IBM Internship Camp
Meerut Institute Of Technology, Meerut

Team Aryabhatta

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Team Coordinator:-
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Project Title:- "Smart electricity controller using face detection"

An idea of saving energy which can help in reducing the effect of Global Warming:-

As we all know that these days Global Warming are increasing rapidly which is a very dangerous sign for the all human beings, not only human being but for the whole earth. So it is very serious topic of concern and by keeping this in our mind we the members of "**Team Aryabhatta**" going to build an *AI system which may help us in saving the energy from wastage*.

It is often seen that we always forget to switch off lights and fan of our room, when we are leaving the room, so we are going to build an AI system which can detect the face in the room and if there will no one in the room the it will automatically switch off all lights and fan of the room. By this wastage of energy can be reduced which is indirectly related to the Global Warming.

Problem Statement:-

Build an AI system which can automatically switch off the lights and fans or other electrical devices of the room, when we leave the room or when the system find no any faces (face detection) in the room.

In this project we will use:-

Software:-
- IDE: - Jupyter Notebook (Anaconda)
- Programming Language: - Python3
- For GUI interface we have used tKinter(Python)
- For face detection: - OpenCV (Computer Vision)
- Machine Learning using Python (computer vision)
- Dataset to train the model: - Face Detection in Images | Kaggle + Personal images

Hardware:-
- Camera (Web camera) for face detection.
- Raspberry pi model 2
- Flex cable
- Bulb (light bulb)
- One Laptop/or PC
- Sensor
- USB cable

Benefits of This project:-

- ➢ Helps us in saving the wastage of energy.
- ➢ Financial benefits.
- ➢ Less time consuming.
- ➢ Eco friendly.
- ➢ Easy to implement.
- ➢ Indirectly helps in decreasing the effects of global warming.

How to make this project

Step 1: Tools We Will Need

Important Components (Hardware)

Raspberry Pi Model 2 - I'll admit, you could use a Model B or B+ (Or maybe even A) but I'd just go all out and buy the best one on the market. For £30/$41 you have a tiny power house that you can use for this project and many more!
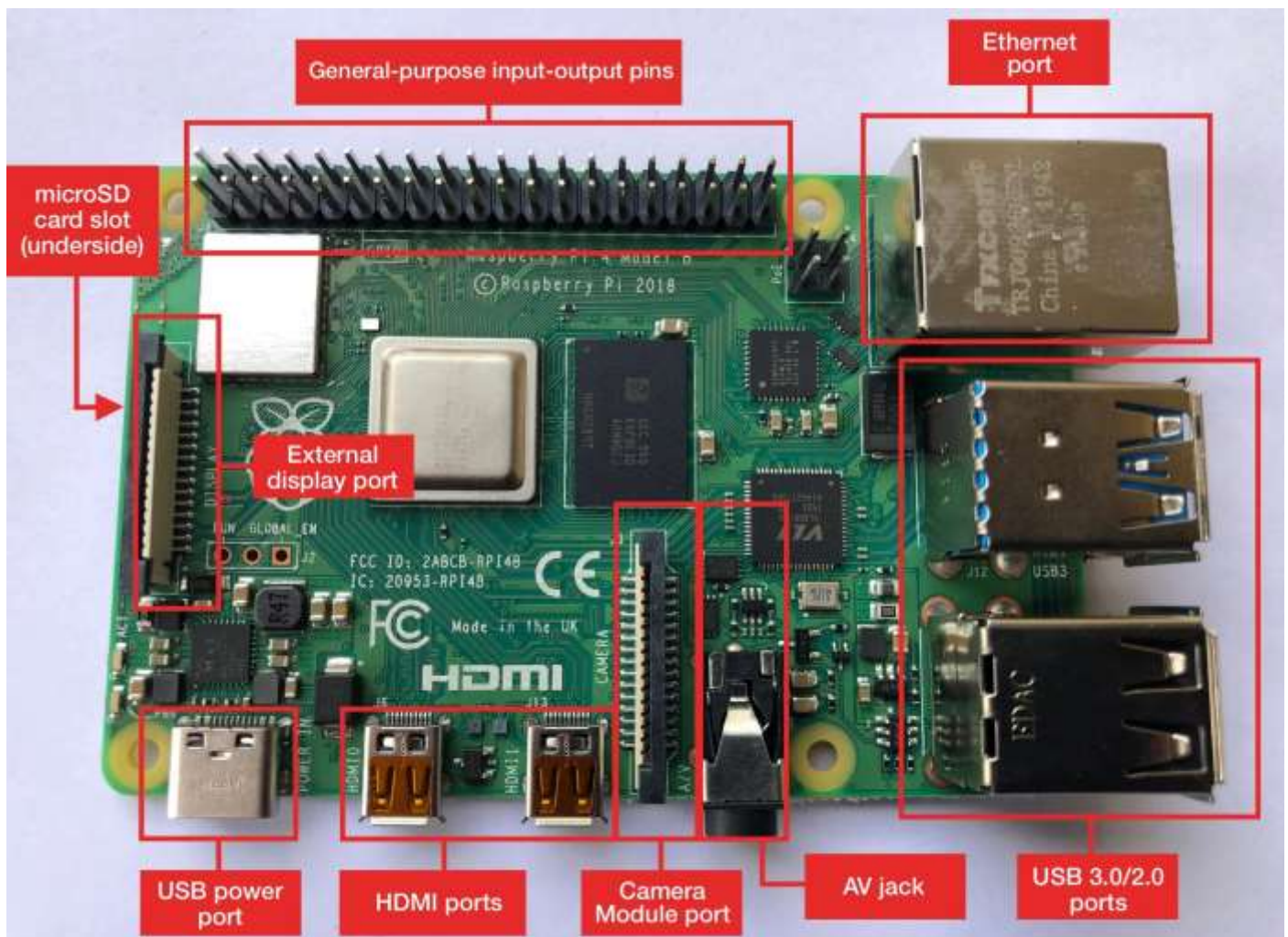
Amazon.co.uk - http://www.amazon.co.uk/Raspberry-Model-Desktop-Quad-Linux/dp/B00T2U7R7I/ref=sr_1_1?ie=UTF8&qid=1439931916&sr=8-1&keywords=raspberry+pi+2

