Smart Plug

1. Gosund Smart Plug

What it is:

A power plug which can be fitted between power cords and sockets to function as a remote controlled power switch.

Setup:

- Insert the Gosund smart plug into a socket of your choice
- Scan the QR code on the Gosund box
- Download the Gosund app onto your smartphone
- Go to the app and sign up with your email address
- When prompted enter the verification code sent to your email address
- Setup an account password
- In the app select Add Device
- Select Add Manually and tap Socket(Wi-Fi)
- The application will ask you to verify your 2.4GHz Wi-Fi Network.
- Enter the password for your network and select Next
- Hold the RESET button (switch) for 5s.
- Make sure the indicator is blinking rapidly
- When you see a confirmation screen explaining the device has been successfully added (or when you see a red light on power button of the smart plug), select Done
- To turn the smart plug on and off select the plug you just registered
- Press the circle labeled Socket is off to turn on the socket

User Manual:

- The user manual that comes with the device is pretty straightforward. It asks you to download the Tapo app which also comes with a barcode to do so which directs you to the AppStore/GooglePlay depending on your phone or tablet.
- Once the app is downloaded the instructions to the set up are pretty easy to follow and answers to any troubleshoots can be found by clicking on the “I need help” button at the button of each page.
- However, the additional features such as sharing the device is not mentioned again after the initial setup phase which can easily be missed. I had to google again later to see how to do so.

Features:

- Can set a timer to control how much the socket will be on for:
    - Once you have selected a device from Home, press Timer
    - Select how long you want your smart plug to be ON for
- Can schedule a time for which the smart plug will stay on for
    - Once you have selected a device from Home, press Schedule
    - Press Add Schedule or Add and then set up a time for when the smart plug will be ON/OFF. You can repeat it, send a notification about it and add a note to it.
- Supports Alexa and Google Assistant (Siri)

- You can assign different devices to different rooms. Can create multiple homes and multiple rooms inside each home.
- Gosund Smart Plug also allows users to create custom scenes. Which helps in setting up specific actions or conditions (Like If-Then statements) that can be triggered simultaneously or in a particular sequence. These custom scenes can involve one or multiple smart devices working together to achieve a specific outcome, such as setting the right ambiance, enhancing convenience, or increasing energy efficiency.

Privacy Concerns:

- Requires you to sign up via Gosund mobile app using your email address or prompts other login methods
- Access to bluetooth for connection via Auto-Scan
- Access to use location. Uses location to set your home location and display information about temperature, humidity and air quality.
- Access to use a camera for scanning inside Auto-Scan
- “Gosund” would like to find and connect to devices on your local network (AUTO SCAN)

Network Connectivity:

There are two types of connection that can be done via the Gosund app for all of its devices. Regardless you need to have a 2.4GHz Wi-Fi network.

1. **Adding a device Manually**
    - This option will automatically go into the default EZ pairing mode once you have selected the device you want to connect and enter your Wi-Fi passcode. Pairs the device with your phone using the Wi-Fi your phone is connected to.
    - With the AP mode you have to connect your mobile phone to the SmartLife-XXXX hotspot. Once you connect your phone to the hotspot it will begin scanning for your device.
    - In general the AP pairing mode connects slower than the EZ pairing mode and the former is suggested only if the latter does not work.
2. **Adding a device using AutoScan**
    - This method did not work for me after I tried several times to connect different smart plugs to the network. It uses bluetooth to connect
    - This method requires your smart device to be either a bluetooth device, zigbee device or a wired device. Since the device is only discoverable after resetting it, you have different resetting instructions for the different types of devices listed above.
    - It uses Wi-Fi and bluetooth to connect your device.

Grant access to others:

- Can share your home with others or join a home.
- Send the link
- to join or enter the account of the other person in your own Gosund app (has to accept the invitation). If other person wants to enter via their phone they must enter the 6 digit code the home owner sent them
- If you don’t want to share a home (list of all devices) with someone then you can share the control of a specific device.
- Per-device sharing (unable to share a small set of privileges).

Consistency:

- The Gosund Smart Plug is designed with a simple, unobtrusive appearance that is consistent with other smart plugs on the market.
- It features an LED indicator and a power button that remains consistent across different models, ensuring that users are familiar with its basic functions.
- When it comes to the Gosund app, the consistency is generally good. The app uses standard icons and labels to represent connected devices, making it easy for users to identify and control their smart plugs.
- The interface is clean and intuitive, with a similar layout and design across various sections of the app, which helps users quickly learn and remember how to perform common tasks, such as turning the plug on/off, setting up schedules, and monitoring energy consumption.
- However, there are a few areas where the consistency could be improved. For example, the process of creating custom scenes or automation rules might be different from what users are accustomed to in other smart home apps. This could lead to confusion or a steeper learning curve for users who are new to the Gosund ecosystem.
    - The process of creating scenes in the Gosund app involves selecting the "+" icon, naming the scene, and then adding tasks for each device. Some other smart home apps may use a different approach or layout for scene creation, such as starting with device selection, followed by action selection, and finally naming the scene. Users might find this variation in the process slightly inconsistent when comparing the Gosund app to other smart home apps.

Memorability:

- The Gosund Smart Plug's basic functionalities are easy to remember, thanks to its user-friendly design and app interface.
- Users can quickly recall how to turn the plug on/off, set up schedules, or monitor energy consumption.
- However, some more advanced features, such as creating custom scenes or automation rules, might require additional reference to the user manual or online resources.

Functionality and value proposition for Gosund Smart Plug:

This device is intended to provide users with a simple and energy-efficient way to control and monitor electrical devices. Gives users the convenience to have remote control access to the device via a smartphone app, voice command compatibility, energy monitoring, and scheduling are all key features. The Gosund Smart Plug's value proposition includes its ease of use, the ability to create customized schedules for turning devices on and off, energy-saving capabilities via usage monitoring and automation, and compatibility with popular smart home ecosystems such as Amazon Alexa and Google Assistant.

Successful delivery of pain points for Gosund Smart Plug:

- Simple installation and setup: The Gosund Smart Plug does not require a hub and has a simple setup process using the Gosund app, making it accessible to users with little technical knowledge.
- The Gosund Smart Plug is compatible with Amazon Alexa and Google Assistant, allowing users to control it with voice commands or integrate it into their existing smart home routines.
- The Gosund app has an intuitive user interface that allows users to easily control connected devices, set schedules, and monitor energy usage.
- Users can track the energy consumption of connected devices, allowing them to identify energy-intensive appliances and make informed decisions about their usage to save money and reduce their environmental footprint.
- Remote control and scheduling: Using their smartphone, users can control the smart plug from anywhere, as well as create schedules for automated control of connected devices, promoting both convenience and security.
- The compact design of the Gosund Smart Plug allows users to use multiple plugs in the same outlet without blocking adjacent sockets.

Mismatch with user pain point for Gosund Smart Plug:

- Some users may experience intermittent connectivity issues, which may impair the smart plug's ability to deliver consistent remote control functionality and integration with smart home systems.
- The Gosund Smart Plug may not be compatible with all smart home ecosystems, which may limit users who want to integrate the plug into a larger smart home setup.
- The Gosund Smart Plug lacks built-in surge protection, which may be a desirable feature for users looking for extra protection for their connected devices.

2. SmartThings Wifi Smart Plug

What it is:

A power plug which can be fitted between power cords and sockets to function as a remote controlled power switch.

Setup:

- Plug the Wifi Smart Plug into a three-pronged outlet and wait until the indicator blinks green and red
- Open the SmartThings app on your phone. Tap ‘Devices’ then tap ‘Add devices’.
- You can add a device either by 1) Scanning the QR code of your device that is inside the box 2) Scan for nearby devices 3) Under the device type tap Outlet under Devices/Sensors and then tap ‘SmartThings’ and then choose ‘SmartPlug (7A-Pl-Z-J3)’.
- Select a location and room for your Smart Plug and then tap Next.

- The indicator light on the smart plug will slowly blink green when it is ready to connect.
- When the installation is complete, the indicator light will change to solid green for 5 seconds and then turn off.

Features:

- You can set your device name and select if you want to set as favorite
- You can customize a timer for how long the smart plug will be on/off for.
- Presents you how much energy consumption it makes and what the power meter
- Can specify routines(everyday/weekdays/Sunrise) for when you want the smart plug to be on/off. (You need to provide geolocation for sunrise and sunset routines) (HAS TO CHECK WITH USER) (double check with the user for robustness)***
- Can see the usage history (when it was on/off or what was its power meter) of your smart plug
- You can add a scene: Link several devices together and control them all with a single tap or voice command
- ONLY through the app if you buy certain products you can add other routines (If .. then …). For example you can have lights turned on when someone arrives ***
- Works with Amazon Alexa and Google Assistant

Privacy Concerns:

- "SmartThings" would like to use bluetooth
- "SmartThings" would like to find and connect to devices on your local network
- "SmartThings" would like to Access the Camera
- "SmartThings" would like to use your location (To add devices, SmartThings needs to access to your location and be able to scan for and connect to devices on your local network). This is for connecting via scanning QR code
- "SmartThings" would like to access the microphone (This allows SmartThings to find and connect to nearby Samsung devices). This is for connecting via scanning nearby devices.
- "SmartThings" wants to join the wifi network "SmartPlug_E210…"

Network Connectivity:

- Requires a 2.4GHz Wi-Fi network only
- Connected using bluetooth?? (TRY WITHOUT giving permission to bluetooth). Maybe bluetooth is used to test proximity. Maybe without wifi it uses bluetooth. You need at least either one of them. SO YOU DON'T NEED BLUETOOTH in this whole process.
- First asked me to join the wifi network of the smart device and then prompted me to write the network name and password of available Wi-Fi networks.

Grant access to others:

- Can invite a member to your house to access all your devices. However you can only give access to all of your devices and not some.
- You can add a person by using a QR code. You have to have them scan the QR code that is displayed on your device. They can join by tapping 'Manage Locations' in their Home screen and then tapping '+' to accept the QR code invitation.
- Another way to invite a person is by entering their email address or Samsung account and then they can accept the invitation and follow the same instructions as above.

Manual studies:

1. Pictures
    i. There is no significant picture usage to demonstrate the set up or control of this device, except for two pictures giving a quick look at the placement of the LED light and the on/off button
2. Clarity of Instruction
    i. Concise and logical instruction in the manual for setting up the device. This manual effectively uses the instructions available on the mobile app for easier set up since a paper manual is further from user's control interface than the mobile device
3. Interactive elements
    i. There are redirections toward downloading the SmartThings app, which would allow for interactivity between the user and the app. But there are no direct access points such as QR codes.
4. Information about devices:
    i. This device also puts demonstrations on the intended purpose, function, and value of the device on its packaging. On the back of the packaging, for example, there is an illustration for a user controlling the mobile app interface two smart outlets that are connected to different home devices
    ii. Network requirement and power requirement and specifications are also listed on the app.

Consistency:

- The device is rather consistent in its performance. Perhaps due to the simplicity in its value proposition - where the functionality of the device is rather concisely laid out in the manual - the smart outlets perform without much failure, and the functionalities that it provides are also effectively delivered.

Memorability: how easily users remember using a device (say, you used the device and stopped for 2-3 weeks; upon returning to use the device, how intuitive does the device seem)

- The device is simple to use and has simple purposes, aka that of controlling the power to the traditional devices at home. Mostly for this reason and for its design - such as the fact that the user interface is clear and easy to use - gives the device strong memorability.

