Project Work Progress Report

Week No: 01 Date: From: 04/02/2019 To: 10/02/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
05/02/2019	**LITERATURE SURVEY**: **Title:** An Android based home automation system **Author:** Alper Gurek ; Caner Gur ; Cagri Gurakin ; Mustafa Akdeniz ; Senem Kumova Metin ; Ilker Korkmaz **Abstract:** In recent years, the number of networks enabled digital devices at homes has been increasing fast. With the rapid expansion of the Internet, the owners have been requesting remote control and monitoring of these in-home appliances. This leads to networking these appliances to form a kind of home automation system. In this paper, an Android based home automation system that allows multiple users to control the appliances by an Android application or through a Web site is presented. The system has three hardware components: a local device to transfer signals to home appliances, a Web server to store customer records and support services to the other components, and a mobile smart device running Android application. Distributed cloud platforms and services of Google are used to support messaging between the components. The prototype implementation of the proposed system is evaluated based on the criteria considered after the requirement analysis for an adequate home automation system. **Conclusion** The paper proposes an intelligent automation system using Google Cloud Messaging server and Android operating system as the emerging technologies used in home automation area. The system has three hardware components: a local device to transfer signals to home appliances, a web server to store customer records and support services to the other components, and a mobile smart device running Android application. The functionalities of each different component of the system are dissected and the communication infrastructures of the parts are explained. Distributed cloud platforms and services of Google are used to support messaging between the components. Such a design of service and data distribution through public and free Google platform makes the system cost-effective. The prototype implementation of the proposed system is evaluated based on the criteria considered after the requirement analysis for an adequate home automation system. According to the evaluation results, the proposed home automation system, which uses state-of-the-art cloud technologies and Android applications, is adequate in overall. The feature work may be to focus on how to measure those criteria in units rather than summarizing the result as “adequate” or “inadequate”.

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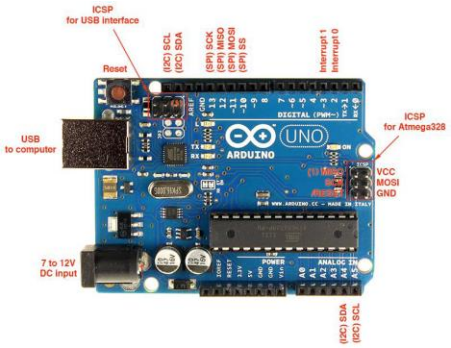
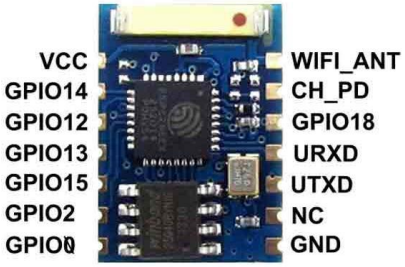
Project Work Progress Report

Week No: 02 Date: From: 11/02/2019 To: 17/02/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
13/02/2019	**Collection of Hardware Components:** **Arduino UNO R3** The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs).  **ESP8266-01 - Wi-Fi Module** The Wi-Fi library for ESP8266 has been developed basing on ESP8266 SDK, using naming convention and overall functionality philosophy of Arduino Wi-Fi library. 

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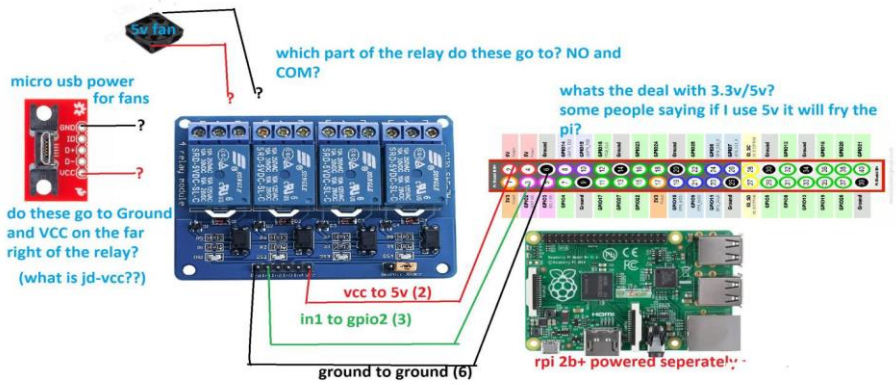
Project Work Progress Report