eBAY.com - http://www.ebay.com/itm/40pin-Jumper-GPIO-Dupont-Kabel-20cm-Female-to-Female-Cable-Raspberry-Pi-trennbar-/201215511827?hash=item2ed9610d13

Additional Tools you may already have!

Now for tools most of us will already have lying around. I won't bother posting purchase pages for these just because most of us have these tools at hand!

➢ Philips/Crosshead Screwdriver (PH0/PH1 works best)
➢ Flat Head Screwdriver
➢ Wire Snippers
➢ Wire Strippers
➢ Craft Knife/Stanley Knife/Any Sharp Knife
➢ Soldering Iron/Cable Crimps/Cable Blocks
➢ Cable Flex (For extending our original wires to our lamps, ideal to keep everything in its original place, lex)

Step 2: Software

I ain't kidding when I say this is a large project. This is going to require an equal amount of effort in both hardware and software. So let's talk about the software we are going to need for this project. I will put links to all the different software need and setting each software up will be an individual step as it can be quite complicated. So let's dive in!

Raspbian - We are going to need an operating system for our Raspberry Pi to run. For this I will be using Raspbian as it comes pre-installed with Python and is a piece of cake to set-up and use. We don't need a pretty GUI however because we will just be using it's command line interface

Download - https://www.raspberrypi.org/downloads/raspbian/

Ignore these tools if you are using a Keyboard, Monitor and Mouse!

PuTTY * - We are going to need to be able to connect to our Raspberry Pi via SSH(**Secure Shell or Secure Socket Shell**). So PuTTY is the perfect client to do this.

Download - http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

Nmap * - If you need to know what the IP Address of your Raspberry Pi is we are going to use Nmap to find it.

