**King Abdul-Aziz University**

**Faculty of Engineering**

**Industrial Engineering Department**

**Computer Applications in Industrial Engineering I – IE332**

**2018**

**Section EA-BA**

**("A room automation dashboard for domestic users")**

***TEAM G11***

|  |  |  |  |
| --- | --- | --- | --- |
| Member Number | Name | University ID | Section |
| 1 | Abdullah Waleed Hawarnah | 1635455 | EA |
| 2 | Bader Omar Balamash | 1635669 | EA |
| 3 | Mohammed Osama Hariri | 1635493 | EA |
| 4 | Mautaz Ali Aljayzani | 1640593 | EA |
| 5 | Sulaiman Saleh Alhumied | 1636491 | BA |
| 6 | Nawaf Muhsin Alamoudi | 1635759 | BA |

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**Project scope:**

The benefits of doing this project is to make a simulation for a home automation system. First, creating the dashboard, which will control the facilities inside the room such as, lights, television, and air conditioner. Some of the commands used in this research are summarized in turning the lights and air conditioner on and off, controlling the fan speed and temperature of the “A.C.”. For the television, controlling the volume and turning the TV on and off are also included in the commands used. Some of the facilities included in our project can be summarized in: a button to play some foreign music, another button was for the entrance, so that we can control who enters and exits the house. The last button was “shutter button” which can control the shutter of the house up and down. Eventually, this will make people’s life much easier.

**Literature Review:**

Programming Languages are group of orders that can be defined as the process of writing instructions and commands to a computer or other device to guide and inform them about how to handle data or how to perform a series of required actions. The programming process follows specific rules to the language chosen by the programmer. Each language has its own characteristics that distinguish it from the other and make it suitable to varying degrees for each type of programs and the task required of this program. Programming languages also have common characteristics and common limitations because all of these languages are designed to deal with the computer. Programming languages (Software) are evolving with the development of hardware (Homepage.cs.uri.edu, 2018). When the computer was invented in the 1940s and 1950s, the computer was working in large numbers of electronic valves, and programming language was also complex, and was a series of numbers written in long code codes These numbers are Zero 0 and 1, and that was difficult for programmers (Computerhistory.org, 2018). However, by creating a transistor, the size of the computer become much smaller and its capabilities have increased. At the same time, specialists and programmers were able to invent easier-to-use programming languages, and programming languages have become widely understood by professionals Such as C, C sharp, and C++ (Encyclopedia Britannica, 2018).

C sharp is one of those programming languages. It isa [multi-paradigm programming language](https://en.wikipedia.org/wiki/Multi-paradigm_programming_language). It developed by Microsoft and released in 2000 then later approved by European Computer Manufacturers Association (ECMA). C# designed for the Common Language Infrastructure (technical standard). The code name was Cool, which stood for ‘C like Object Oriented Language’ then Microsoft decided to change the name because it was infeasible for trademark, it has been changed to 'C sharp' which reflect a musical notation where the sharp means getting higher semitone in the pitch. There isn't a best language; it really depend on the programmer taste. There is not to distinguish between Java and C sharp, only a small details. Usually C sharp is much more efficient than java and runs faster. In C sharp classes can be defined within classes unlike C and C++. However, C sharp makes more memory garbage and there is not much helping material available (InfoQ, 2018) (Computerworld, 2018).

C sharp programming helps Industrial engineers to design application that makes their work easy and increases productivity. There are many applications for industrial engineering by using C sharp language. First, C sharp could help them to create a Simplex method in order to find maximum profit or minimum cost. Second, industrial engineers can design application for project management by C sharp language that shows a project overview using a Gantt chart that can help them to manage tasks among employees. Third, industrial engineers can design a program for engineering statistics that help them to count data such as Chi-Square, binomial, exponential, Poisson, gamma, and Hypothesis Tests. Finally, C sharp could help industrial engineers to design Simulator software that allows them to experiment with design ideas and review outcomes. In the end, it can be concluded that C sharp is useful for Industrial engineers in their work (Code.daypilot.org, 2018).

The home automation today needs to make use of the latest technological components available. The idea behind the home automation system is that people may control their homes using a certain controller (i.e., remote control). In this paper, the design and implementation of a home automation system is used. By using and merging “C sharp” techniques and concepts together successfully, a result of a single wireless home automation system will take place (Ieeexplore.ieee.org, 2018).

Imagine if all things at your home based on technology. In addition, you can control them remotely. Nowadays, all devices such as lights, doorbells, cameras, window blinds and speakers can communicate to the system by connecting to the internet. However, people will have the ability to control all of them automatically. It is all about how smart your home is! A smart home is something touchable in our life. People can get an affordable system that connects AV in lighting, so that to allow them to control the lights. You can also change the color of the lights from your phone or tablet. The smartness of our homes reached a level that the thermostat can control the temperature of the rooms by sensing the hot or cold points according the weather news of each day. As well as we can control it using the voice commands instead of remotes which make life easier for us, and the device is called Escobee4 (PCMAG, 2018).