Week No: 03 Date: From: 18/02/2019 To: 24/02/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
20/02/2019	**Collection of Hardware Components**: **LM35 Temperature Sensor** The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature.  **Relay Module 4-Ch** Use this 4 Channel Relay Module board to interface any Microcontroller with Electrical Appliances/Loads. Can also be used in driving high power motors.4-channel relay output modules, relay output contacts 250A 10A. Input IN1, IN2, IN3, IN4, the signal line LOW effective. VCC, GND power input, can relay a separate power supply relay power input of JD-VCC. 

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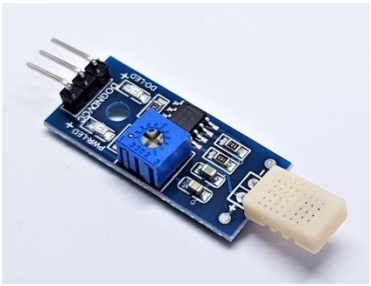
Project Work Progress Report

Week No: 04 Date: From: 25/02/2019 To: 03/03/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
27/02/2019	**Collection of Hardware Components**: HR202 Humidity Sensor HR202 resistive humidity sensor, which exposes excellent linearity, has a wide measurement range and a low power consumption. The module features both a power output indicator LED and a digital output indicator.  Connections Learn from the websites https://www.circuito.io/static/reply/index.html?solutionId=5cd8247771e936003077752e&solutionPath=storage.circuito.io This link provides step by step guide for making the connections of Arduino board and other hardware components.

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Project Work Progress Report

Week No: 05 Date: From: 04/03/2019 To: 10/03/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
06/03/2019	**LITERATURE SURVEY**: **Title:** Embedding Internet Technology for Home Automation **Author:** Matthias Kovatsch, Markus Weiss, Dominique Guinard **Abstract:** As more and more digital appliances populate our homes, networking them to form a home automation (HA) system not only becomes an option, but almost a necessity. While comfort, security, and energy efficiency can be provided by many existing systems, they all remain complex islands that are difficult to expand and customize. We propose Internet technology to remedy the situation and to become the future solution for HA. For this, we analyze the feasibility of today's Internet technology about traditional HA solutions. Furthermore, we present two case studies that substantiate the benefits of our proposal. **Conclusions:** In this paper, we presented the requirements of home automation systems and evaluated how current Internet technology compares to the capabilities of traditional standards. Where Internet technology was once seen too heavy-weight and expensive for low-cost hardware, recent advances, such as 6LoWPAN and embedded Web servers, foster our belief in Internet technology to become the future standard of home automation utilizing IPv6 as a 'virtual installation bus hat is able to cover all emerging aspects. To summarize, IPv6 forms an established and proven system whose features are well-suited for HA. Utilizing existing LAN infrastructures lowers the installation overhead while 6LoWPAN extends the network to inexpensive wireless embedded devices. Web technology on top eases development and ensures usability as it is already part of the users' daily life. Furthermore, the Internet's ubiquity and wide range of application possibly turns 6LoWPAN devices into mass market products which then will outrank specialized systems in price and reliability. We also resented two case studies that demonstrate further benefits of Internet technology in the home. The Web application layer allows for loosely coupled services following the REST paradigm. This way, the development process of applications is eased as standard components, libraries, and toolkits are available. For users, well-known concepts like scripting and mashups enable unprecedented customization options. For mobile access, in our case smart meter feedback on the iPhone, a standalone 'app' that fully exploits the devices' features can be better suited than a Web page. Thanks to a RESTful API and widely available support for Web programming, vendors can easily port the presentation layer to different platforms.