Download - https://nmap.org/

FileZilla - We are going to need a way to transfer files onto the Raspberry Pi using SFTP(**Secure File Transfer Protocol**) which is FTP over SSH. Usful stuff

Download - https://filezilla-project.org/

Win32DiskImager - This will be used to burn Raspbian onto an SD Card for use in our Raspberry Pi

Download - http://sourceforge.net/projects/win32diskimager/

We will also need a Web Server for our Raspberry Pi but we will get that later because we will be using apt-get.

Step 3: Designing the GUI

We have used Tkinter module of python for the GUI interface.

Step 4: Wiring Up the Lamp, Relay Connectors and Raspberry Pi.

First of all let's prepare our Raspberry Pi and our Relay Connector. I recommend looking at the diagrams I have created to help you out. Depending on how many lights/lamps you want to add will depend on how many jumper wires you use.
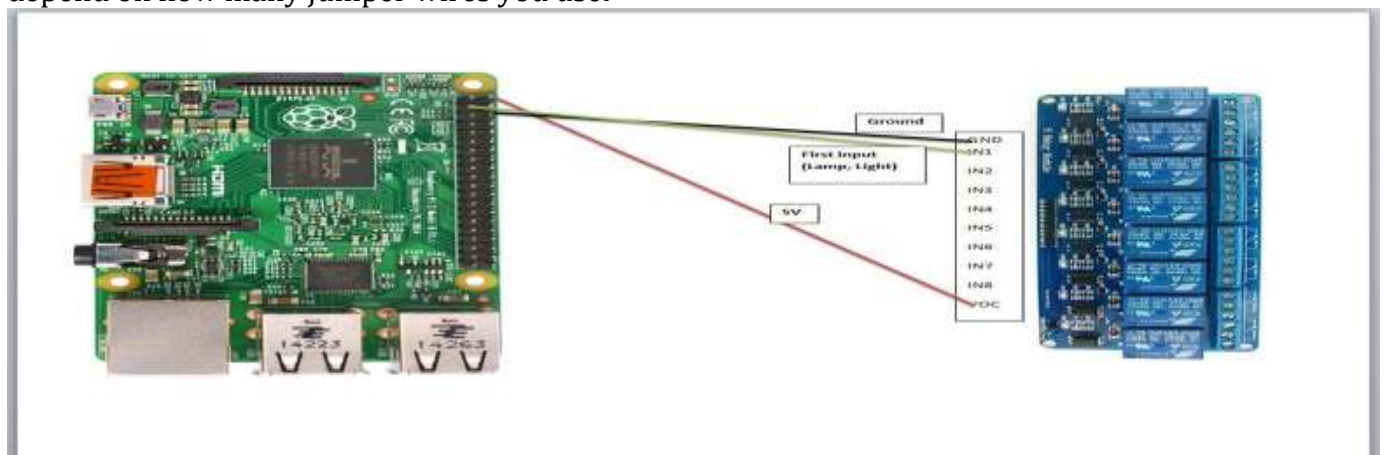

The image shows you how to wire up your Raspberry Pi to the 8 Channel Relay board using the Jumper cables. I recommend using Red for Positive and Black for Negative just to keep things simple

Now that you've wired this up we can prepare our lamp. Please refer to the diagram featuring the lamp. I apologize for my crude designs, but hopefully they make sense. Please read the step by step instructions incase you are confused.

1. Cut the flex cable in half using Wire cutters and then strip back the insulation.

2. You will have two wires inside the flex - Blue (Neutral) and Brown (Live) (In most cases). Strip back the insulation on both of these wires and twist the ends up to make a neat end.

