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ijirset@gmail.com

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Smart Mirror Using Raspberry Pi

S. B. Dhekale¹, Komal Jadhav², Diksha Ingle², Mansi Shirode²

Assistant Professor, Department of Electronics and Telecommunication Engineering, AISSMS College of Engineering, Pune Maharashtra, India¹

U. G Student, Department of Electronics and Telecommunication Engineering, AISSMS College of Engineering, Pune Maharashtra, India²

ABSTRACT: This project presents the design and implementation of smart mirror which is used to perform multiple operations such as monitoring of real time temperature and also to monitor the energy usage of electrical appliances in home. Single board computers are perfect match for the project of smart mirror as per the requirements needed. Any single board computer can be used to make a smart mirror. We are going to display energy usage values, from which the user can easily analyse the total energy consumption and would be able to keep record of it. The existing models use Wi-Fi or internet network to know the outside weather and climate. In this project we are going to display the real temperature and humidity and also going to display the dew point by using temperature and humidity values.

KEYWORDS: Raspberry Pi Electron JS, Backend python programming, Javascript, HTML, CSS.

I. INTRODUCTION

We built this project to change the purpose of smart mirror. We have interfaced DHT11 with raspberry pi board to monitor and display real time temperature and humidity of that particular place where this smart mirror will be installed. Smart mirrors are widely employed interactive component to show climate, time, date, news feeds etc. Mostly the data is collected from web API's. Rather than being used only to display news events and remainders, we used it to display the energy usage of electrical appliances with help of current transformer and sensor. ACS712 current sensor is used with current transformer to sense and measure the current and hence calculate the total consumption of energy by appliances. We have also provided the services to control some lights and fan of rooms in a house using simple relay circuit. Other basic components such as monitor, acrylic sheet are used to improve interaction in between mirror and user. The user can easily control the appliances with respect to the real time temperature and humidity. To display the content on the monitor we used Electron UI framework.

II. LITERATURE SURVEY

Parameters	Paper 1: Vaibhav Khanna	Paper 2:Suryansh Chandel	Paper 3:V.E Pawar	Paper 4: Indrabhushan choubey
Single board computer	Raspberry Pi 3	Raspberry Pi 3	Raspberry Pi 3	Raspberry Pi 3
Language/Concept used	Artificial Intelligence	Face detection, IoT	Node.js, python, javascript	Computer vision, detection and tracking of moving object
Display actions	Weather, time, calendar, YouTube, maps	weather, calendar, traffic, news updates	To-do lists, calendar schedule, news weather	Calendar, news, weather, to-do lists



Working	This paper includes the working prototype and open standards like web services to communicate with other devices.	This paper includes The webcam which is attached to the Raspberry pi using the universal serial bus to detect user’s face using OpenCV. This will help in setting up the personalized profiles.	In this paper the smart mirror automatically turns on/off and starts performing actions by detecting the face of end user and gives o/p as audio of assistance.	This paper includes the same concept as paper3 but the difference is in the algorithm to detect moving objects. It is acquired by pixel to pixel abstraction proceeded by applying threshold to create binary image.
Personal assistant	Yes, same as alexa works	No	Yes	Yes

III. BLOCK DIAGRAM

The block diagram consists of various sensors interfaced with main controller. Here the controller we used in our system is Raspberry pi 4 model B. The temperature and humidity sensors are connected directly to raspberry pi module as it is the digital sensor and does not need any ADC in between. ACS712 (current transformer) is connected to raspberry pi through ADS1115 to measure the energy consumption of various electrical appliances in the house. Various electrical appliances are connected to ACS712. Raspberry pi has been given the power supply through a 5V adapter. The LCD monitor is connected with raspberry pi through HDMI cable to display all the services and data provided by raspberry pi after successful interface of the sensors to pi board. The acrylic sheet which is used as the alternative for mirrors is placed in front of the monitor to see the information displayed by monitor on sheet as well to give the mirror effect.

