019.