3. Connect the two blue ends of the wire together using a connector block or solder. Connect the brown wire to the relay channel using the middle and left side of one relay switch. Fasten this down with the screw and make sure it's secure. Ensure that the wires cannot short out.
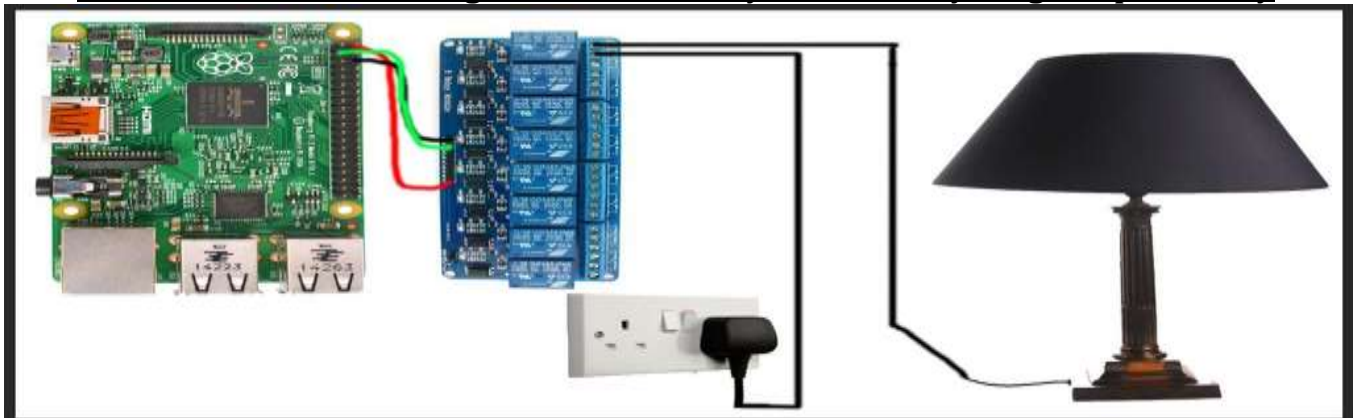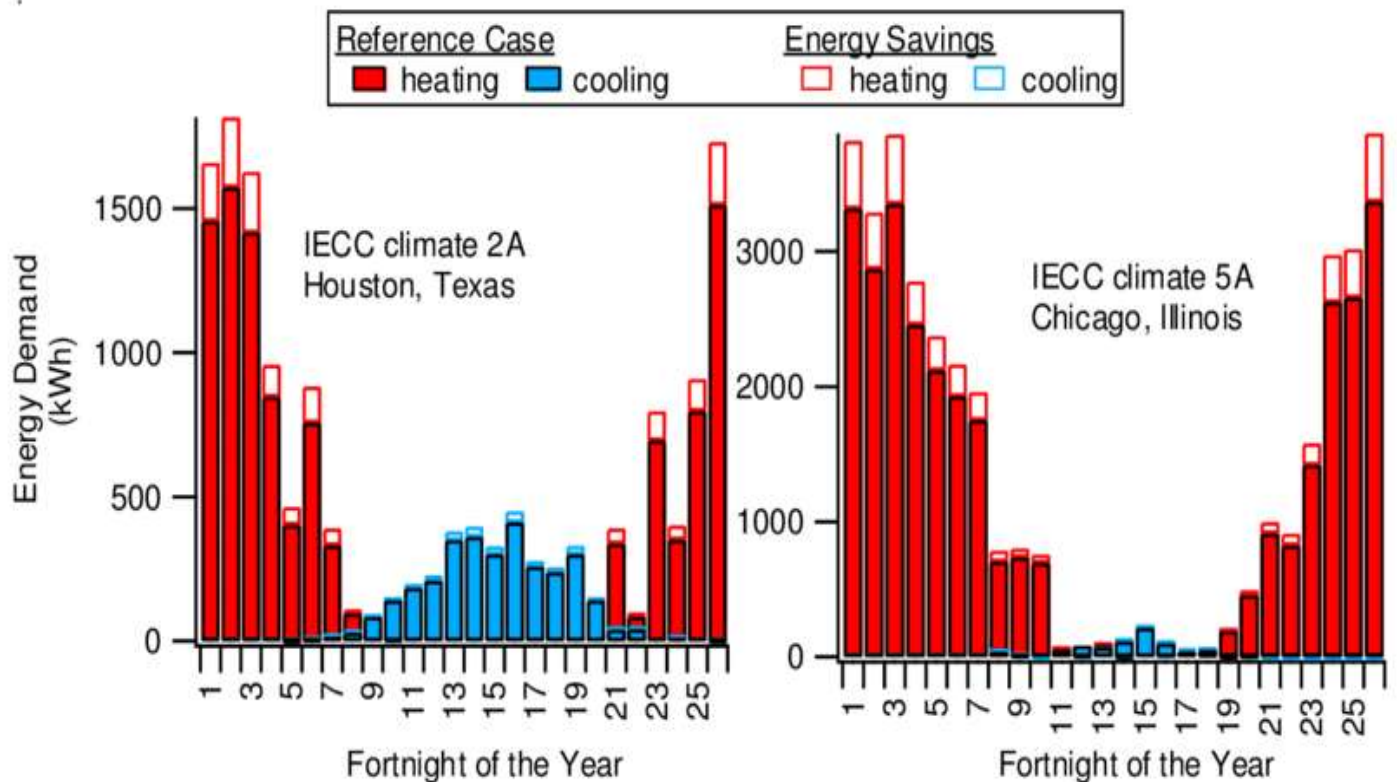
Flow Chart Of Project
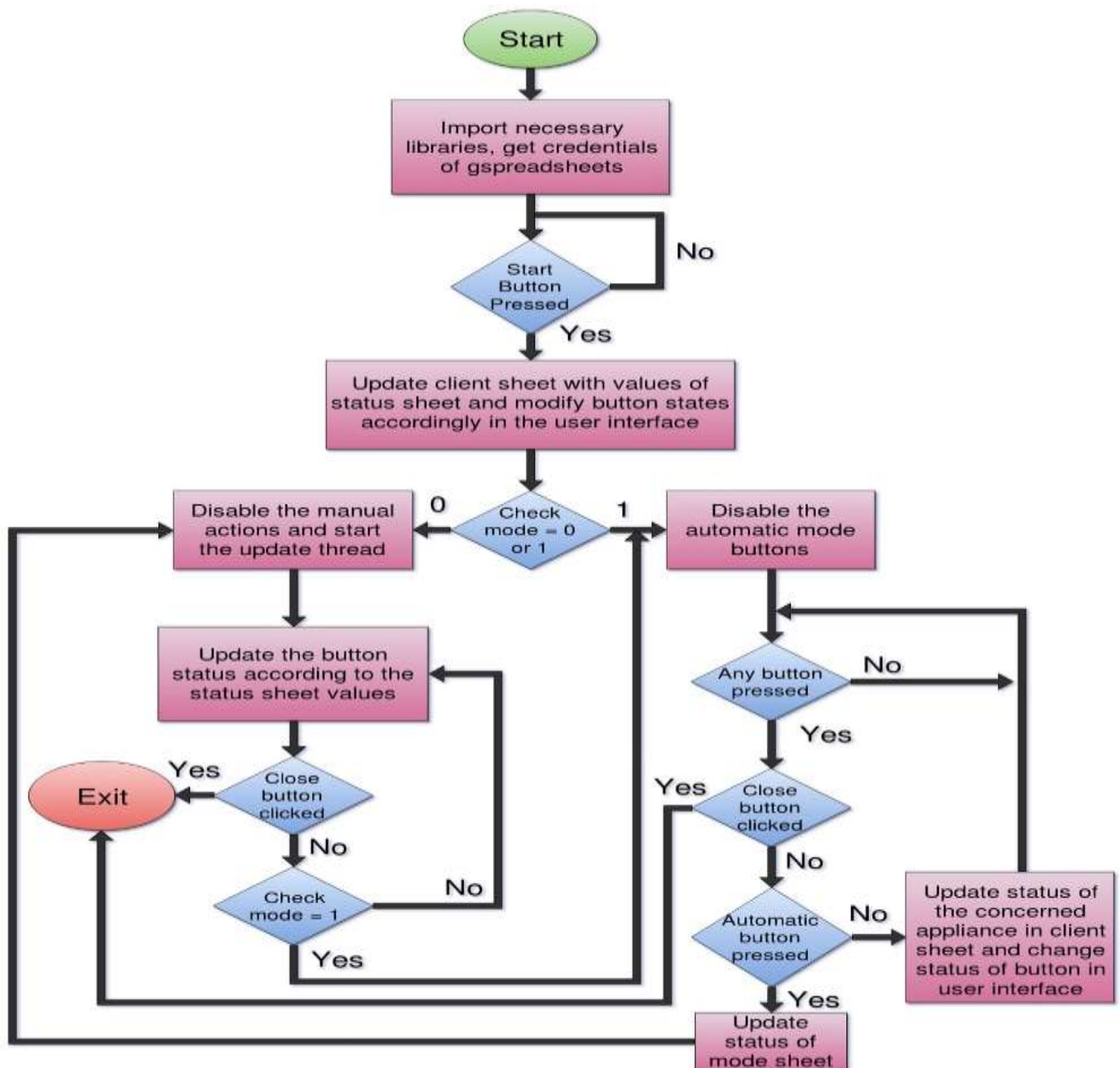
Automatic Room light Control