Experience:

- I was able to connect the device via scanning the QR code however was unable to find it via scanning nearby devices.
- I was unable to manually connect my device by selecting the device type and model because the application told me that I needed a hub to connect this device

Evaluation of functionality and user pain points:

- Their functionality and value proposition: Samsung SmartThings Smart Plug targets families—characterized by a diverse age group—as its audience group. With its value proposition of easy control of home devices by allowing users to control on

their phone end devices connected to the Smart Plug or via Amazon Alexa, the device aims to solve the pain point of the number of home devices being difficult to manage.
- Successful delivery of pain points: The SmartThings phone app as well as the Smart Plug's available connection to Amazon Alexa does successfully provide it with the functionality of allowing users to have a single control space for all their home devices.
- Mismatch and shortcomings: the connection between SmartThings app to the Smart Plug to the home devices on the other end suffer from issues of not sufficiently robust performance. There are instances when users cannot command from their phone end devices connected to the Smart Plug. There are also instances where the Smart Plug cannot communicate with Amazon Alexa. And the process of setting up Amazon Alexa with the Smart Plug is also not sufficiently easy and can be slow, making it not convenient for users in general and particularly people who are not proficient with technological aptitude.
These flaws hinder the device's ability to deliver its value proposition.

3. Etekcity Voltson Smart Wifi Outlet

What it is:

A power plug which can be fitted between power cords and sockets to function as a remote controlled power switch.

Setup:

- Scan the QR code on the Etekcity box and download the VeSync app and create an account
- Connect your device to a 2.4GHz Wifi network
- Press the '+' icon at the top right of your home screen in VeSync and select the Etekcity Fitness Tracker from Health.
- Select Etekcity "15A Wifi Outlet US/CA" under 'Outlet and Switches'
- Plug your smart outlet into the wall
- Press and hold the power button for 10 seconds until the LED light starts blinking quickly (it should blink blue while the yellow light is on
- Go to your phone;s WiFi settings, and join the WiFi network starting with "Vesync".
- Join a WiFi Network that you want to connect and enter its password
- Once your device is activated you should assign it to an existing room or a new room
- You can give your device a unique name you'll remember

Features:

- You can give your device a unique name you'll remember
- Once you activate your device the application will ask you for a firmware update if available
- The following third party applications are supported: Alexa, Google Assistant
- Can see what the voltage and energy consumption is. You can also see the power monitor for a week/a month/a year.
- Can schedule a timer to specify when you want the device turned on/off

- You can manage your device to run on a schedule: Have to specify a start time and end time (optional), Repeat (either once or on a weekly basis). You can set the sunrise and sunset as your start and end time instead of specifying a time.
- You can also set an away mode which will randomly turn your device on and off half an hour before or after the preset time to give the appearance that someone is home.
- The device supports energy saving mode: it turns off your device when your max cost setting is reached (Cost per kWh)
- The device supports abnormal power protection: it prevents power spikes. When power usage is over threshold, the device will shut off (eg. 1800 W threshold).
- ALL THE FEATURES that apply to 'ETEKCITY SMART FITNESS TRACKER' apply here as well

Privacy Concerns:

- "Vesync" would like to find and connect to devices on your local network - to find and connect to local network devices
- "Vesync" would like to use bluetooth - to connect to "Vesync" devices that require a bluetooth connection
- Plug in the wifi outlet and you should see a yellow light indicating that the outlet is on
- Allow "Vesync" to access your location to connect your device to WiFi. (Iphones with iOS 14+ need Precise Location turned on to finish configuration.)

Network Connectivity:

- During the setup process, you must be on a 2.4GHz WiFi network
- If your outlet cannot connect to your phone then you can use the APN mode to set up the outlet. APN mode uses a bridge network (found under your phone's WiFi settings) to link the outlets to a WiFi network
- While on the configuration page, tap "Use APN Mode". Enter your home WiFi network name and password to start setup. Press and hold the power button for 10 seconds until the LED light blinks blue or purple. Go to Settings on your mobile device, and select the network that reads "ESP-XXXX". The system will take a moment to connect and then you can start using your smart outlet.

Grant access to others:

- Can share Device by going to More>Manage Sharing> Manage Shared Devices> Edit and then select the device you want to share. You have to enter the email address of the person you want to share the device with. If the other person does not have a "Vesync" account he/she should create one.
- You can invite a member to your Home by going to More>Manage Sharing> Manage Homes> Invite and enter their email address like above.

Experience:

- When you try to add a device it first searches for devices nearby using bluetooth. Since this device does not use bluetooth to connect to your device it displays that 'No device found yet, please try to add manually.'

User Manual Study:

- The user manual of Etekcity Voltson is very clear, with detailed instructions on the setup and usage of the device. It guides you to download the VeSync app which can be found easily by scanning a QR code that directs to the AppStore or GooglePlay, depending on the type of phone you're using. The instructions for setting up the device are simple and clear, and there is also a section for troubleshooting common problems, which is helpful.

However, there is no detailed explanation about how to connect the device with third-party services such as Alexa or Google Home in the user manual. This information must be found online or in the app itself.

Consistency:

- The design of the Etekcity Voltson is consistent and intuitive. It plugs into any standard outlet and has a button on the side for manual control, which is straightforward and easy to understand. In the VeSync app, the device can easily be located and identified by its icon, which closely resembles the actual device, making it easy for users to select their specific device for setup and control. Navigation in the app is smooth and intuitive, with a consistent design language that makes it easy for users to understand and control their device. The ability to view energy usage and schedule operations are also easy to find and use within the app.

Memorability:

- For a user returning to the device after some time, the basic functionalities should be easy to remember due to the intuitive design of the app and the device itself. However, more advanced features like energy tracking and scheduling may be harder to recall due to their somewhat hidden nature in the app. Additionally, the process of integrating the outlet with a third-party service like Alexa or Google Home may be difficult to memorize, as it requires going through multiple steps and isn't clearly explained in the user manual.

Evaluation of functionality and user pain points:

Their functionality and value proposition:

- The Etekcity Voltson Smart Wifi Outlet is designed for convenience, energy efficiency, and customization. The outlet can be controlled remotely through the VeSync app, allowing users to turn devices on and off from anywhere, and also schedule operations for specific times. In addition, it offers energy tracking capabilities, giving users the ability to monitor and optimize their energy consumption. The device also integrates with third-party services like Alexa and Google Home for additional functionality.

Successful delivery of pain points:

- The smart outlet plugs into any standard socket and is easy to set up through the VeSync app. It provides remote control, scheduling, and energy tracking capabilities which are all accessible from the app. The outlet is also compatible with Alexa and Google Home, allowing for voice control and integration with other smart home routines.

Mismatch with user pain point:

- Despite its strengths, the Etekcity Voltson Smart Wifi Outlet may have some issues. Some users have reported connectivity issues, which can result in the outlet losing its connection to the network, thus affecting its remote control capability. Additionally, the device is heavily reliant on the VeSync app for controlling its features, which could be a downside for users who prefer using a single, unified app for all their smart home devices. Lastly, there may be compatibility issues with certain devices or appliances, as the outlet may not be able to fully control devices with complex power on/off sequences or those that require a large amount of power.

4. Kasa Smart Wi-Fi Plug Lite

What it is:

A power plug which can be fitted between power cords and sockets to function as a remote controlled power switch.

Setup:

- Download the Kasa Smart app and create an account
- Once you login you can add a device by tapping the '+' icon on the top right corner.
- Select 'Device' and then 'Smart Plugs' then tap 'Smart Plug Lite/Mini'
- Plug in your Smart Plug and then Kasa will check your Wi-Fi condition
- Once plugged in the smart plug should blink orange and green/blue
- Go to your Iphone's settings and join your Smart Plug's Wi-Fi network starting with "TP-LINK..."
- Connect your device to your home Wi-Fi network by entering its password. Blue light indicates that you have successfully connected.
- Name your device and select an icon of your choice to represent the device

Features:

- You can customize the name of your device and select an icon for it from the preset options or by selecting a photo from your library or camera
- Once you activate your device the application will ask you for a firmware update if available
- You can create a schedule for when you want the smart plug to be on/off. You can either specify an exact time or simply select sunrise or sunset options. Once selected you can choose to repeat this for which days you want in a week.
- You can select a timer for which you want the plug to be on/off for.
- Can see what the voltage and energy consumption is.
- You can set up an away mode which is a feature to give the appearance you're home while you're actually away. During the period specified in the Away mode, the device turns on and off at random intervals.
- You can see the total runtime and current runtime for today. You can also see the daily average and total runtime for the past 7 days and past 30 days.
- You can add a group by pressing '+' to control multiple devices simultaneously
- You can set up a scene where you can control multiple devices to do something as a reaction to a given circumstance (Good Morning - Get ready for the day by turning on your devices)
- You can add Smart Actions:
    - Motion Sensing (Camera needed)
    - Control with a Switch (Smart switch needed)
    - Schedule a Scene (Once a scene is specified for example Good Morning scene you can set a time for when you want this scene to happen)
    - Set a Auto-Off Timer (Once you select a device or multiple devices you can set timer for when you want all those device to be off)
- Supports Amazon Alexa, Google Assistant, IFTTT, Samsung Smartthings

Privacy Concerns:

- “Kasa” would like to find and connect to devices on your local network - scan for devices on the local network to find and connect to local network devices
- “Kasa” would like to use your location to determine sunrise and sunset times.

Network Connectivity:

https://www.tp-link.com/us/support/faq/2229/

- Requires a 2.4GHz network connectivity

Grant access to others:

- Kasa does not support sharing devices between accounts so you cannot share your Home or a device with another account.
- However the Kasa team suggests you share the account between users by sharing the login information with the people who you want to share with.
- If you want to control the devices locally then you can login as a guest. To login as a guest you have to skip click on ‘Skip’ and ‘Continue without account’ when creating an account. However, you will not be able to use the following features: (https://www.tp-link.com/us/support/faq/2707/)
    - Smart Integrations (Using third party applications)
    - Remote Control (Controlling your devices when you are away from home - You can only control them when your phone is connected to the same Wi-Fi network that the smart devices connected.)
    - Advanced Features (Scenes, Groups, Smart Actions)

User Manual Study:

- The user manual for the Kasa Smart Wi-Fi Plug Lite is comprehensive and clearly written. It walks the user through downloading the Kasa Smart app using a provided QR code, which leads to either the AppStore or GooglePlay, depending on the device being used. The set-up instructions are well-detailed and easy to follow, with accompanying diagrams and screenshots for a better understanding. Instructions for troubleshooting are included in the manual, however, the manual lacks specific details on how to link the smart plug with third-party services like Amazon Alexa or Google Home.

Consistency:

- The Kasa Smart Wi-Fi Plug Lite is compact and designed to blend in with standard wall outlets. Its physical design includes a power button, maintaining some consistency with traditional plugs. Within the Kasa Smart app, the plug is represented with an icon that matches its physical appearance, simplifying device identification. The app's interface is consistent and easy to navigate, with key features like remote control, scheduling, and energy monitoring readily accessible.

Memorability:

- Given the intuitive design of the device and its app, recalling basic functionalities after a period of non-use should be relatively easy. However, more complex operations, such as scheduling or integrating with a third-party service like Alexa or Google Home, might be less memorable due to their multi-step processes and the limited guidance provided in the user manual.

Evaluation of functionality and user pain points:

- **Their functionality and value proposition:**

  This device looks at the problem that users have in needing to manage all their devices and creates a centralized, convenient, and smart way of managing devices. It markets easy installation, convenient placement in home with its small size and compact design, and convenient control.

- **Successful delivery of pain points:**

  - Effective control center for home devices
  - Provides a way to make devices at home less cumbersome to control. Takes the trouble of using the devices away from the hands of the user
  - Voice control takes the hassle out of the user's hand
  - The control is easy to use and not confusing for the user.
  - Clean design and small size of the device make it convenient to you
  - Reliable performance
- **Mismatch with user pain point:**

  - Set up is still cumbersome. This trouble may outweigh the benefit or potential return that the user sees. In fact, the complexity of setting up is a turn off for users.