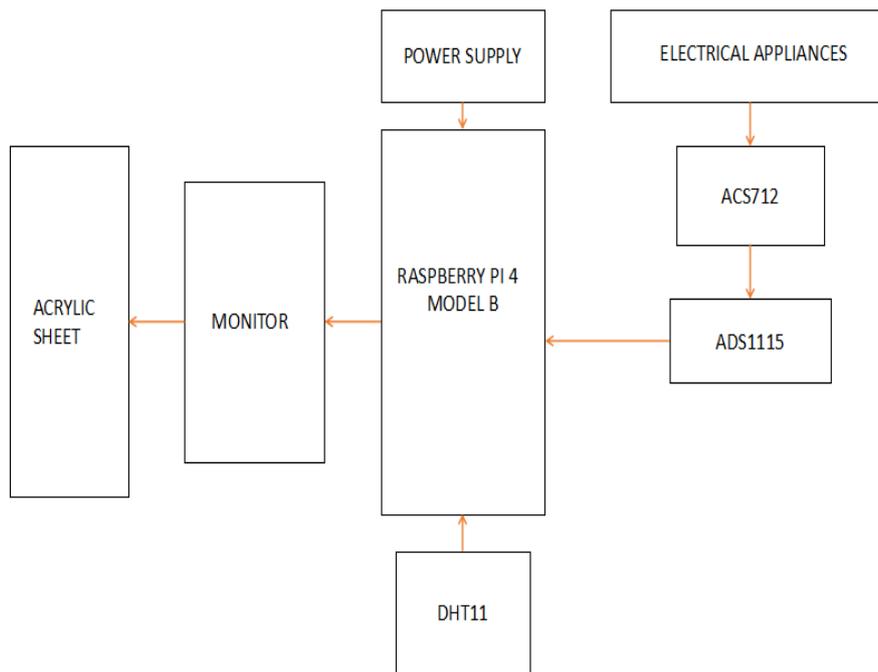


Figure 1. Block diagram of proposed system



IV. FLOWCHART

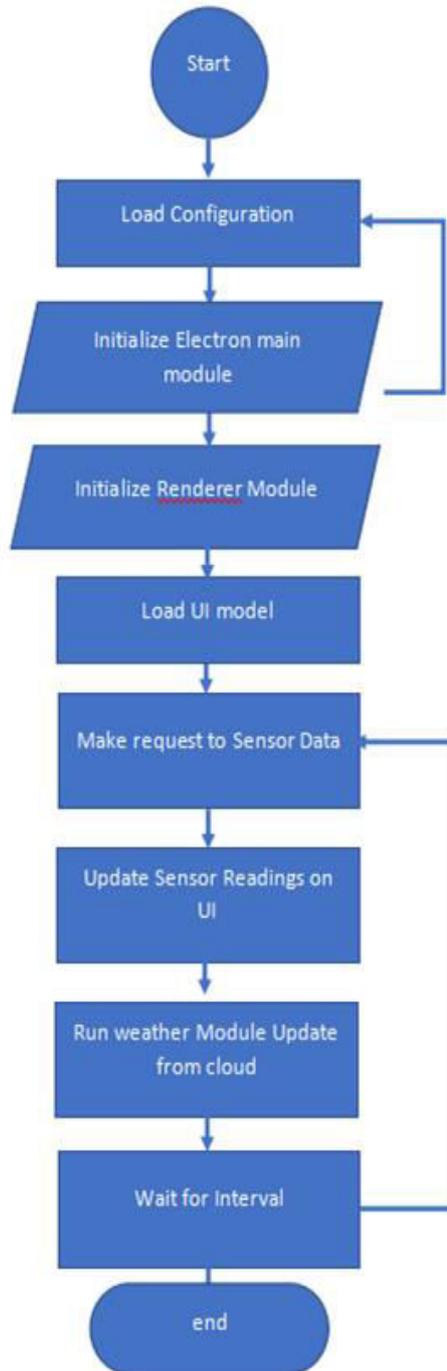


Figure 2. Front-end flowchart

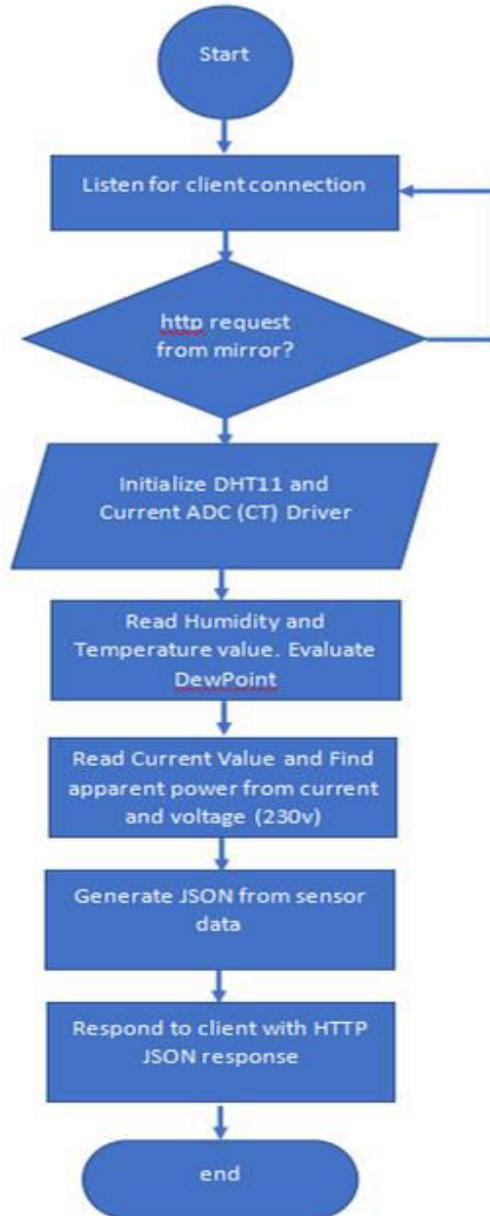


Figure 3. Back-end flowchart

V. IMPLEMENTATION

We interfaced DHT11 and current transformer to the raspberry pi 4 board which is under the black color case. The cylindrical yellow component is the current transformer to measure the current flowing in the appliances and the pink chip is nothing but the ADS1115 ADC to convert the analog values to digital and then feed the same to pi board. After allowing to run the total setup, display of monitor goes into mirror mode where all the values will be displayed .

