SMART MIRROR WITH IN BUILT AI

MGT1022
LEAN STARTUP MANAGEMENT

Report submitted in partial fulfilment of the requirements for the degree of

Bachelor of Technology in Computer Science Engineering

by

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under the guidance of

DR. MEKHALA R S

VIT BUSINESS SCHOOL (VITBS)

April 2022

BONAFIDE CERTIFICATE

This is to certify that this project entitled "**SMART MIRROR WITH IN BUILT AI**" submitted impartial fulfilment of the degree of Bachelor of Technology to Vellore Institute of Technology, Chennai, done by **Mr. Devarinti Dhapatla Puneeth Reddy**, Register No. **20BCE1852**, **Mr. Sanjil KC**, Register No. **20BCE1855**, **Mr. R Lenin Vasan** , Register No. **20BCE1892** , **Ms. Swetha Anbalagan**, Register No. **20BCE1978** are an authentic work carried out by under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Place: VIT Chennai
Date: 26-04-22

Signature of the Course Faculty

The report is satisfactory / unsatisfactory

Signature of the Internal Examiner **Signature of the External Examiner**

Approved by

Head of the Department

DECLARATION

We **DEVARINTI DHAPATLA PUNEETH REDDY** , **SANJIL K C**, **LENIN VASAN**, **SWETHA ANBALAGAN** bearing Reg. No. **20BCE1852**, **20BCE1855**, **20BCE1892** and **20BCE1978** respectively hereby declare that this project report entitled **SMART MIRROR WITH IN BUILT AI** has been prepared towards the partial fulfilment of the requirement of the course Product Design, Management Techniques and Entrepreneurship under the guidance of **DR. MEKHALA R S**.

I also declare that this project report is my original work and has not been previously submitted for the award of any Degree, Diploma, Fellowship, or other similar titles.

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Date: 26-04-2022

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ABSTRACT

Smart mirrors are a brand-new addition to the IoT product family that has been obtaining a great deal of attention in recent years by each industrial makers and hobbyists. This paper describes the planning associated implementation of a voice-controlled wall mirror, referred to as “Magic Mirror” with Artificial Intelligence for the home environment. It is a mirror, which can display real time content like time, date, weather and news at the same time. The Magic Mirror consists of functionalities like real time information and data updates, voice commands, face recognition. The user can control the magic mirror by voice commands.

The project shows the design of a smart device-Smart Mirror. The smart mirror here is mainly for home environment. These smart mirrors are not widely used due to cost or high requirements of hardware. The proposed smart mirror will be operated by Raspberry Pi and will be connected by real world through internet. The smart mirror will consist Raspberry-Pi, LED monitor, speakers, microphone with two-way mirror and acrylic glass. With the help of voice recognition API the mirror will communicate with the user through voice commands and responds them accordingly. The mirror will highlight some basic amenities like time, local news, weather, etc. The mirror will also perform some advance function such as Home Automation using Smart Mirror. This mirror with artificial intelligence will provide an extraordinary experience to the user.

ACKNOWLEDGEMNT

We are using this opportunity to express our gratitude to everyone who supported us throughout the course of this project. We are thankful for their aspiring guidance, invaluably constructive criticism and friendly advice during the project work. We are sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project.

We wish to place on record the profound gratitude to our guide, Dr. Mekhala R S, VIT Business School (VITBS), Vellore Institute of Technology, Chennai for her constant encouragement, continued support and valuable guidance without which this work could not have been possible. The support and encouragement given by our friends and colleagues are beyond words and we are deeply indebted to her for her continued help and dedication.

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INTRODUCTION

Heterogeneous computing devices with wireless connectivity which embeds everyday objects are being used in different activities are providing a whole new experience. The interactive computing, voice technologies, artificial intelligence are providing ease in life in very secure and convenient way. In every house there is a mirror and we look at the mirror every day and find out how we look. The smart mirror is a modification over a normal mirror with interconnected smart devices and technologies with embedded intelligence which offers advanced functionality such as time, news, weather, displaying maps. This mirror will help in developing smart homes and provide a unique environment to the users.