  - Controlling traditional home devices through a smart home may turn out to be not of urgent need for many users. This is because the design of these traditional devices are already rather simple. The only case where they take a lot of effort to manage is if there are simply too many devices, which is not an urgent problem for most people.

    Additionally, since most of the traditional devices already have sufficiently simplified interface, adding a smart control interface through a smart plug turns out to be adding additional steps for users. And due to this interface being unintegrated to the original devices, their presence turns out to add to the trouble of the user.

    Does not support 5GHz wifı. And several types of routers do not connect with this device.

5. DSP-W320 Outdoor Wi-Fi Smart Plug

What it is:

A power strip that can be plugged into a power outlet so that any device plugged into its sockets can be controlled remotely.

Setup:

- Plug the smart plug into a power outlet. Wait until the LED on the front changes from red to flashing yellow.
- Search for the “mydlink” app on the Apple Store or Google Play Store and download the app.
- Log into the app. For New Users, tap Sign Up to register for a mydlink account with an email and a password. Verify the new account through the verification email before logging into the new account.
- For existing users, sign in to existing mydlink accounts using email and password.
- Connect your phone to any home Wi-Fi network and enable Bluetooth and location settings on your phone. The Bluetooth function will not be needed after setup, but the location setting is recommended several times after setup.
- Tap “Add a Device” from the navigation menu on the left-hand side. Scan the Setup Code on the Quick Installation Card and follow the on-screen instructions to complete the setup.
- The mydlink app will prompt users to check that the smart plug is plugged in and powered on. Choose the “Next” option after the LED on the smart plug starts flashing orange.
- The mydlink app will then prompt users to make sure that the Bluetooth settings on their phone is turned on in their phone’s settings.
- The mydlink will scan for mydlink smart plugs connected nearby.

Features:

- You can customize the name of your smart plug as well as each socket to correspond to where each smart plug is used, so that any smart plug can be easily found on the list of smart devices connected to your phone.
- You can create an individual schedule for when you want each socket to be powered on/off.
- The mydlink app has an Automation function on the navigation menu on the left-hand side of its Home Screen that allows users to set up automation rules, which will allow users to set a device event which triggers one or multiple devices. However, there are no device events listed for the smart plug.
- The mydlink app also has a Scene function on the navigation menu on the left-hand side of its Home Screen that allows users to apply settings to multiple smart devices connected to the phone as soon as the scene on the top of the Home Screen is activated.
- You can customize the time zone of the device so that the device corresponds to the current local time when the Schedule function is used.
- The mydlink app has an “Event & Video” function on the navigation menu on the left-hand side of its Home Screen that allows users to access more features for their smart devices, like setting up device events and cloud recording, if they subscribe to mydlink’s cloud services.
- The mydlink app has the option for users to protect their mydlink account with “Two-Factor Authentication”, so that all trusted devices will receive a notification

whenever a new device requests to sign into an account. Unauthorized devices using similar accounts will be signed out immediately once “Two-Factor Authentication” is enabled.
- The mydlink app has the option for users to protect the security of their account by signing in using their fingerprint.
- The smart plug can be controlled using voice commands when connected to Google Assistant or Amazon Alexa.

Privacy Concerns:
- The mydlink app requires users to turn on location settings during the device setup to scan for its smart plug.

Network Connectivity:

- The DSP-W320 Outdoor Wi-Fi Smart Plug requires a 2.4GHz Wi-Fi network for setup and operation, similar to many other smart plugs.

Granting access to others:
- The mydlink app does not support sharing access to devices between accounts so you cannot share your device with another account, as the mydlink app requires that the mydlink smart plug be reset to its factory settings in order for a new account to be connected to it.

Manual studies:

1. Pictures
    1. There are illustrations of how the device looks and how to assemble it with the gears in the package.
    2. Illustration is also given for the login interface of the app
2. Clarity of Instruction
    1. Clear instructions are given for how to set up the hardware of the device, as well as for how to install the user interface to control the device
    2. Special instructions are also given to mounting and precautions, for situations such as flooding or danger of electric shock
3. Interactive elements
    1. The manual prompts the user to download the mobile app to use and control the device.
    2. The app has a quick installation card for convenient set up once in the mobile app
4. Information about devices
    1. Pictures are used both in the manual and on the packaging. Visuals on the packaging particularly give information about the features and functionalities that the product has. The manual mostly contains information about the makeup and layout of the device, as well as its specifications.

Consistency: The device has consistent performance and delivers on its features in the same way that the manual describes. There is not much inconsistency.

Memorability: How easily users remember using a device (say, you used the device and stopped for 2-3 weeks; upon returning to use the device, how intuitive does the device seem)

The device has good memorability. It is easy to set up, and its function of providing a robust power outlet extension makes it rather simple to use and easily memorable for the user.

Evaluation of functionality and user pain points:

- **Their functionality and value proposition:**

  This product targets the pain point of needing to connect devices in outdoor conditions and being able to control the devices easily. The product is designed to be weatherproof and allows convenient control of devices. Controlling outdoor devices such as Christmas tree lights or party lights can be usually troublesome. But having this control hub significantly reduces the hassle in controlling outdoor devices and enables strong connection of devices in the meantime.

- **Successful delivery of pain points:**

  The consistent performance and the simply control of the device enables it to successfully deliver on its core value proposition.
  - Easy set up
  - Automation works
  - Reliable performance.
  - Weather proof
  - Control over connected devices is convenient
  - Having usb ports on top of the outlets gives users more flexibility.
- **Mismatch with user pain point:**
  - Size and weight makes it a difficult to use

6. BN-LINK Wifi Smart Plug

What it is:

A power plug which can be fitted between power cords and sockets to function as a remote controlled power switch.

Setup:

- Insert the BN-LINK smart plug into a socket of your choice
- Download the BN-LINK Smart app onto your smartphone
- Go to the app and sign up with your email address
- In the app select Add Device

- Select Add Manually and tap Socket(Wi-Fi)
- The application will ask you to verify your 2.4GHz Wi-Fi Network.
- Enter the password for your network and select Next
- Hold the RESET button (switch) for 5s until the indicator blinks.
- Make sure the indicator is blinking rapidly
- When you see a confirmation screen explaining the device has been successfully added, select Done.

User Manual:

Missing

Features:

- Schedule a repeatable timer to turn the smart plug on or off.
- Schedule a countdown for the smart plug to turn on or off after the countdown is finished.
- Displays the current power and energy consumption, and voltage level. Also displays the energy consumption monthly and yearly
- You can set offline notifications which send a notification when the device has stayed offline for more than 30 minutes (8 hours for low-power devices).
- You can create a group for your devices which allows you to control the devices you select to group together.
- There is a Tap-to-Run feature which allows you to control multiple devices with one tap or by using an AI-enabled speaker through voice commands. You have to set a condition, then specify a task when that condition holds. Types of conditions you can specify are 'when weather changes, schedule, or when device status changes'. The types of tasks are 'run the device, select smart, send notifications, delay'.
- Instead of using Tap-to-Run you can also execute automations. They are essentially the same thing as Tap-to-Run where you have to specify a condition and action. These can be set to be periodic tasks, which will make them more meaningful.
- Works with Alexa, Google Assistant, XIAODU, DingDong, and Tmall Genie

Privacy Concerns:

- "BN-LINK Smart" Would Like to Use Bluetooth. This will allow the app to find and connect Bluetooth accessories. This app may also use Bluetooth to locate Bluetooth devices.
- Allow "BN-LINK Smart" to use your location.
- "BN-LINK Smart" would like to find and connect to devices on your local network. This app will be able to discover and connect to devices on networks you use.
- "BN-LINK Smart" would like to access the camera. The app can use a camera to take a new profile and to scan QR code.

Network Connectivity:

- Requires 2.4GHz network connectivity.
- There are multiple option to connect link your device to your phone:
- AutoScan automatically discovers Bluetooth/Wi-Fi/Zigbee/wired devices when the corresponding permission is turned on. Before using **Auto Scan** the application prompts you to ensure that the device is ready for network connection. The application also asks you to configure Wi-Fi info to connect your device to the network. So before connecting to the device you choose and enter the password of the network you want to connect to.
- Adding Manually is another option which I describe in the setup process, which also worked for me. However there are two types of connection modes you can select. The **EZ**

Mode proceeds to add the device automatically after selecting the correct device from the previous menu. The **AP Mode** asks you to connect your mobile phone to your device's hotspot. When I went to my phone's Wi-Fi settings I did not see the device's hotspot labeled "SmartLife-XXXX". The app asked if I enabled local network access from settings to ensure that AP mode worked, yet even though it was enabled in my case it did not work.

Grant access to others:

- In order to share your home with a guest, the guest needs to create a separate account from the BN-LINK Smart application. To join a home you need to go to "My> Home Management > Join Home" and enter the code.
- There are two types of permission you can give to your guest. The first is a common member which can only use the devices registered to the home and use smart settings. The latter is an administrator which can also manage devices and rooms, and manage smart settings.

Consistency:

- The BN-LINK Wifi Smart Plug maintains a consistent design and user experience throughout the hardware and app.
- The smart plug itself is compact and easy to plug into a standard wall outlet.
- The BN-LINK Smart app has a uniform layout and design, with all features and functions accessible through a series of recognizable icons and menu options. This consistency allows users to quickly learn and navigate the app without confusion.
- The process of adding devices, creating scenes, and managing settings is consistent across different sections of the app, which contributes to a smooth and cohesive user experience.

Memorability:

- The BN-LINK Wifi Smart Plug and its associated app are designed with user-friendliness in mind.
- The simple design of the smart plug and the intuitive layout of the app make it easy for users to remember how to navigate and use the device.
- Key features such as scheduling, grouping, and automation are easy to locate within the app, which makes it easier for users to recall how to access and utilize these functions.
- Additionally, integration with popular voice assistants like Alexa and Google Assistant enables users to control the smart plug through familiar voice commands, further enhancing memorability.
- However, it is a bit difficult for a non-technical user to remember the difference between the EZ Mode and AP Mode when attempting to connect the smart plug to their Wi-Fi network. This could cause confusion and make the setup process less memorable for users.

Functionality and Value Proposition:

The BN-LINK Wifi Smart Plug intends to offer several key functionalities, including remote control of connected devices, energy consumption monitoring, and integration with voice

assistants. The value proposition of the smart plug lies in its ability to provide users with greater control over their home appliances, leading to increased energy efficiency, convenience, and security.

Successful delivery of pain points:

- The BN-LINK Smart app guides users through the setup process, making it simple to connect the smart plug to a Wi-Fi network and integrate it with voice assistants.
- The app's design is consistent and user-friendly, allowing users to easily access features such as scheduling, grouping, and automation.
- The BN-LINK Wifi Smart Plug provides users with insights into energy consumption, helping them optimize their usage patterns and save on energy costs.
- The smart plug works with popular voice assistants, allowing users to control their devices through familiar voice commands.

Mismatch with user pain point:

- The BN-LINK Wifi Smart Plug only works with 2.4GHz Wi-Fi networks, which could be an issue for users with dual-band routers or those on 5GHz networks.
- The app requires users to grant Bluetooth and location permissions, which might raise privacy concerns for some users.
- Some users may experience difficulties when trying to connect their device using AP mode, as the device's hotspot might not be visible in the Wi-Fi settings.
- The BN-LINK Wifi Smart Plug might not be compatible with all devices or appliances, potentially limiting its usefulness for some users.