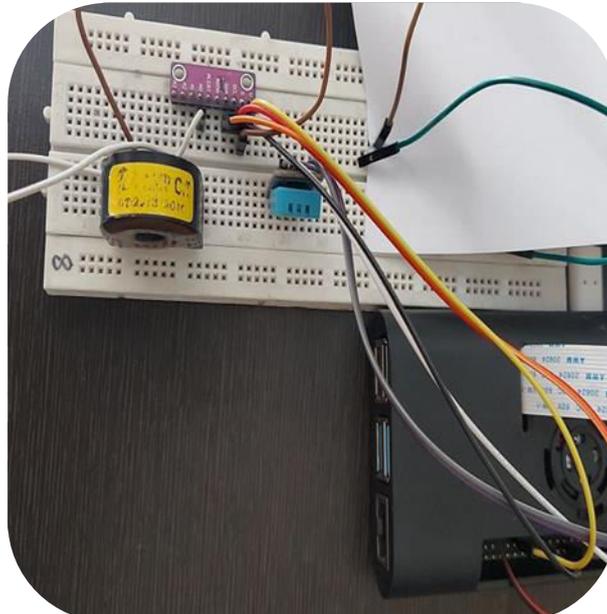


Figure 4. Setup of hardware

VI. RESULT

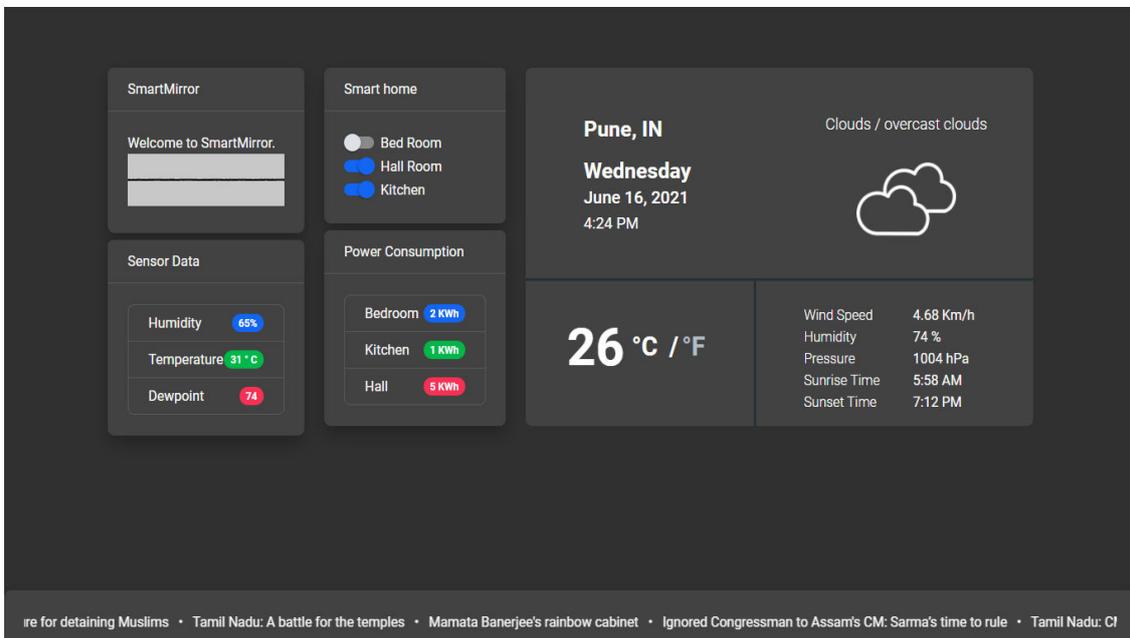


Figure 5. Demo display on smart mirror

VII. CONCLUSION

The Smart Mirror has the scope in the field of IoT and home automation. While using it during our daily schedule it will show the real time data like temperature, humidity. System helps avoid the extra time to look into the data manually by the user before stepping out of home. This absolutely can be used as a regular mirror since its name suggest as smart mirror.



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