LITERATURE REVIEW

In this paper, an intelligent mirror based on raspberry pi is designed for the home of Internet of things. The intelligent mirror is made of raspberry pi as the host controller. In working condition, the system by raspberry pi is connected to the network through WIFI, and obtain information about the weather forecast from the API network interface specified dressing index, time, date and other information, and then through the information displayed on the plasma display. The user can interact with the mirror, such as asking the mirror the weather, news, time, the mirror can automatically obtain the corresponding information network and broadcast. The designed intelligent mirror has the advantages of small size, simple operation, low cost, and has broad application prospects. The disadvantage of this kind of mirror that it won't support gesture control so as to make the mirror more interactive.

PROBLEM STATEMENT

The major problem of any existing mirror is displaying just the object in front of it or just the human face without having to interact with them. This project is developed with the intention that people spend quality time in front of the mirror.

- What if we say that you can do everything that you do with your mobile phone on a mirror, yes, it's possible with a smart mirror which uses android as its operating system ,it can be a mirror and a smart phone whenever you wish. The main goal of this gadget is to make the most of your time and keep you entertained .

- It is designed in a fascinating way and it has many apps to keep you entertained whenever you need. It also has an in-built AI which will make your tasks easier ,you just have to say the magic word.

- Smart mirrors feature a digital display behind the glass and connect to your phone via Bluetooth or Wi-Fi. Through this display, you can typically get information such as the date and time, daily news, weather forecasts , traffic reports and some apps.

CHAPTER 1

DESCRIPTION OF IDEA

Smart mirrors often have built-in LED lights, allowing you to adjust the color and warmth to provide optimal lighting for your needs. Some smart mirrors play music via Bluetooth and let you make phone calls or access the apps on your phone. Smart mirror technology is increasingly used for specific applications, from beauty to fitness. The beauty-focused HI Mirror can provide personalized information about your skincare and makeup, while the fitness device Mirror provides workout guidance right on the glass. Smart mirrors feature three components: a two-way mirror, digital display and computer. Unlike standard mirrors, smart mirrors need light to pass through from behind the glass to view the display. That's why you need a two-way mirror, like you'd find in a police station. Behind the glass there's a built-in digital display (a monitor screen or tablet) powered by an internal computer. The computer connects to your home's wireless network or your phone via Bluetooth, allowing it to display real-time information from the Internet.

CONCEPT GENERATION

This section contains brief explanation about the product, industry, customer need identification .

Product concept creation is an attempt by product developers to give helpful insights into the product's working principles, which is commonly depicted in 3D models or preliminary sketches followed by a brief textual explanation.

The method comprises a variety of design options from which designers may choose and come to a decision or generate better ideas.

There are just too many items in today's society.

As a result, good concept generation is critical to any product's commercial success.

Concept generation is an important process in manufacturing because it removes the frustration due to incompatibility of products or complex products which aid prototype development. Due to this, it also saves time, effort and money spent.