Smart Camera

7. Blurams Smart Home Camera Home Pro

What it is:

A smart camera tracks the happenings in your home and uses your Wi-Fi network or bluetooth to transmit the video to your smartphone or cloud storage for the archive.

Setup:

- Place the camera in a best position by following the installation tips.
- Scan the QR code on the back of the box and download the blurams app.
- Register and log into the blurams account.
- Once logged in, press ‘+’ sign to add your first device. Choose *A10C Home Pro.
- Power on this camera to a power socket via the USB cable.
- After connecting the device wait 30 seconds, then press and hold the reset button until Red light is flashing.
- Choose the Wi-Fi connection your phone is connected to and enter the Wi-Fi password.
- Keep the QR code that shows on the screen after connecting to Wi-Fi in front of the device lens.

- After you hear a beep press ‘I heard the beep’ and your device phone should successfully connect to your device

Features:

- You can trigger your device to sound an alarm immediately.
- You can talk through your device’s speakers.
- Any motion detected during live recording is saved under the Library.
- You can either take a screenshot or a recording of your live camera.
- You can keep your device off at a set time.
- You can specify activity zones, areas of interest in your device’s view, to get notified when there is motion there. You can configure the sensitivity of motion detection.
- You can allow push notification when a relatively loud sound is detected, or when someone appears or when a familiar face is detected.
- You can set a time interval when you do not want to receive any notifications and you can adjust the notification frequency for the same type of alerts.
- You can change the video quality and enable or disable night vision.
- You can either choose to store the videos in a cloud storage or with an SD card you have to purchase externally.
- You can rotate the image or apply dewarping which gets a more complete picture of your property without the typical fisheye distortion.
- You can choose an area in the image that will be distorted to protect your privacy.
- You can get Blurams Guard which is a service inside Blurams that saves the device’s videos to the cloud server and includes additional features like face recognition, favorite videos, and video sharing.
- You can enable Siri Shortcuts and create automation which enables you to control multiple devices with one tap according to conditions automatically.
- Works with Amazon Alexa, Google Assistant and IFTTT.

Privacy Concerns:

- “Blurams” would like to find and connect to devices on your local network. This app will be able to discover and connect to devices on the networks you use.
- Allow “blurams” to use your location? You need to turn on the “positioning” switch to get WiFi information. Blurams needs access to the location permission to configure the camera network.
- “Blurams” would like to access the microphone. App needs access to the microphone when using the voice intercom feature.

Network Connectivity:

- During the setup process, you must be on a 2.4GHz WiFi network.
- If you fail to add your device then select “Manual Mode”, and choose your Wi-Fi encryption mode and tap “Next”. Options are “WPA2, WPA, WEP, None”.
- Supports open Wi-Fi networks.

Grant access to others:

- By entering the accounts of your family members you can invite them to watch the device’s content.
- Your family member must have a separate account registered in blurams.
- You can only give permission for live streaming and playback.

Evaluation of functionality and user pain points:

Their functionality and value proposition:

This product aims to solve the problem of users needing to monitor areas of their home for cases such as pets, toddlers, or sick members. It provides high quality video as well as features like motion detection to give user a full range of actions for these devices.

Successful delivery of pain points:

The consistent performance of this device is its core success in delivering value to users. By allowing users to consistently monitor their home and do so with high quality, their major pain point that this product targets is solved.

i. Easy setup
ii. Compact, small, convenient placement in home
iii. High video quality
iv. Motion detection of high quality

Mismatch with user pain point:

v. Connecting can sometimes present problems. Network error prevents the app from performing all its features
vi. Products do have issues of breaking too easily.

Manual studies:

1. Pictures
    1. Pictures are employed for using features such as live view and for setting up the device
2. Clarity of Instruction
    1. Extensive instruction on the manual about set up as well as usage of particular features such as live view
    2. There is a combination of instructions from the manual as well as using instructions in the app
3. Interactive elements
    1. QR codes are available to scan downloadables
    2. App is required to be downloaded in order to use the device
4. Information about device
    1. Device packaging is employed to provide description to the device. Simple vector pngs are on the side of the packaging to describe key features of the device, including night vision and human detection

2. The information about the devices on the packaging seems somewhat confusing since there are information for the functions that the device provides as well as use cases. This mix of information actually reduces the informativeness of these pictures
3. Specification of the device is also on the packaging, including network spec, as well as operating system support.

Consistency

The descriptions of the device are generally consistent. Functions of the device, such as live view, are easy to use, and features are successfully delivered.

- The device does have significant issues with its performance consistency and breaks too easily. This makes the extensive instruction almost useless

Memorability: how easily users remember using a device (say, you used the device and stopped for 2-3 weeks; upon returning to use the device, how intuitive does the device seem)

- Qualitative research from user review shows that the device is intuitive to use. Yet, this is drawn back from the fact that the device breaks too easily.

8. Kasa Spot 24/7 Recording

What it is:
A smart camera tracks the happenings in your home and uses your Wi-Fi network or bluetooth to transmit the video to your smartphone or cloud storage for the archive.

Setup:
- Download the Kasa Smart app and sign up for a Kasa Smart account.
- Tap the '+' button in the Kasa app and select Device then Cameras (Kasa Spot).
- Plug in your camera and place it in the area you would like to monitor. Make sure the area has a strong Wi-Fi signal.
- Make sure that the LED light in the camera is blinking orange and green. Press and hold the reset button for 5 seconds if it is blinking red.
- Go to your iPhone's settings and join your Kasa Spot's Wi-Fi network. Return to Kasa to continue setup (Kasa_Cam_A7DB).
- Connect your Kasa spot to your Home Network by choosing your home Wi-Fi and entering its password.

Features:
- The camera can alert you whenever it detects motion.
- 24/7 recording allows you to record every minute of every day with an SD card.
- Make sure you are using a high-speed Micro SD card with capacity 8GB-128GB.
- You can take a screenshot of your live camera.

- You can talk through your device's speakers.
- You can turn on/off your camera for selected times by creating a new schedule.
- You can adjust motion sensitivity and detect motion only if the motion lasts longer than the selected duration. You can also turn on sound detection and adjust its sensitivity.
- Add up to four activity zones to restrict your camera's field of view.
    - Activity zones refer to specific areas within the camera's field of view that a user can define for focused monitoring. By setting up activity zones, users can choose which areas should trigger motion alerts when movement is detected. This feature allows users to prioritize specific areas of their property for increased security and reduced false alarms. Ex: Maingate, Living room etc.
- You can enable or disable night vision and rotate video and change video quality.
- You can either store recorded activity with an SD card or purchase Kasa Care for cloud stored activity.
- You can set up a scene where you can control multiple devices to do something as a reaction to a given circumstance (Good Morning - Get ready for the day by turning on your devices)
- You can add Smart Actions:
    - Motion Sensing (Camera needed) - did not work for me (You need a device to setup this Smart Action; add one from the Devices tab) even though I could see the camera in my devices tab.
    - Schedule a Scene (Once a scene is specified for example Good Morning scene you can set a time for when you want this scene to happen)
    - Set an Auto-Off Timer (Once you select a device or multiple devices you can set timer for when you want all those device to be off)
- Supports Amazon Alexa, Google Assistant, IFTTT, Samsung Smartthings

Privacy Concerns:

- "Kasa" would like to find and connect to devices on your local network - scan for devices on the local network to find and connect to local network devices
- "Kasa" would like to access the microphone.

Network Connectivity:

- Requires 2.4GHz network connectivity.
- Open networks are unsupported? Wi-Fi networks without password protection potentially allows anyone to monitor and control your smart home. To better protect your home, Kasa no longer supports open Wi-Fi networks.

Grant access to others:

- Kasa does not support sharing devices between accounts so you cannot share your Home or a device with another account.
- However the Kasa team suggests you share the account between users by sharing the login information with the people who you want to share with.
- Some Kasa devices (but not cameras) support local control. If you want to control the devices locally then you can login as a guest. To login as a guest you have to skip click on 'Skip' and 'Continue without account' when creating an account. However, you will not be able to use the following features: (https://www.tp-link.com/us/support/faq/2707/)
    - Smart Integrations (Using third party applications)
    - Remote Control (Controlling your devices when you are away from home - You can only control them when your phone is connected to the same Wi-Fi network that the smart devices connected.)

- Advanced Features (Scenes, Groups, Smart Actions)

User Manual Study:

The user manual that comes with the TP-Link Kasa Spot smart camera is easy to understand and provides clear instructions for setup and operation. The manual guides users through downloading the Kasa Smart app, signing up for an account, and configuring the camera. It also offers troubleshooting tips and advice for optimizing the camera's performance. However, some advanced features, such as sharing access to the camera with other users, may not be covered in detail, requiring users to search for additional information online.

Consistency:

- The smart device itself does not have any interactive buttons. It is designed to be unobtrusive and easy to install.
- Users can interact with the camera through the Kasa Smart app. The instructions app is pretty consistent with the design and appearance of the camera.
- The app's user interface is intuitive, with easily identifiable icons and clear instructions for setting up and controlling the camera.
- The app's design, layout, and visual elements are consistent with the camera's branding and appearance, ensuring a cohesive user experience.
- This ensures that users can easily navigate and use the app, even if they are not familiar with smart home devices.

Memorability:

- The basic functions of the Kasa Spot smart camera, such as viewing live footage and receiving motion alerts, are easy to remember due to the intuitive design of the Kasa Smart app.
- Users with a non-technical background may find it challenging to recall more advanced features or settings, such as sharing access to the camera or configuring custom activity zones.
- These features may require users to consult the user manual or search for additional information online to refresh their memory.

Functionality and value proposition:

The TP-Link Kasa Spot smart camera aims to provide users with peace of mind by allowing them to monitor their home or business remotely through live video feeds and motion alerts. The camera offers 24/7 recording capabilities, night vision, two-way audio, and compatibility with popular smart home ecosystems, such as Amazon Alexa and Google Assistant. The value proposition lies in the convenience, security, and customization offered by the smart camera.

Successful delivery of pain points:

- The camera is simple to set up using the Kasa Smart app, with clear instructions provided in the user manual
- Users can view live video feeds and receive motion alerts on their smartphones, ensuring they can keep an eye on their property even when they are not physically present.

- The camera allows users to adjust motion sensitivity, sound detection, and activity zones to tailor the device to their specific needs.
- The Kasa Spot smart camera integrates seamlessly with Amazon Alexa, Google Assistant, IFTTT, and Samsung SmartThings, providing users with a unified smart home experience.

Mismatch with user pain point:

- Some users may experience occasional connectivity problems, affecting the camera's ability to consistently deliver remote monitoring and smart home integration.
- The Kasa Spot smart camera may not be compatible with all smart home ecosystems or third-party apps, potentially limiting users who wish to integrate the camera into a more extensive smart home setup.
- Users may have concerns about the security of their video footage, particularly if they choose to store it in the cloud.

9. Larkkey Smart Wi-Fi Camera (UNABLE TO FINISH)

What it is:

A smart camera tracks the happenings in your home and uses your Wi-Fi network or bluetooth to transmit the video to your smartphone or cloud storage for the archive.

Setup:

- Download the Larkkey app from the App Store or Google Play.
- Register an account on your Larkkey application.
- Plug the device into an outlet and use the reset pin to press the Reset Button for several seconds until the camera starts to beep.
- Click on Add Device and Select “Smart Camera (Wi-Fi)” from the “Security & Video Surveillance” category.
- Make sure the indicator light on the device is flashing red quickly, then press “Next Step”. Enter your “Wi-Fi network and password”, click “OK”.
- Read the instructions about “Scan with the camera”, and click “Continue”.
- Scan the QR code on your phone with your camera. When you hear a prompt tone, click “Heard a beep”.
- When the indicator light on the device turns from flashing red light to steady green light, the network configuration is complete.