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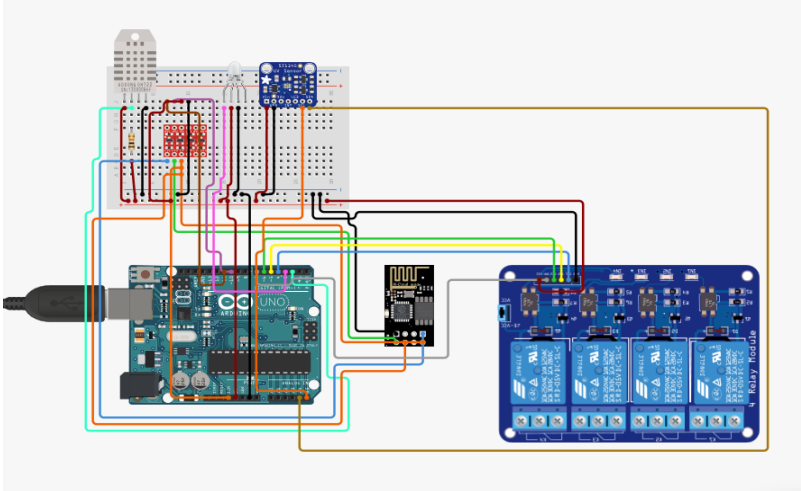
Project Work Progress Report

Week No: 06 Date: From: 11/03/2019 To: 17/03/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
13/03/2019	**Building of Hardware with all the Circuits Connected**  All the hardware components are connected but software components must be decided at this stage. All the pins are configured in the Arduino Board. The hardware requires Arduino IDE to run the Home Automation System.

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Project Work Progress Report

Week No: 07 Date: From: 18/03/2019 To: 24/03/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
20/03/2019	**LITERATURE SURVEY:** **Title:** Smart home automation. **Author:** Mihaly Saga, Dejan Mijić, Dejan Milinkov, Bojan Bogovac **Abstract:** This paper elaborates the idea of using an adaptive control system for managing household electricity consumption. The proposed solution aims at reducing the overall electrical energy consumption per household, thus decreasing their monthly electricity bills. The solution is based on a component-oriented architecture that provides a high degree of adaptability to different types of users in terms of ways to access the application (smart phones, web browser), the interaction with the individual devices and independency from various types and configurations of devices. It leverages the benefits of available tools and technologies such as device controllers, web services, mobile platforms, together with well-known concepts of artificial intelligence and some of the services that will be available soon, such as meter data management systems. Beside previously mentioned decrease of energy consumption, this solution can manage and monitor grid energy storage and household renewable energy sources, if available, and therefore its application results in offloading power grid starting from the lowest level of granularity - the end user. **Conclusions:** The proposed solution combines already existing technologies and emerging solutions in a new and innovative way that strives to optimize power management within modern households, tackling the problem of high global energy consumption at the lowest level of granularity, the end user. Extensible, component-based architecture, together with adaptable controlling system is what makes this solution perfectly fit to various types of users. It allows the final user to have complete control over the system with minimum amount of time required to be spent on monitoring the system activity. The primary task of proposed solution is scheduling device activities in an optimal way, to minimize total power consumption without disrupting user comfort and commodity. In the long run, reducing of power consumption on a daily level would result in decreasing monthly electricity bills. Further research on this topic includes development of platform independent client application, and designing suitable user interface for it, to make this solution available to a wider set of users.

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Project Work Progress Report

Week No: 08 Date: From: 25/03/2019 To: 31/03/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
27/03/2019	**LITERATURE SURVEY:** **Title:** Optimization of Home Automation Systems Based on Human Motion and Behavior **Author:** Taha Mehrabi, Alan S. Fung, and Kamran Raahemifar **Abstract:** Given the reduction in cost and power supply of wireless systems along with the increasing demand for conserving energy when controlling consumer electronics and home appliances, smart home automation systems are more popular than ever before. A home automation system designed for reducing electricity consumption typically uses different sensors located in different areas of the house that communicate with a process unit to control the lights, HVAC system, consumer electronics, etc., so that the process unit turns these systems on only when needed. Additionally, other automated tasks may include setting the HVAC to an energy saving setting while the house is unoccupied and restoring the normal setting when an occupant is about to return. To optimize current home automation systems, it is proposed that by considering the behavior of the residents inside a house, the power consumed daily will be significantly reduced. Such a power reduction could be achieved by both the sensors that monitor the motions of the residents inside a house and the adaptive control system that promptly adjusts itself to the most efficient level to further reduce electricity consumption based on different actions, habits and lifestyle of the residents. **Conclusions:** A new system optimization was proposed that firstly suggested the requirement of solidly programming the process unit to further improve system reliability and reduce power consumption. In other words, different areas in the house must be categorized based on the roles they play for the people inside them. Once this is achieved, algorithms must be developed to run on the process unit for each of these groups separately. For example, the type of sensor used in a washroom was suggested to be a motion detection sensor only (infrared or ultrasonic), and a specific code for the washroom must be run that covers all the possible cases without causing any discomfort for the residents. The main idea is to avoid the one extreme of using the same components, such as sensors, in every area of the house and the other extreme of giving a unique code to each area on the central controller. Rather, a few codes and components would be enabled to match the purpose of an area.