**Smart Home Control with Alexa**

You can use Alexa to control smart home devices such as cameras, door locks, entertainment systems, lighting, and thermostats. Alexa provides capabilities, or skills, that enable customers to create a more personalized experience (Developer.amazon.com, 2018).

**What You Can Do with Alexa**

With Alexa and the Smart Home Skill, you can increase yours awareness and engagement with your smart home devices. You can use a built-in voice user interface to enable yourself to control your connected devices from tens of millions of Alexa-enabled endpoints. You can certify your products through the Works with Alexa program to make it easy for for you to discover them, and to ensure an intuitive, hassle-free experience. with your voice calling alexa you can ask her to Turn on/off the lights, the Air Condition, the television. you can open the pelmet ,the garage doors. and you can even set up security system in the house when your outside your house (Developer.amazon.com, 2018).

**Identification of the Desired Needs/Requirements Analysis.**

In this project, we need to know how to use “C#” programming language to implement the desired output needed for this project. After finishing this project, we should be able to sell this output to householders (homeowner), because this product will eventually make their lives much easier and more flexible! No one could finish a certain work or project (especially if this project is hard and complicated) without the help of experienced people such as, electrical engineering or programming students, because they are, for sure, have the enough knowledge that we simply need. The inputs for this program consists of buttons, which will logically expedite the operation of controlling all facilities in the room. As a result, the outputs of the software will be turning all the facilities on/off, and controlling them by a simulated remote. The simulated remote will control lights’ level, A.C. fan speed, temperature level, switching T.V channels and finally lauding or lowering T.V volume. We may face some difficulties during the process of programming the automation dashboard, such as misplacing the codes, time management, and finding an experienced programmer to help us doing this project.

**Timeline:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Project End Date | | Project Start Date | | | Project Duration | | | Project Name | |
| 21-Apr | | 16-Mar | | | 36 Days | | | Home Automation | |
|  |  | Day6 | Day5 | Day4 | Day3 | Day2 | Day1 | Task Description | Task No. |
|  |  |  |  |  |  |  |  | Brainstorming | 1 |
|  |  |  |  |  |  |  |  | Topic selection | 2 |
|  |  |  |  |  |  |  |  | Writing project scope | 3 |
|  |  |  |  |  |  |  |  | Writing a literature review | 5 |
|  |  |  |  |  |  |  |  | Writing identification of the desired needs/Requirement Analysis | 6 |
|  |  |  |  |  |  |  |  | Designing the GUI | 8 |
|  |  |  |  |  |  |  |  | Coding the entrance group box | 9 |
|  |  |  |  |  |  |  |  | Coding the shutter group box | 10 |
|  |  |  |  |  |  |  |  | Coding the music group box | 11 |
|  |  |  |  |  |  |  |  | Coding the TV group box | 12 |
|  |  |  |  |  |  |  |  | Coding the AC group box | 13 |
|  |  |  |  |  |  |  |  | Coding the light group box | 14 |
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Figure 1: Gantt Chart

**Minutes of meetings:**

Table 1: Meetings

|  |  |  |  |
| --- | --- | --- | --- |
| Meeting | Time | Location | Attendance |
| Meeting 1 | 6:30 - 10:00 PM | Abdullah's House | 1,2,3,4,5,6 |
| Meeting 2 | 12:30 - 4:00 PM | KAU Library | 1,2,3,4,5,6 |
| Meeting 3 | 3:00 - 6:00 PM | KAU Library | 1,2,3,4,5,6 |
| Meeting4 | 9:00 PM–12:00AM | Boga Cafe | 1,2,3,4,5,6 |
| Meeting5 | 5:00PM-9:00PM | Deera Cafe | 1,2,3,4,5,6 |
| Meeting6 | 8:00PM-11:00PM | Nardeen Cafe | 1,2,3,4,5,6 |

**Member Contribution:**

Table 2: Contribution

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Tasks | Member number | 1 | 2 | 3 | 4 | 5 | 6 |
| Brainstorming | | # | # | # | # | # | # |
| Topic selection | | # | # | # | # | # | # |
| Writing project scope | | # |  |  |  | # |  |
| Organizing Timeline (Gantt chart) | |  |  |  | # |  |  |
| Writing a literature review | | # | # | # | # | # | # |
| Writing identification of the desired needs/Requirement Analysis | | # |  |  |  | # |  |
| Organizing meetings | |  | # | # |  |  | # |
| Designing the GUI | | # | # |  | # | # |  |
| Coding the entrance group box | |  |  | # |  |  |  |
| Coding the shutter group box | |  |  |  |  |  | # |
| Coding the music group box | |  | # |  |  |  |  |
| Coding the TV group box | |  |  |  |  | # |  |
| Coding the AC group box | | # |  |  |  |  |  |
| Coding the light group box | |  |  |  | # |  |  |
| Presentation | | # | # | # | # | # | # |

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