Features:

- Small
- Easy to install
- 1080p HD, 20fps. High quality, lag free video
- Night vision. Intelligent sensing of ambient light changes

- Smart motion detection: when a moving object is detected within the zone of surveillance, the owner will have a notification and real-time photo of the event sent to their app. Burglar Alarm
- Two-way voice function.
- Noise reduction algorithm filters out background noise, makes human voices clearer
- SD Card Storage
- Cloud storage available
- Optionally disable features such as night vision, two way audio, and motion detection.

Privacy Concerns:

- Monitoring of personal spaces
- Possibility of video monitoring to be hacked or abused
- Collection of personal information is unknown to the user, since use of the device is passive. Sensitive functions such as audio collection cannot be disabled easily, leading to potential leak of personal information.
- Access control is unmonitored and may cause unintentional leaking of personal information.

Network Connectivity:

- Only supports 2.4GHz Wifi.

Grant access to others:

- Device can be shared between different end app users

Evaluation of functionality and user pain points:

Their functionality and value proposition:

The product provides a convenient, and affordable IoT home camera. It is to be both conveniently used and placed, and therefore provides its set of simple controls and the small size. The device is also equipped with features that fairly compete with other devices, including its two-way audio system and its high quality camera.

Successful delivery of pain points:

a. Its small size allows it to be conveniently placed at home
b. Cheap price. Also allows users to add SD cards, further reducing costs such as paying for a cloud service.
c. Easy to use after the initial setup

Mismatch with user pain point:

d. Fails to connect to the other devices or hubs like Google Home
e. The set up is quite cumbersome and can be a difficult barrier to use for the users
f. Customer support is not up to the test
g. Does not last long: breaks after a short period, usually within days. The devices also sometimes start back to work. Whether they break or work is not inconsistent, for unclear reasons, and cannot be controlled by the user.
h. Although the device supports several features to be disabled by the user, it does not allow the user to pause the audio recording, which is a privacy concern.

10. Mi Home Security Camera

What it is:

A smart camera tracks the happenings in your home and uses your Wi-Fi network or bluetooth to transmit the video to your smartphone or cloud storage for the archive.

Setup:

- Download the Mi Home App from the App Store or Google Play.
- Register an account on your Mi Home App.
- Plug the device into an outlet.
- Reset your device by inserting a straightened tool into the reset button that is located on the side of your smart camera. Wait until the indicator light turns orange.
- Wait until the orange indicator quickly blinks orange.
- Once you are on the add a device page, it will scan for bluetooth devices nearby and your smart camera should show up.
- Enter your Wi-Fi network and password, then click “Next”.
- Scan the QR code on your phone with your camera. The device should say “QR code scanned successfully”.
- Your device should successfully connect to the network.

Features:

- You can either take a screenshot or a recording of your live camera.
- You can speak through your camera’s microphone.
- You can rotate the image and there is a wide dynamic range mode which enhances the clarity of the underexposed and overexposed parts of an image. You can also set sleep schedules for your camera which turns off your device for those specified hours.
- You can enable night vision where infrared imaging will be used when there isn’t enough light.
- In order to save videos/photos for activity alerts you need to either insert a microSD card. Currently “Mi Home” does not offer any cloud storage plans, either for free or with subscription. However the app supports NAS (network attached storage) which means you can choose to have videos saved to your local network or cloud drives.
- With the newest firmware update there is a home monitoring setting where you can enable to get notification when the camera detects action. You can change monitoring

time and also select the areas where you want the camera to be more sensitive to motion (the image captured by the camera is divided into grids and you can select the sensitivity level for each grid). You can change the intervals between alarms and specify the event to which you want to receive a notification about (motion detection, person detection etc.)

- You can create automations for your device by specifying the condition and then the action. The smart video camera currently only supports motion detection as a condition and for actions you have multiple options like sending notifications to device, turn on/off an automation, and delay.
- Works with Amazon Alexa, Google Assistant, NAVER Clova

Privacy Concerns:

- "Mi Home" would like to find and connect to devices on your local network. "Mi Home" needs to use local network permissions in order to discover, connect, and control devices on the network. For example, to automatically discover devices that are waiting to be paired with the network.
- "Mi Home" would like to use bluetooth. The authorization to access users' Bluetooth will be used to scan, add and use Bluetooth devices.
- Allow "Mi Home" to use your location. The authorization to acquire users' location will be used to fast connect with devices, discover nearby devices and Wi-Fi lists.
- "Mi Home" would like to access your home data. The authorization to access users' HomeKit will be used to operate devices that work with HomeKit via "Mi Home".
- "Mi Home" Would Like to Access the Microphone. The authorization to access users' microphone will be used to operate devices via voice commands and video chat.
- "Mi Home" would like to access the camera. The authorization to access users' cameras will be used to scan the QR code to register devices or sign in an account.

Network Connectivity:

- Supports 2.4GHz and 5G network connectivity.
- There is an AutoScan functionality that uses bluetooth to find your nearby device. The second option is to add the device manually. Both methods prompt you to enter your local network and scan the QR code from your smartphone. The only part where they differ is that AutoScan automatically detects the nearby device where in manual setup you have to select the exact device you are expected to connect.

Grant access to others:

- You can share your home with a family member. In order to share a device with your family member, the family member must have a separate Mi Account that yours. You can also share a device with a family member as you would share a home.
- There are two types of permission for family members. The first type of permission gives the user to control the smart devices in your home. The second type of permission gives the user the ability to pair with and delete devices, add and remove members, and manage homes.

"Mi Home" Would like to send you critical alerts. Critical alerts always play a sound and appear on the lock screen if your phone is muted or Do Not Disturbed is on.

Evaluation of functionality and user pain points:

- **Their functionality and value proposition:**

  This smart camera is designed to provide high quality monitoring of home and provides multiple features such as motion detection and night vision, as well as high resolution under low light, to give user a smooth and overall good experience when tracking their home

- **Successful delivery of pain points:**

  - Quality of the picture is high, both normally and for night vision
  - Wide angle provides user with larger vision of monitored area

- **Mismatch with user pain point:**

  The biggest problem with this smart camera is also its performance issue. Frequent disconnects but with the WiFi network and with other issues harms the smoothness and consistency of the user experience. Many of its promised features, such as motion detection, is also not delivered properly to the users; particularly, motion event notifications what were supposed to be sent to the personal device of the user are often dysfunctional

  Setting up the device and using the mobile app is also extremely difficult, especially in the step of scanning the QR code and connecting with the camera.

  The incorporation of technology into a reliable and high performing device seems to be the major challenge that smart cameras face. Most cameras on the market provide multiple features that are used to market the quality, yet the performance of these devices are often underwhelming. Perhaps the product tried to incorporate too many technologies at once into a device and neglected the performance, but the presence of technological limitations for smart cameras is also possible

Manual studies:

1. Pictures
    1. The manual contains picture that concisely and clearly lay out the components of the device. It goes into detail on areas such as potential confusion as well, such as the SD card style that are best for this device.
    2. Picture are also used for setting up as well, although the pictures seem somewhat redundant. For example, there is a picture showing how to plug the device's power cable into the wall mounted power outlet, which would have been straight forward for users even without the picture demonstrations
    3. A picture showing an empty phone interface is also in the manual, which again seems to be a redundant and not extremely useful visual.
2. Clarity of Instruction

    1. There is a lot of clarity in the device. The manual also hands over much of the set up instructions to the mobile app for easier readability and operational ease for the user when they follow the instructions close to their control interface
3. Interactive elements:
    1. There is a QR code for downloading the mobile app.
4. Information about devices
    1. The packaging of this device uses vector png style visuals to highlight the features of the device, including night vision and wide angle view. These feature visuals are repeated in the manual
    2. Network and power specifications are also given for the device on tis packaging, making these simple information easy to see. Furthermore, more detailed specification is also placed inside the manual, in case users may find them helpful.

11. TECKIN CAM 1080P HD Wi-Fi Indoor Cam

What it is:

A smart camera tracks the happenings in your home and uses your Wi-Fi network or bluetooth to transmit the video to your smartphone or cloud storage for the archive.

Setup:

- Download the TECKIN App from the App Store or Google Play.
- Register an account on your TECKIN App.
- Plug the device into an outlet and wait for 15 seconds until the red status light flashes.
- Reset your device by pressing the reset button at the back of your smart camera.
- Wait until the indicator is flashing red light.
- Click on “+” to add a new device. Go to the ‘Cam’ category and select ‘Teckin Click’.
- Enter your Wi-Fi network and password, then click “Next”.
- Scan the QR code on your phone with your camera. When the LED indicator is flashing white light or has turned to steady white, press “Next”.
- Your device should successfully connect to the network.

Features:

- You can either take a screenshot or a recording of your live camera
- You can speak through your camera’s microphone.
- In order to save videos/photos for activity alerts you need to either insert a microSD card or subscribe to their cloud service.
- You can rotate the image and turn on/off/auto night vision which enables the camera to capture the environment when the light source is very weak.
- You can turn on motion detection to receive alert information, but you need to subscribe to cloud storage to store alert information. You can adjust its sensitivity and schedule when you want motion detection to be on or off.
- Like motion detection you can turn on sound detection to receive alert information but you need their cloud storage to store alert information. You can adjust sensitivity and schedule when you want sound detection to work.

- You can create Tap-to-Run or automations that require a condition and an action. Even though I added the device I could not see it registered to my home (only on the camera page) so I could not test these features.
- Works with Amazon Alexa and Google Assistant.

Privacy Concerns:

- “Teckin” would like to use bluetooth. The authorization to access users’ Bluetooth will be used to scan, add and use Bluetooth devices.
- “Teckin” would like to find and connect to devices on your local network. This app will be able to discover and connect to devices on the networks you use.
- Allow “Teckin” to use your location. We need visit your location so Teckin app can know you are nearby Teckin camera or not. Please open location permission to configure device networks and help the app obtain weather information.

Network Connectivity:

- Requires 2.4GHz network connectivity.

Grant access to others:

- You can invite people to share the view from your camera where they need to have a separate account. This will allow them to view through your camera but they will not be able to control your device. This is guest access but you can invite a person to your home as an owner, where in this case the person will have the same permissions as you have.

Evaluation of functionality and user pain points:

- **Their functionality and value proposition:**

  Designed to allow users to monitor their home, the camera is equipped with clear picture, two-way audio, and other features like night vision. These features give users a range of possible actions on top of solving the core problem of video monitoring.

- **Successful delivery of pain points:**

  The product has consistent performance, ensuring that the value proposition is fully realized. Connects to mobile app and WiFi network effectively, and additional features like high quality picture and audio as well as nigh vision all perform consistently.

  - Small product makes it convenient to use
  - Two-way speaker works well
  - Video quality is high
  - Rather consistent performance
  - SD card is allows user to have cheap and convenient storage\
  - Night vision functions

- **Mismatch with user pain point:**

  - Motion detection occasionally fails to perform
  - Stored videos cannot be accessed easily. The cloud service has performance and usability concerns

Consistency

Memorability

12. SmartThings Cam

What it is:

A home monitor camera that allows two-way audio, live view, and recording. Connected to mobile or tablet app, the camera sends alerts for motions or events that it detects.

Set up:

- Connect power cable to camera
- Plug cable into power outlet
- Download the SmartThings app
- Login (or create first) Samsung account
- Add device. A middle step is to scan the QR code at the bottom of the SmartThings cam.
- Connect to the home wifi network from the SmartThings app

Features:

- 1080 HD Video, High Dynamic Range
- Two way audio, built in mic
- Night Vision
- Distinguishes between a person and an object. It utilizes motion detection for this purpose. For areas in the camera's vision that frequently involve moving objects
- Alerts user immediately necessary, while minimizing false triggers.

  same question: what constitutes an immediate response? How is this function realized? What technology, mechanisms, or software is used?