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Project Work Progress Report

Week No: 09 Date: From: 01/04/2019 To: 07/03/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
04/03/2019	**LITERATURE SURVEY:** **Title:** Prediction of Human Actions in a Smart Home Using Single and Ensemble of Classifiers **Author:** Basman M. Hasan Alhafidh, Amar I. Daood, William H. Allen **Abstract:** There is a growing need for home automation systems that monitor and control a smart home environment to produce an efficient system that accurately predicts the needs of the human occupants. Past research has focused on the accuracy of prediction of a user's future action. However, much of that work uses synthetic datasets which do not always reflect the real-world interactions that occur between an individual and the home environment. In addition, a focus on prediction accuracy often comes at the cost of slower processing time. This paper focuses on the prediction of future human actions in an intelligent environment with the goal of achieving both high prediction accuracy and response times that are appropriate for a real-time application environment. We performed experiments using the MiPad dataset, which was gathered from a fully-instrumented home environment and compared several different machine learning algorithms that included both single and ensemble classifiers. This study investigates whether an ensemble approach will satisfy the condition of real-time application much better than the performance of a single classifier. The results show that using a Support Vector Machine as a single classifier approach achieves the best results when using a group of sensors within a local zone, while the Random Forest classifier as an ensemble classifier approach achieves a higher performance when using sensors that are distributed across all zones inside the environment. The results lead us to the conclusion that dividing the environment into smaller zones assures the best performance of machine learning algorithms which is represented by the combination of maximum accuracy with a minimum time response for the prediction process. **Conclusions:** This paper presented an investigation of the use of two different approaches to machine learning techniques, single and ensemble of classifiers, for the prediction of user actions in a real-time automated home environment. The MavPad dataset was used to train several well-known MLAs for each approach in 30-days period followed by a 7-days dataset used to test the effectiveness of the proposed system after dividing the environment into two different space zones. We demonstrate several significant contributions from our results. First: using SVM as a single type of binary classifier gives the best results when using a small number of sensors in a specific zone (Local Zone) with minimum prediction time. The second conclusions: SVM shows inconsistent results when using all the sensors in the global zone of the home environment. Therefore, the Random Forest (RF) ensemble classifier approach gave the best combination of accuracy and execution time.

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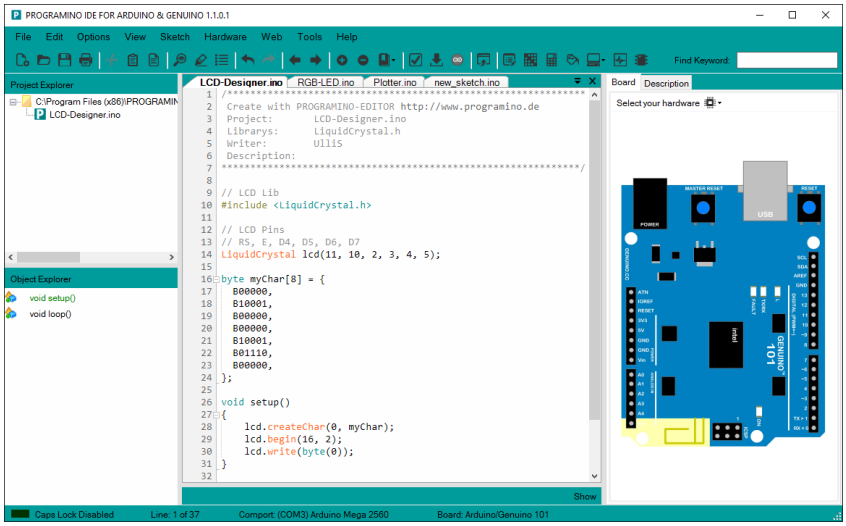
Project Work Progress Report

Week No: 10 Date: From: 08/04/2019 To: 14/04/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
11/04/2019	**Software Components :** **Arduino IDE** The Arduino Integrated Development Environment - or Arduino Software (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuine hardware to upload programs and communicate with them. Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. 