Analysis

By controlling the power supply of our house with the help of AI can save the electricity and change in effect of Global warming (heat).
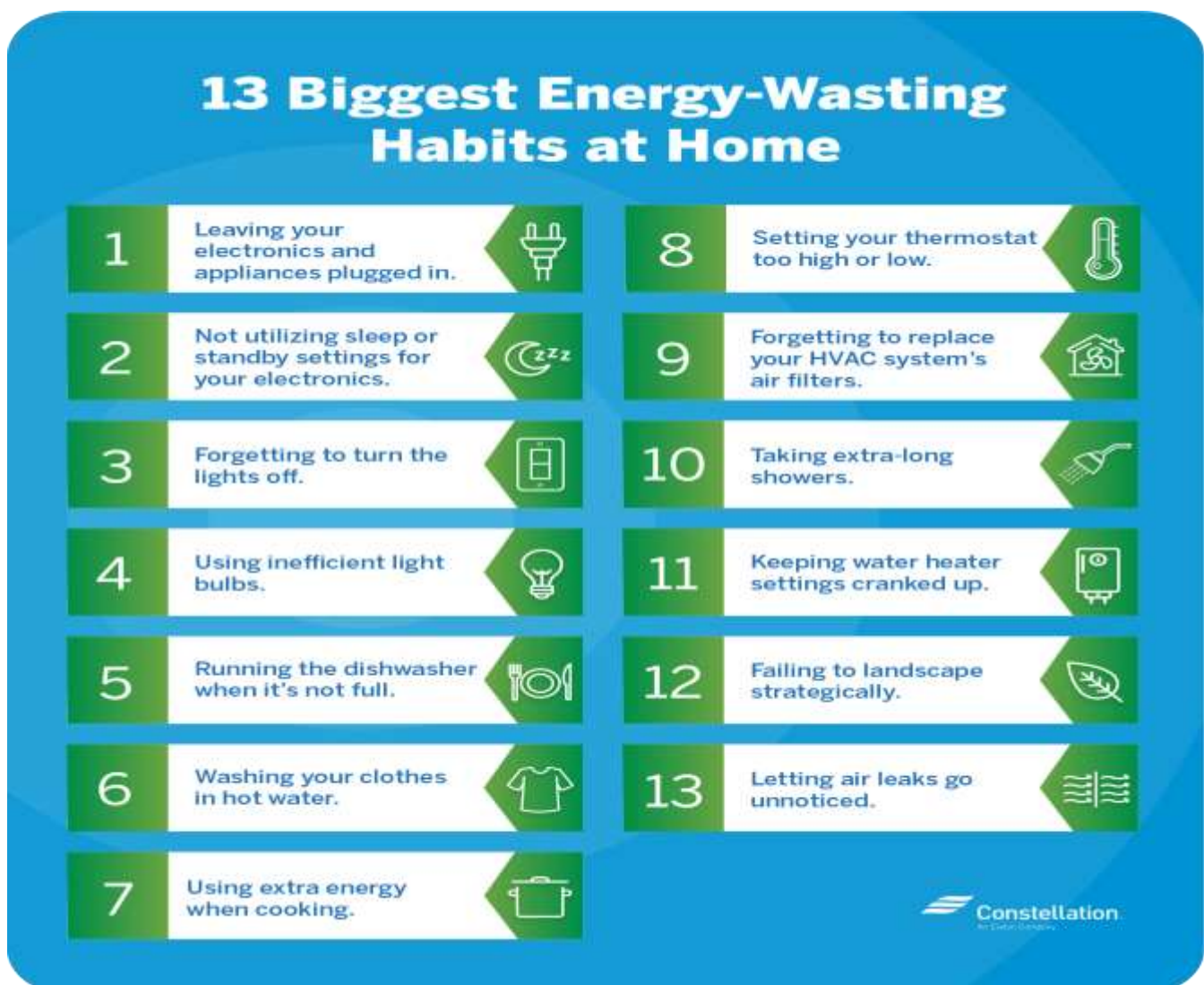