- App provides a timeline of alerts from the device.
- Track the events that the camera had captured in the past.

- Synchronization between multiple personal devices connected to the same camera, including both Android and iPhone devices.

- Can connect up to four cameras at once

- Recording for an extra fee. Storing up to past 24 hours of footage is free.

Privacy Concerns:

- Access to personal information such as activity in living quarters
- The device's tracking of movement in the personal home makes it possible for the device to track patterns of behavior of a personal home.
- Audio and built in microphones exposes the danger of being hacked or abuse from the developers or administrators

Network Connectivity:

- 2.4GHz/5GHz Wi-Fi.
- Broadband internet connection

Grant access to others:

- Same camera can be shared across multiple personal devices, such as tablets or phones, can be connected to the same camera

Evaluation of functionality and user pain points:

- **Their functionality and value proposition:**
    - Intended for home usage. Its functionality is intended for people who wish to track things going on in their home. Highlighted value of the camera are the video quality it provides , two-way audio feature, as well as the alerts it gives on events that enables users to better track things going on in home
- **Successful delivery of pain points:**
    - Great video quality. Wide camera angle available
    - Good UI of the mobile app.
    - Two way audio.
    - Without additional subscription.
    - Easy to set up
    - Easy to access from phone device
    - Adjust camera to see different angles or areas of home
- **Mismatch with user pain point:**

The camera has serious connection, hardware quality, and performance problems. The camera, perhaps due to technical difficulty, overlooks the users' most important pain point, which is that they want something to be able to track their home. Therefore, being consistently able to track their home and that the camera works is the most important pain point. The camera fails to deliver on this point but adds too many features

- Camera chooses to be offline: this happened to many users. It is on sometimes, but is not on in many other cases. Device chooses to be on in some cases, but chooses to be off in some other cases.
- The camera also frequently disconnects from the network, therefore the user can sometimes access the camera but sometimes cannot.
- Live view is also a problem: Cannot look at a Camera's live view even when the camera is indicated as on.

Manual studies:

1. Pictures
    1. Uses vector visuals to highlight the features of the device.
    2. Clear demonstration of the alert notification function of the device through a visual story.
2. Clarity of Instruction
    1. Set up instructions is fairly simple and easy to handle for users of all types of experiences
3. Interactive elements
    1. Requires downloading apps using app stores on Apple and Android platforms
    2. Allows users to connect to IoT device hubs and control platforms like SmartThings
4. Information about devices
    1. Clear and concise description of functions of the devices on the cover.
    2. Highlights features of the device with visuals

Consistency: Performance of the device is an issue. While the device promises many features that do perform as described, the camera is often offline and disconnects on itself without user instructions.

Memorability: Set up is retained after a period of not using the device, this makes continuing using the device an easy task. Mobile interface for controlling the device is also intuitive and memorable for usage. Particularly, the functions of adjusting camera angle as well as of two way audio are easy to use and easily remembered after a period of not using.

Voice Assistant

13. Echo flex

What it is:

A plug-in smart speaker that allows users to control other smart devices at home by voice control through the use of Amazon's virtual assistant, Alexa.

Setup:

- Download and install the latest version of the Alexa app from the app store.
- Sign into the app using an Amazon account, and approve the sign-in attempt from the email used to log into the account.
- Plug the Echo Flex into a power outlet. For best results, Amazon recommends that users do not place the Echo Flex behind large furniture or appliances. Wait for about a minute for the Alexa virtual assistant to greet the user.
- When the Echo Flex is plugged into a power outlet for about a minute, the Alexa virtual assistant will greet users and let them know to follow the instructions given on the Alexa app on their phones.
- The Alexa app will prompt the user to enable their location settings and allow Alexa to access their location.
- The Alexa app will scan for smart devices nearby and allow users to choose which devices they would like to connect to.
- The Alexa app will prompt the user to choose which Wi-Fi network they would like to connect to.
- Once the Alexa app detects the chosen Wi-Fi network, the Echo Flex is connected to the user's phone.
- Choose the language used.
- Choose a location in the house where the Echo Flex is set up..
- Verify that the Amazon account used is yours, and double-check that the name is correct. This creates a profile in the Alexa app and allows the Alexa virtual assistant to learn the user's name.
- Set up voice ID by allowing the Alexa app to record the user saying required phrases. This is so that a voice ID can be created in the Alexa app, so that users can talk to Alexa and have their voice recognized.
- The profile is now ready to be set up for the user's features.
- Choose if you want the Alexa app to access your contacts.
- Verify your phone number of the phone connected to the Echo Flex.
- Add the Amazon accounts of other users using the same Echo Flex to create new profiles for them as well.
- Verify the location and address of the Echo Flex. Users have the option to choose from addresses listed in their Amazon address book.
- Customize the name of the address so that it can be used in conversation with the Alexa virtual assistant.

User Manual:

- The user manual that comes with the device is pretty straightforward. It asks you to download the Amazon Alexa app.
- Every step of the set-up process is followed with a picture explaining how to do it, which makes the process a lot easier for a first time user
- Optional instructions such as Connecting to a speaker and Connecting to a compatible accessory are also given in detail and pictures.

- Also comes with some examples of commands that you can try with alexa. Which is useful for users who are not familiar with voice assistants and its capabilities.

Things to try with your Echo Flex

Get news, weather and sport
Alexa, tell me the news.
Alexa, what is the weather forecast for this weekend?

Voice control your smart home
Alexa, turn off the lamp.
Alexa, set the temperature to 21 degrees.

Stay organised and manage your home
Alexa, reorder kitchen rolls.
Alexa, set an alarm for 7 a.m.

Enjoy your favourite music and audiobooks
Alexa, set volume to 8.
Alexa, resume my audiobook.

Some features may require customisation in the Alexa app, a separate subscription or an additional compatible smart home device.

For more examples, select Things to Try from the Alexa app menu or visit amazon.co.uk/meetalexa.

- More features related to the device usage such as linking with your Spotify account etc can only be found on the app. Not mentioned in the manual.

Features:

- The Alexa app allows users to choose a language for Alexa, though not all languages are supported in certain countries.
- The Alexa app allows users to choose which room the Echo Flex is set up in or else create an entirely new customized location, as it recommends users to group two or more devices in the same room in the Alexa app, to help them work together better.
- The Alexa virtual assistant can learn the names of users, by allowing users to choose between different options for how their name is pronounced, or else spell out the pronunciation of their name if the correct pronunciation is not available.
- The Alexa app can set up a voice ID that allows Alexa to learn the user's voice, call the user by name, and provide more personalization options.
- Group devices by location so that Alexa can turn on all the devices in one location at once.

Privacy Concerns:

- Alexa is a cloud-based voice service, so it allows Amazon to process and retain audio, interactions and other data in the cloud to provide and improve their services.
- The user's location is used to make device setup easier, enable location-based features, and get local results.
- The Alexa app asks for access to the user's contacts, so that it is easier to find friends and family on Alexa, call and message contacts by name, share media, and set up emergency contacts. These contacts will be periodically uploaded to the Amazon service.
- The location and address of the user has to be verified, so that the Echo Flex can give the user local weather, traffic, and other information.

Network Connectivity:

- Make sure the echo flex is nearby, plugged in, and in Pairing mode.

- Choose the “Access Device” option on the homepage of the Alexa app to configure devices or add new devices and groups. Choose the type of device you would like to set up and the brand of the device. Tap “Enable To Use”, log into the account required by the device, and allow the Alexa app access to the connected device. Allow the Alexa app to look for devices to connect to.

Granting access to others:

- The Alexa app allows users to add a profile for each family member so Alexa can recognize each family member using the Echo Flex and get the right information to the right person (doesn’t seem to allow per-user access to the Echo-controlled devices)

Consistency:

- The Echo Flex has a consistent plug-in design, making it easy to identify and use with various appliances.
- The Amazon Alexa app has a uniform layout and design, with features and functions accessible through recognizable icons and menu options.
- The voice commands for controlling smart devices are consistent across different devices and brands, allowing users to easily control their devices using the same commands.

Memorability:

- The intuitive app design and consistent voice commands make it easy for users to remember and locate key features.
- Alexa's voice recognition feature enables personalized responses, increasing user engagement and memorability.
- The plug-in design of the Echo Flex allows users to easily remember its purpose and function.

Functionality and value proposition:

The Amazon Alexa Echo Flex intends to allow users to control smart devices in their home through voice commands, providing convenience and accessibility. Its compact design saves space and offers a discreet appearance, making it suitable for various room layouts. It also allows users to use it as a speaker for playing songs etc. Integration with other Amazon Alexa devices enables users to create a smart home ecosystem.

Successful delivery of pain points:

- Echo Flex simplifies controlling smart devices by providing a single interface (voice control) for managing different devices.
- The device enables users to set up routines and schedules for their smart devices, automating tasks and increasing convenience.
- The plug-in design eliminates the need for additional wiring or installation, making it easy to set up and use.

Mismatch with user pain point:

- Privacy concerns regarding data storage and processing might deter some users from using the Echo Flex and associated services.
- The device requires a stable Wi-Fi connection, which might be an issue for users with weak or unreliable connections.
- The Echo Flex might not be suitable for users who are not comfortable with voice assistants or prefer tactile controls for their devices.
- The Echo Flex has a relatively low maximum volume, which may make the speaker inaudible in noisy environments.
- Additionally, when the speaker is being used at max volume, it might struggle to understand voice commands, requiring users to move closer and speak louder for the device to recognize their commands. This can be inconvenient for users who require a more powerful speaker or need to use the device in louder settings.

Fitness Tracker

14. Etekcity Smart Fitness Tracker

What it is:

A wearable device or for monitoring and tracking fitness-related metrics such as distance walked or run, calorie consumption, and in some cases heartbeat

Setup:

- Pull the bands off the tracker and insert the built-in USB plug into a USB port for charging
- Once charged flip the wristband over and insert the tracker with its built-in USB plug facing the opposite side the end of the wristband that says “OPEN”
- Scan the QR code on the Etekcity box and download the VeSync app
- Once you open the Vesync app create an account by tapping Sign Up
- Enter your email address and password and enter the verification code sent your email
- Press the ‘+’ icon at the top right of your home screen in VeSync and select the Etekcity Fitness Tracker from Health.
- Swipe up and down on the screen or tap the ring to wake up and display.
- Tap on the home screen to cycle through your daily data
- Swipe up and down to access the functions and tap to select. Tap the ring to go back.

Features:

- Can change the lengths/units displayed on the fitness tracker and the brightness of the screen and set a goal for sleep and activity
- Can monitor sleep (track how many hours you sleep and how much you are awake for)
- Can choose activities which are displayed under Activity (multi-sport activity tracking)
- Has a heart rate monitor where you can change the detection frequency
- Can track your weight: You have to manually enter your weight and body fat. Once you enter you can see a graph of your weight, BMI and body fat over time.