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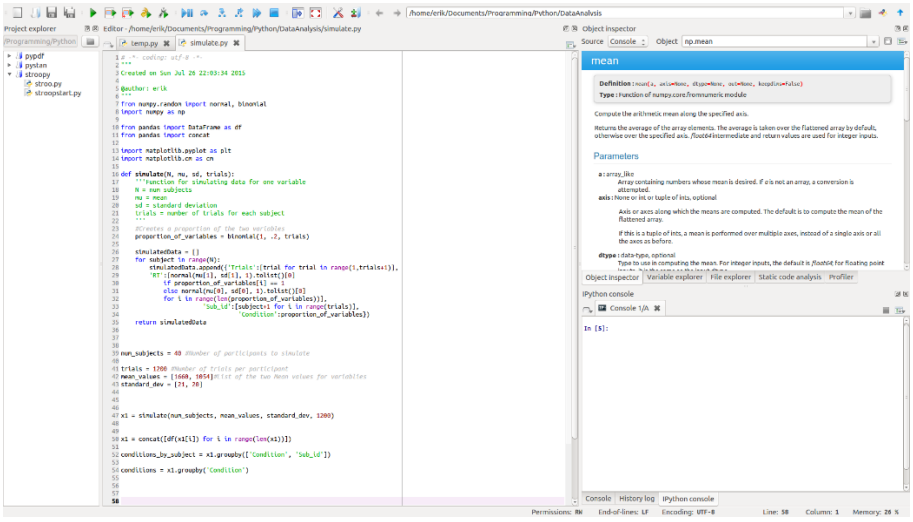
Project Work Progress Report

Week No: 11 Date: From: 15/04/2019 To: 21/04/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
17/04/2019	**Software Components :** Spyder is a powerful scientific environment written in Python, for Python, and designed by and for scientists, engineers and data analysts. It offers a unique combination of the advanced editing, analysis, debugging, and profiling functionality of a comprehensive development tool with the data exploration, interactive execution, deep inspection, and beautiful visualization capabilities of a scientific package. Beyond its many built-in features, its abilities can be extended even further via its plugin system and API. Furthermore, Spyder can also be used as a PyQt5 extension library, allowing developers to build upon its functionality and embed its components, such as the interactive console, in their own PyQt software. It is used to import the data from the CSV file and use the data to predict the outcome of the appliances. 

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Project Work Progress Report

Week No: 12 Date: From: 22/04/2019 To: 28/04/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
24/04/2019	**LITERATURE SURVEY:** **Title:** Sensors in Smart Homes for Independent Living of the Elderly **Author:** Pireh Pirzada, Neil White, Adriana Wilde **Abstract:** A rapidly ageing population requires support systems which would enable them to preserve dwellers' independence without compromising on their safety or their quality of life. Smart homes for the elderly have the potential to offer unobtrusive health and wellness monitoring. The aim is to provide a safe, independent living environment which can identify and predict problems by monitoring the activities of daily living (ADLs) of the inhabitants. For this, a system able to handle continuous streams of data is required. Such a system can extract the information by using appropriate classification and learning algorithms and thus allow the remote monitoring of health and wellbeing at a high level. The implementation requires: the use of appropriate sensing technologies, identification of ADLs, data pre-processing techniques and machine learning algorithms. This is challenging due to individual differences: such a system must be able to personalize individual needs. Our contribution was the design and implementation of a platform to smartly monitor health condition of elderly using sensor data from a smart home, through an interactive user interface which is user-friendly and multiplatform. This proof-of-concept used off-line data, with the view to extend to real-time data collection in the future, which could then be used to inform support providers remotely. **Conclusions:** In this paper, we have presented a design and implementation of a system that could monitor health conditions of elderly person living alone using sensors in unobtrusive manner. Allowing caretakers or loved ones to be in touch and monitor health and environment status remotely. The main purpose of smart homes for elderly was to allow non-invasive and unobtrusive monitoring without affecting their dignity while being at comforts of their homes. For future work, the system currently caters single person's activities which could widely differ if multiple elderly persons live in a smart home. Along with that extending this system to gather data on Realtime basis from an elderly home with monitoring anxiety, depression and other such mental health factors could extend the features of the system.