Source internet

Drivers of AI in energy management market: Impact analysis

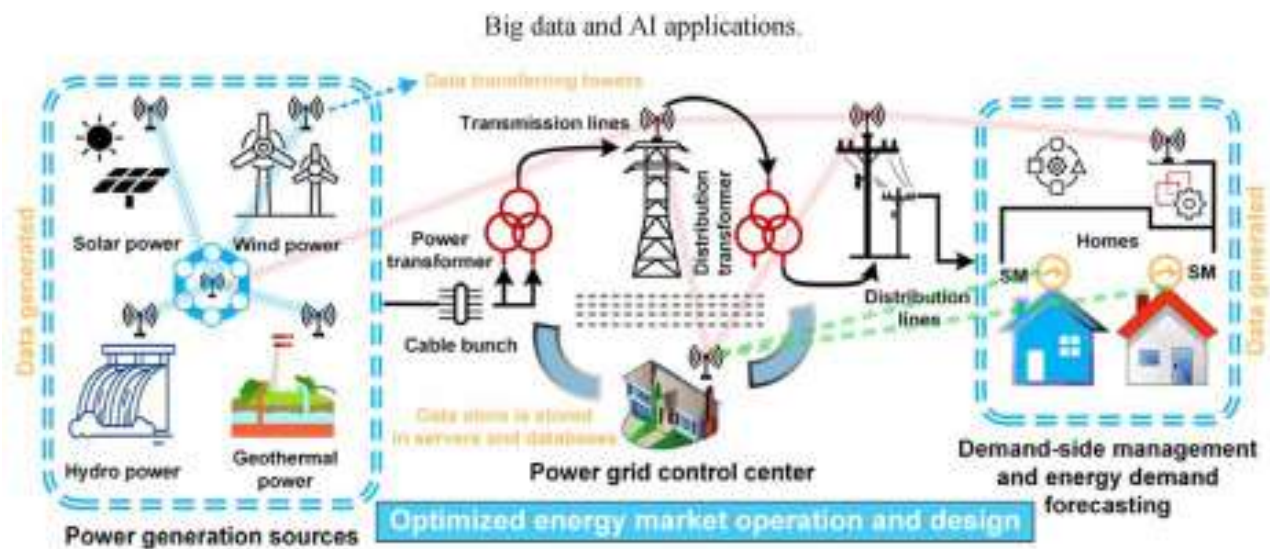## DRIVERS FOR THE AI IN ENERGY MANAGEMENT MARKET: IMPACT ANALYSIS

LOW   MEDIUM   HIGH

Leveraging AI to improve grid stability

LOW   MEDIUM   HIGH

AI to forecast energy usage and make energy-saving decisions

LOW   MEDIUM   HIGH

Increasing adoption of AI for low-carbon electricity generation

Common habits for wastage of energy at home**.**

13 Biggest Energy-Wasting Habits at Home

1 Leaving your electronics and appliances plugged in.

2 Not utilizing sleep or standby settings for your electronics.

3 Forgetting to turn the lights off.

4 Using inefficient light bulbs.

5 Running the dishwasher when it's not full.

6 Washing your clothes in hot water.

7 Using extra energy when cooking.

8 Setting your thermostat too high or low.

9 Forgetting to replace your HVAC system's air filters.

10 Taking extra-long showers.

11 Keeping water heater settings cranked up.

12 Failing to landscape strategically.

13 Letting air leaks go unnoticed.

Constellation

How can we save energy?

Big data and AI applications.

****************** ***Thank You*** ******************