- Can log your food: Have to manually enter the food you ate for each meal (breakfast, lunch, dinner, snacks). It offers a nutrition analysis where you can see how many calories you gained and also see the percentage of nutrients inside the food you ate. You can track how many calories and nutrients you gained every day.
- Can track your blood pressure: Have to manually enter your blood pressure (Systolic (mmHg), Diastolic (mmHg), Pulse (BPM). Cannot measure from fitness tracker ??? Can track your blood pressure over time.
- Sunrise Reminder: Receive a notification on your phone at sunrise
- Can customize the icon of your smart device by selecting a photo from your library
- Has a check-in (window) where you can see how many days in a row have you used the app

Privacy Concerns:

- Vesync would like to find and connect to devices on your local network
- Vesync would like to use bluetooth
- Vesync requests access to write and read your Apple Health data
- Vesync to use your location - to display temperature, humidity, air quality (PM2.5), wildfire info (Beta)

Network Connectivity:

- Automatically discovered the device without me trying to manually search it
- Connects using bluetooth
- Third party service (voice commands supported): Alexa, Google Assistant, IFTTT
- Data can be synced with the following apps: Fitbit, Apple Health

Grant access to others:

- Have to assign the device to an existing room or a new room
- Must have a unique device name
- Can invite a user to your Home: access to all devices
- It does not support Bluetooth device sharing
- Have to invite a user by typing their email address
- Only one account can be created per account so you cannot control or see once a person shares their home with you
- Smart scenes are not supported in shared homes

Email: kerimkurttepeli@gmail.com
Password: Feowfds12

Email: kk3084@columbia.edu
Password: Feowfds12

https://www.youtube.com/watch?v=exOK_goxHk0

15. Wyze Band: Smart Home Assistant & Activity Tracker

What it is:

A wearable device or for monitoring and tracking fitness-related metrics such as distance walked or run, calorie consumption, and in some cases heartbeat.

Setup:

- Plug the charger into a standard USB port and attach the Wyze Band with the clip end so that the charging ports make contact.
- Wyze Band comes fully charged. Charging it will activate the band. The Wyze Band screen will light up when it is ready for setup.
- Download the Wyze app by scanning the QR code below.
- Sign up for an account if you do not already have one and log in.
- Click on Add New Device and select Lifestyle then select the Wyze Band from the list.
- Select the code shown on your band screen. Tap your screen to see the band ID.
- Tap the OK icon on your band to finish pairing.

Features:

- The home page displays the time and day of the year and also the number of steps taken on that day.
- You can see your activity data while using the band. The activity section displays the number of steps taken, heart rate, number of hours slept.
- You can create shortcuts which allow you to perform multiple actions with your Wyze devices at once. In order to create a shortcut you need to create a rule for the device to do. However the Wyze Band does not support smart scenarios and I could not set a rule. Types of rules are Shortcuts (e.g. Tap to turn all cameras), Schedule (Turn on notification on …), Device Trigger (when front door opens, turn on the light), Location Trigger (When I get home, turn on my AC).
- You can choose a workout to do from your smart band. The two types of workouts are indoor run and free training. The indoor run tracks the miles you ran, time, heart rate, and how many calories burned. The free training only tracks your heart rate, time, and how many calories burned.
- You can set an alarm from your band which will go off at the specified time.
- If you enable location services you can get the weather data from your band.
- The band has a find phone feature which causes the phone to vibrate and make a sound when pressed. You can also search for the band from your iphone which will cause the band to vibrate and make a sound.
- Wyze Band includes Alexa which allows you to use Alexa to control smart devices, get friendly reminders and answer any questions or check the weather. In order to speak to Alexa you need to sign in with Amazon and hold the home button on your band.
- You can wake the device up by raising your arm and slide upwards to lock your screen to prevent unintentional touches.
- There is an optional sedentary reminder which notifies you when you are sitting still for 50 minutes or more which is not healthy.
- You can set a daily goal for the number of steps you take. When you achieve this goal the band will notify you each day.
- You can allow night mode which lowers screen brightness in certain hours. Also you can adjust the duration of display to shorten the use time of the band.

- You can allow your smart band to receive your iphone's notifications from all third party applications. You can also set tools for Wyze Band such as stopwatch and lighting.
- It is waterproof and you can integrate your apple health data.

Privacy Concerns:

- "Wyze" would like to find and connect to devices on your local network. This app will be able to discover and connect to devices on the network you use.
- "Wyze" would like to use bluetooth. Allow "Wyze" to access your Bluetooth to connect to your devices.
- Allow "Wyze" to use your location. Allow "Wyze" to access your location to perform location-based features.

Network Connectivity:

- Connects using bluetooth

Grant access to others:

- In order to share your devices with a guest, the guest needs to open up a separate account in the "Wyze" app. Use the same email address that the guest signed up with to send an invitation. The guest should go to Account, and then Messages where the guest should be able to see the invitation and accept it. You cannot share the Wyze Band.

Light Bulb

16. Tapo Smart Wifi Light Bulb, Multicolor - L530E

What it is:

A smart bulb is an internet-capable LED light bulb that allows lighting to be customized, scheduled and controlled remotely.

Setup:

- Download the TP-Link Tapo App, available on app store and google play (scan barcode on the package for the link to the app)
- Once the app is installed, create an account or log in to an existing account.
- Turn off the power to the lamp or light fixture where you want the smart light.
- Remove your old bulb. Carefully screw in your new Tapo light bulb.
- Turn on the power to the lamp. An orange light should start flashing to indicate pairing mode.
- Once the bulb is in pairing mode click on the 'add device' button on the app and it will show a list of device models to add.
- Select Bulbs and then select the model of the smart bulb you are using - here Tapo L530
- This will display an installation page on your screen - "Install Your Tapo Device", Click 'Next', and then Power Up your device by clicking Next again.
- Enable Location if required.

- Connect to your Tapo Device now - Go to your phone's or tablet's Wifi settings and join your Tapo device's network : Tapo_Bulb_XXXX. Then return back to the app.
- The Wi-Fi network your phone is connected to will appear. You can change your network if needed and enter a password.
- The bulb will start flashing again which means that it is connecting to wifi.
- After you are connected to the wifi with the app, Name the device as you wish and select a location that you will be using the bulb in Ex: Bedroom. This step will help you find this particular device easily while trying to set it up in Amazon Alexa or Google Home.
- If there is a new firmware update for your device it will pop up now and you can download the update by clicking on 'Download'
- After the firmware update is complete the device is set up and ready to use.
- You can view the device in My Home section of the app and add it to your favorites if you wish for easy access.

User Manual:

- The user manual that comes with the device is pretty straightforward. It asks you to download the Tapo app which also comes with a barcode to do so which directs you to the AppStore/GooglePlay depending on your phone or tablet.
- Once the app is downloaded the instructions to the set up are pretty easy to follow and answers to any troubleshoots can be found by clicking on the "I need help" button at the button of each page.
- However, the additional features such as sharing the device is not mentioned again after the initial setup phase which can easily be missed. I had to google again later to see how to do so.

Features:

- Brightness: The light can be dimmable and can be adjusted between 0-100% to suit the convenience of the user.
- Multi Color: A wide range of colors to select from including
- Auto Mode: an auto mode for the light bulb color can be used for different purposes. Namely, there are 2 auto modes.
  (i) Auto Match: Ideal for gentle morning wake up and indoor use. Automatically adjusts the color temperatures to match natural lighting from dusk to dawn.
  (ii) Auto Compensate: Ideal for corridors and outdoor use. Automatically adjusts the color temperatures to compensate for a lack of natural light to ensure you always have sufficient illumination.
- Has a feature to select the theme of the lighting - the 2 themes include 'Party' and 'Relax'. The party theme has bright and flashy lights which keep changing automatically to give a disco-like atmosphere. The relaxed theme is more calm and lighter colors.
- You can schedule a time to set when you want your device on or off regularly.
- An away mode is also present on the app which will turn on and off the device randomly to make it look like someone is home. This helps in saving the power and life time without worrying about turning all the lights off when you are not home.
- You can also set a timer for how long you want the light to stay on.
- You can also add Third Party services to control your Tapo light bulb. Third Party devices that work with Tapo devices are - Amazon Alexa, Google Assistant, Apple's Siri and IFTTT.

- Using a dimmer light can interfere with the device's performance in terms of the lighting and luminosity. If a dimmer light is used, then make sure to keep the switch on 100% and dim the bulb using the app for best results.

Privacy Concerns:

- "Tapo Smart Light Bulb" would like to find and connect to devices on your local network. The purpose of the app connecting to the local network: enable pairing and control of the devices connected to the local area network.
- Allow "Tapo" to use your location. Location permissions will be used for smart device automation, discovery of nearby devices, Wi-Fi lists, and more.

Network Connectivity

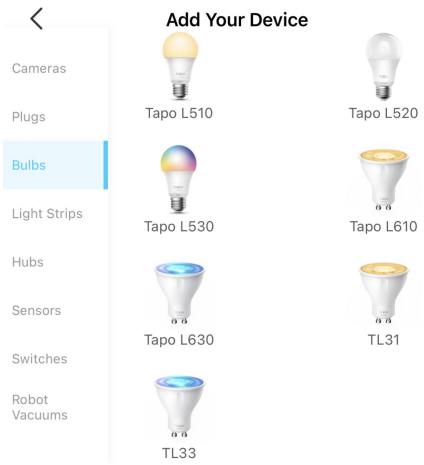
- Requires 2.4GHz network connectivity.
- Using metal lamp shades will strongly degrade the device's Wi-Fi signal strength.

Grant access to others:

- There is a device sharing feature which can be used to allow family members or friends to manage the smart device together.
- To share the device first the new member should download the app and create their own account or use an existing account. Then from the original account you will have to long press on the device you want to share and click on the 'Share' option or on the Me page you can tap on 'Device Sharing' and select the device you want to share. Now you will have to enter the invitee's TP-Link ID and then tap Share. Now the second user can simply accept the invitation on their app and the device is ready to use from 2 accounts.

Consistency:

- The smart bulb is very lightweight and easy to fix to a socket like any other normal bulb. The smart bulb itself does not have any interactive buttons, everything must be controlled by the Tapo app or a third party service.
- Coming to the App, it is pretty consistent with the device. In the initial phase of set up, selecting my version of the bulb (Tapo L530) was easy to locate from a variety of different devices and versions. This is because the icons/pictures on the app exactly resemble the device's box and the bulb itself. Every version of the smart bulbs have different icons and it was easy to locate which one I was looking for. For a non-technical user, they wouldn't even have to know the exact model/series they are using to set it up.



- During the entire setup phase, you can always go back and forth the steps to change or correct any information or to look again to see what's going on.
- Using the device from the app is very convenient too. There are 5 basic colors to choose from and long pressing on a color takes you to a color palette where you can select any color and the bulb changes colors while you keep selecting. And so is with the brightness.
- Setting up a timer or scheduler is also easy to use and is consistent with any other timers that a general user may be using on their smartphone or tablet.

Memorability:

- I used the device/app after a week of initial use and the basic functionalities were pretty easy to remember because of the good consistency of the device.
- However, for a user with non-technical background, tasks such as sharing the device with a new member can be a bit difficult to memorize because there are only 2 ways to do so as mentioned in one of the previous sections which involves a lot of steps, some a bit complicated for a general user such as navigation to the Me section and sharing a device by entering the TapoLink ID of the invitee.

Evaluation of functionality and user pain points:

- **Their functionality and value proposition:**

  - The device is intended for both residential and commercial usage, a smart light bulb offers convenience, energy efficiency, and customization to its users. Its key functionalities include remote control access to the device, scheduling, and compatibility with various smart home ecosystems like Amazon Alexa and Google Home. The value proposition of the smart light bulb includes its energy-saving capabilities through usage tracking and optimization and the ability to create personalized lighting scenes and ambiance. It can also be used for security purposes, when a user is not home they can control the light bulb be blink or turn on for some times of the day to make it look like someone is at home.