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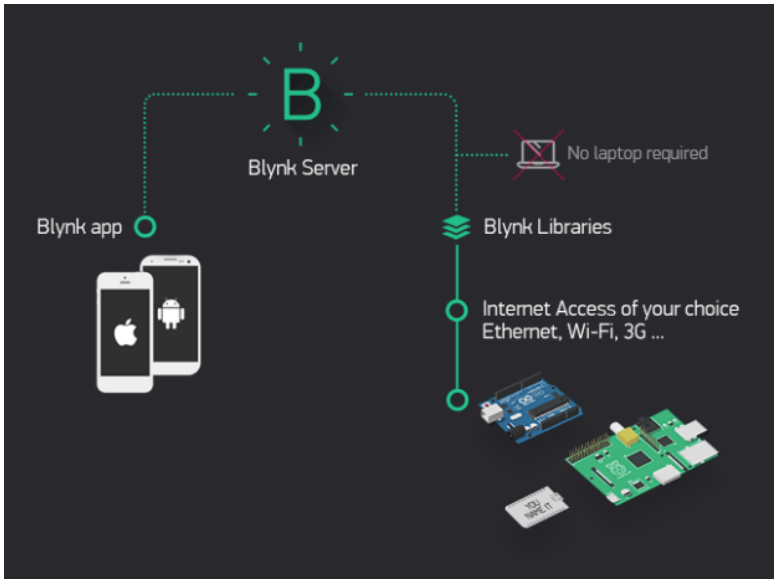
Project Work Progress Report

Week No: 13 Date: From: 29/04/2019 To: 05/05/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report
30/04/2019	**Android Application :** Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen. Using the widgets, you can turn pins on and off or display data from sensors. Whatever your project is, there are likely hundreds of tutorials that make the hardware part easy but building the software interface is still difficult. With Blynk, though, the software side is even easier than the hardware. Blynk is perfect for interfacing with simple projects like monitoring the temperature of your fish tank or turning lights on and off remotely. Personally, I'm using it to control RGB LED strips in my living room. 

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Project Work Progress Report

Week No: 14 Date: From: 06/05/2019 To: 12/05/2019

Project Title: **IOT based Home Automation System over cloud**

Name of the Guide: Associate Prof. Madhu B.R.

Name of the Student: Vaishnavi K R, Tushar Jain, Sohan Chopdekar, Dushyanth N Gowda

Date	Report

08/05/2019	**BLYNK APPLICATION:**
	
	After downloading, open your application, it will ask you to select board, you will choose ESP8266. After that you will be asked to login, enter your email id and password. Then follow the video.
	
	An authentication code will be sent to your email id, this code will be used in your program which you will upload on your wi-fi.
	
	Arduino Code:
	
	Download the DHT Library from the link given below:
	
	https://github.com/surilli-io/DHT11-Library
	
	Unzip it and paste in into This PC > Documents > Arduino > libraries.
	
	Now you have completed setting up your hardware. Copy and paste the code given below into your Arduino IDE sketch and hit upload.
	
	`#include <BlynkSimpleEsp8266.h> //include Blynk library`
	`#include <dht.h> //include temp sensor library`
	`#define dht_apin 4 // Analog Pin sensor is connected to pin 4`
	`dht DHT;`
	`char auth[] = "********************"; //Enter the authentication code`
	`char ssid[] = "**********"; //Enter the name of your wifi`
	`char pass[] = "**********"; //Enter password of your wifi`
	`void setup(){`
	`Blynk.begin(auth, ssid, pass);`
	`Serial.begin(9600);`
	`delay(500); //Delay to let system boot`
	`}`
	`void loop()`
	`{`
	`Blynk.run();`
	`Blynk.syncAll();`
	`Blynk.virtualWrite(V0, DHT.temperature); //write value of temp to V0 pin`
	`Blynk.virtualWrite(V1, DHT.humidity); //write value of humidity to !1 pin`
	`DHT.read11(dht_apin);`
	`}`

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