- **Successful delivery of pain points:**

    - The bulb easily screws into standard light fixtures, and pairing with the Tapo app is straightforward, requiring minimal technical knowledge.
    - Seamless integration with smart home systems: The device is compatible with Amazon Alexa and Google Assistant, the Tapo Smart Wi-Fi Light Bulb can be controlled through voice commands or integrated into existing smart home routines.
    - Intuitive app interface: The Tapo app provides a user-friendly interface, allowing for easy control of brightness, color temperature, and scheduling of the bulb's operation.
    - Customizable lighting: Users can choose from millions of colors and various white light temperatures, enabling personalized lighting scenes and moods to suit different occasions and preferences.
    - Energy efficiency: The LED technology used in the Tapo Smart Wi-Fi Light Bulb consumes less energy than traditional incandescent bulbs, contributing to cost savings and a reduced environmental footprint.
    - No subscription fees: The Tapo Smart Wi-Fi Light Bulb doesn't require additional subscription costs for its basic features, ensuring affordability and accessibility to a wide range of users.
    - Remote control and scheduling: Users can easily control the bulb from their smartphone, even when away from home, as well as create schedules for automated lighting adjustments, promoting both convenience and security.

- **Mismatch with user pain point:**

    - Connectivity issues: Some users may experience occasional connectivity problems, leading to a loss of remote control functionality or difficulty in integrating the bulb with their smart home systems. This may affect the bulb's ability to consistently deliver the convenience and seamless smart home experience users expect.
    - Limited compatibility: The Tapo Smart Wi-Fi Light Bulb may not be compatible with all smart home ecosystems or third-party apps, potentially limiting users who wish to integrate the bulb into a more extensive smart home setup.
    - No built-in motion sensor: The Tapo Smart Wi-Fi Light Bulb lacks a built-in motion sensor, which could have provided additional automation and security features that some users may desire.
    - Potential performance degradation over time: Some users may experience a decline in the bulb's performance, such as a reduced response time or diminished brightness, as the product ages.
    - Reliance on the Tapo app: Users are required to use the Tapo app for most of the bulb's functionalities, which might create inconvenience for those who prefer using a single, unified app to control all their smart home devices.

17. LIFX - LED Smart Light

What it is:

A smart bulb is an internet-capable LED light bulb that allows lighting to be customized, scheduled and controlled remotely.

Setup:

- Download the LIFX App, available on app store and google play
- Once the app is installed, register to LIFX by creating an account or log in to an existing LIFX account.
- Turn off the power to the lamp or light fixture where you want the smart light.
- Remove your old bulb. Carefully screw in your new LIFX light bulb.
- Turn on the power to the lamp. A white light should start flashing to indicate pairing mode.
- Once you log in to your account and the device is in pairing mode, click on the '+' sign on the bottom right of the home page and select "New Device" -> "New Light"
- Now, there are 2 ways to set up the new device, either using Apple Home Kit (If you are an iOS user) or connect using Wi-Fi. We will compare both the methods
- Go to your Wi-Fi in your settings app.
- Select your light (device) under "Choose a Network". This will gather information about your existing wifi network and the accessory (Here: Light device) will be set to join your Wi-Fi network. (You can also choose here to join a different wifi network nearby)
- Now then return to the LIFX app and click on the green arrow on the bottom right of the screen.
- On the home page, click on the green menu bar beside the calendar icon on the top right of the screen.
- You will see a home page with your device name (name of the light you just connected) under the "Almost Done" section.
- Select that light and a new screen will pop up to let you continue the set up.
- Select "complete setup" and it will ask you to give a name for the location of your new device. Ex: Home, Office etc
- Now it will ask you to make a New Group or join an existing one - Ex: Room, Kitchen, Hallway etc.
- Finally, it will ask you to name your LIFX Smart Bulb. (You will need to remember this name if you want to add it to Amazon Alexa or Google Assistant later)
- Now the setup process is complete. You can now add another device here or set-up a voice assistant which can also be done later on.

Features:

- Brightness: The light can be dimmable and can be adjusted between 0-100% to suit the convenience of the user.

- Multi Color: A wide range of colors to select from including
- Themes: You can create themes from a wide range of options already available in the app such as: Peaceful, relaxing, ports, energizing etc, in the “create” section. Useful of you are using multiple bulbs.
- Effects: There are a wide range of effects available to the user such as music visualizer, random, spooky, flicker, strobing etc.
- Day and Dusk: Has a feature to set different themes for different times which will automatically turn the light on at specified times with selected themes to automate the user experience.

- Using a dimmer light can interfere with the device’s performance in terms of the lighting and luminosity. If a dimmer light is used, then make sure to keep the switch on 100% and dim the bulb using the app for best results.
- Connects to a smart speaker such as Google Home or Amazon Alexa.

Privacy Concerns:

- “LIFX” would like to find and connect to devices on your local network. The purpose of the app connecting to the local network: enable pairing and control of the devices connected to the local area network.
- Allow “LIFX” to use your location. Location permissions will be used for smart device automation, discovery of nearby devices, Wi-Fi lists, and more.

Network Connectivity:

- Requires 2.4GHz network connectivity.

Consistency:

- The smart bulb is very lightweight and easy to fix to a socket like any other normal bulb. The smart bulb itself does not have any interactive buttons, everything must be controlled by the LIFX app.
- Coming to the LIFX App, there were some consistency issues during the setup process. The serial number of the device is not clearly mentioned on the box. So while setting up, it can be confusing to find the device while connecting to it via Wi-Fi.
- Once the device is connected using Wi-Fi the user has to return to an app and click on the devices symbol icon on the top right corner of the homepage to select the device. But the symbol does not resemble the light or even a LIFX switch which can be confusing for a user to understand what the icon actually means without looking at the manual.
- Using the device from the app once it’s setup is convenient for basic tasks. First there is a brightness controller which can be used to adjust the brightness. If you swipe the screen left you can also pick the colors by scrolling through the color palette and adjust the dimness pretty easily.
- Setting up a timer or scheduler is a bit inconsistent with what a general user would be used to.

Memorability:

- Most of the basic features were easy to remember and use. The app gives clear instructions at every step.

- Using HomeKit makes it much easier to do most of these basic tasks as most of the other smart devices are also connected to the homekit, so the user can access all their devices at one place.
- Setting up the device again took a bit longer. The app kept asking me to give LAN permissions even though the permissions were ON. Fixed by reinstalling the LIFX app and signing in again.
- Using other features like connecting the light to a speaker or adding timer etc were really hard to work around in the app and it took me a while to look at the manual multiple times and a lot of tries to connect it to a speaker (Used Google Home).

Functionality and value proposition for LIFX LED Smart Light:

Designed for residential and commercial applications, the LIFX LED Smart Light offers users a versatile and feature-rich lighting solution. Key functionalities include remote control via a smartphone app or voice command, customizable lighting scenes, energy monitoring, and compatibility with various smart home ecosystems. The value proposition of the LIFX LED Smart Light includes its superior brightness and color range, robust app functionality for precise control over color and brightness, energy-saving capabilities through usage tracking and optimization, and improved security through presence simulation while users are away from home or business premises.

Successful delivery of pain points for LIFX LED Smart Light:

- Easy installation and setup: The LIFX LED Smart Light requires no hub, making the installation process simple, and the pairing with the LIFX app is straightforward.
- Extensive compatibility: Compatible with major smart home ecosystems such as Amazon Alexa, Google Assistant, and Apple HomeKit, the LIFX LED Smart Light allows for seamless integration and control.
- Intuitive app interface: The LIFX app offers a user-friendly experience, enabling users to easily adjust color, brightness, and create custom lighting scenes.
- Vibrant color and brightness options: LIFX LED Smart Light boasts a wide color range and superior brightness compared to many competitors, allowing for extensive customization.
- Energy efficiency: The LIFX LED Smart Light is built with energy-saving LED technology, reducing energy consumption and costs over time.
- Remote control and scheduling: Users can control the light from their smartphone, even when away from home, as well as set schedules for automated lighting adjustments, enhancing convenience and security.
- Firmware updates: LIFX provides regular firmware updates, ensuring that the smart light continues to perform optimally and stays compatible with the latest smart home innovations.

Mismatch with user pain point for LIFX LED Smart Light:

- Connectivity issues: Some users may experience intermittent connectivity problems, affecting remote control functionality and integration with smart home systems.

- Limited third-party app compatibility: The LIFX LED Smart Light may not be compatible with all third-party apps, potentially limiting users who wish to use alternative control methods.
- No built-in motion sensor: The LIFX LED Smart Light does not have a built-in motion sensor, which could have offered additional automation and security features desired by some users.
- Price point: The LIFX LED Smart Light is generally more expensive than some competitors, which might be a deterrent for budget-conscious customers.
- Reliance on the LIFX app: Users need to use the LIFX app to access most of the light's functionalities, which might be inconvenient for those who prefer a single app for all their smart home devices.

Missing Devices (NOT Finalized)

18. Amazon Alexa Dot

What it is:

A smart home device that acts as a singular space that unites functionalities of multiple home devices and simultaneously as a voice command interface for home devices.

Set up:

- Plug Alexa into power outlet
- Open the Alexa app
- Go to Menu in the Alexa app and select settings
- Find the device and update WIFI
- Press and hold the Action button (solid circle) until the light ring turns orange
- Now the device is connected with a mobile app, users can select the local WIFI to connect the device to.

Features:

- Speaker
- Voice control for home devices
- Look up information online
- Source of news
- Timer

Privacy Concerns:

- Connects to local wifi
- Audio monitoring of physical environment in which the app is set

Network Connectivity:

- AP mode and EZ mode

Grant access to others:

- Only connects to singular Alexa app with user permission.

Evaluation of functionality and user pain points:

- Their functionality and value proposition: Amazon Alexa Dot targets families—characterized by a diverse age group—as its audience group. With its value proposition of easy control of home devises by allowing users to use voice control, as well as functions like acting as a Timer, speaker, source of news, and source of information, Amazon Alexa Dot aims to solve the pain points of inefficient
- Successful delivery of pain points: By being a place where the functions of multiple devices are put into one and allowing user to control other devices whose functions Alexa Dot does not incorporate, the product provides an effective way to control home devices.
- Mismatch and shortcomings: The performance of controlling the devices is not as robust so as to successfully deliver its value proposition. For example, its voice control system which allows users to control other home devices fails to pick up a wide range of accents. Another flaw that draws back the device's performance is in the functionality it provides in place of other home devices. When acting as a way for users to search for information online, Echo Dot is not consistent enough in the quality of search results as compared to a traditional search engine.

  The device also has difficulty with its networking stability, where it often fails to connect to the local wifi router but other times it would connect.

19. Knocki: Make any Surface Smart

What it is:

A smart device that converts a surface into a control board

Set up:

- Create an account with the phone app
- Connect a Knocki device
- Add Gesture and Tasks

Features:

- Find phone
- Control lights
- Adjust temperature
- Up to 10 gestures
- Built-in Wifi

Privacy Concerns:

- Location services
- Access to Wifi

Network Connectivity:

- AP mode and EZ mode

Grant access to others:

- Connects to a singular user app, but shares a physical interface.

Evaluation of functionality and user pain points:

- Their functionality and value proposition: Knocki Smart Surface targets families—characterized by a diverse age group—as its audience group. With its value proposition of easy control of home devises by allowing users to use ‘tabs’ as commands to their home devices, Knocki Smart Surfaces aims to solve the pain points of technology home devices being difficult to manage at home.
- Successful delivery of pain points: The different commands does allow Knocki to serve as a centralized control panel. The set up and mounting process of the device itself is also sufficiently convenient that the usability and ease of use of the product is good.
- Mismatch with user pain points: Knocki Smart Surface has consistency issues in interpreting the commands correctly and can confuse different commands, such as the number of tabs, for each other. Occasionally, certain commands are not also taken in and there is no response; and when following commands are made, the device confuses the number of tabs actually inputted between the two commands and leads to unintentional responses.