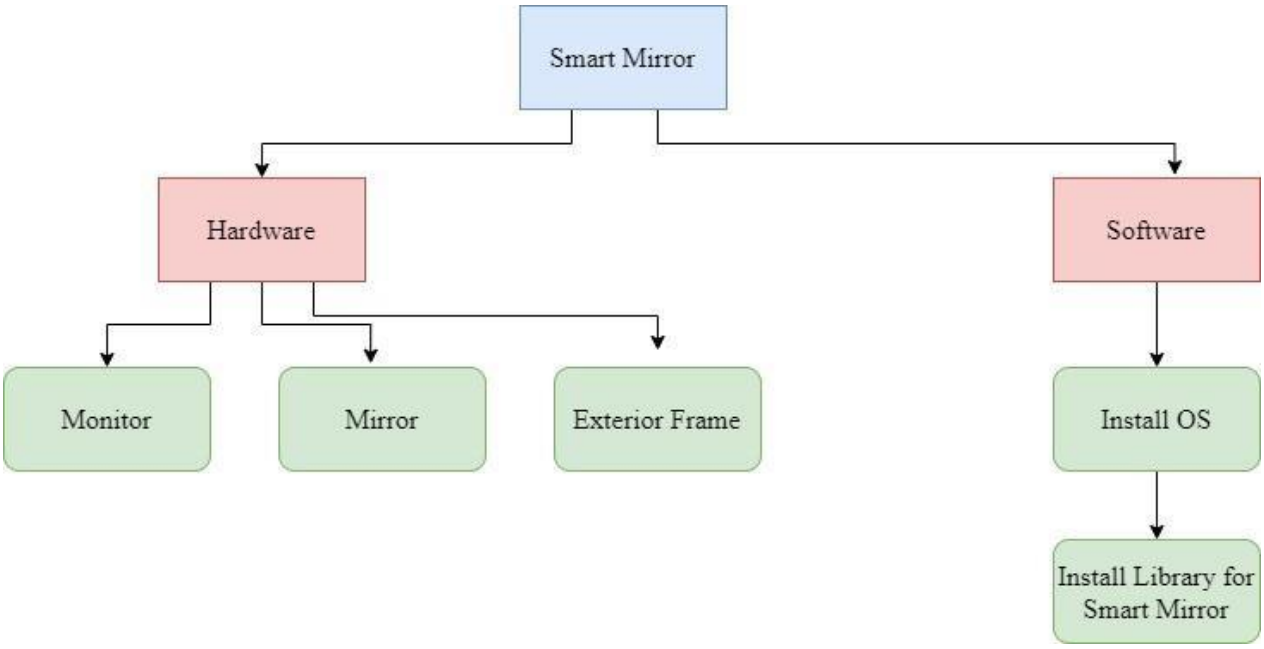
KEY PROPOSITIONS OF THE GADGET

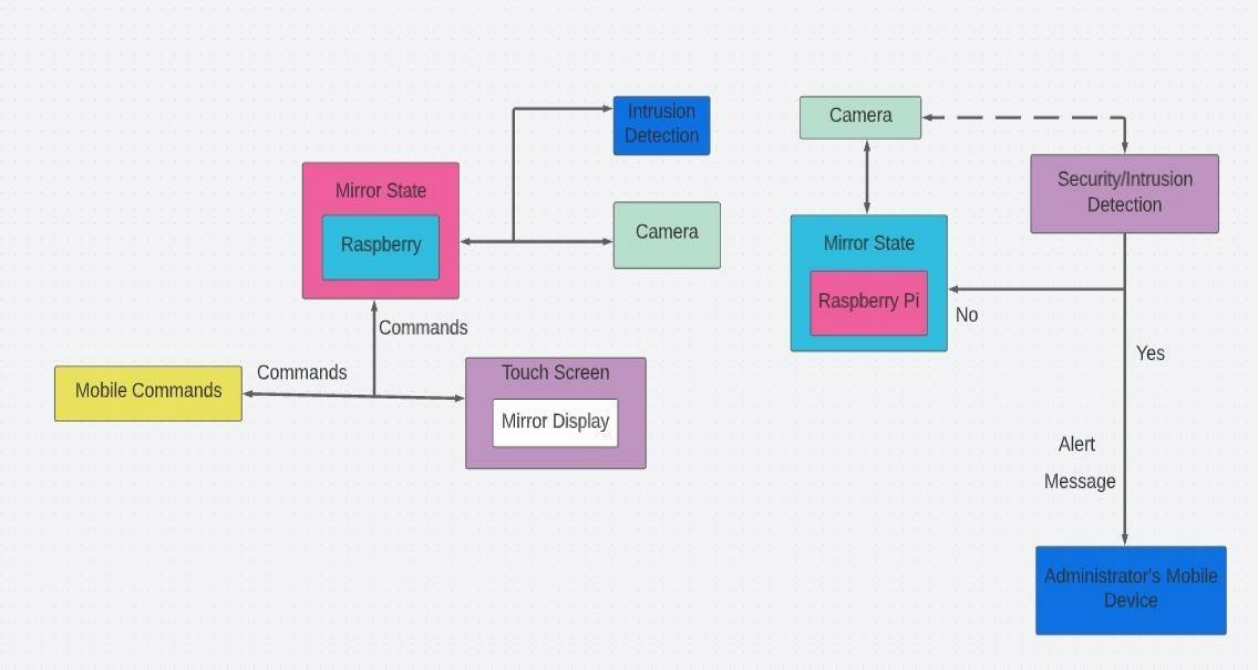
- Platform for entertainment.
- Platform for education.
- Voice assistance for saving time.
- Information about anything, anywhere.
- Suppliers of raw materials for the product.
- Investors for the growth of the product.
- Technological advancements.

MIND MAP

A mind map is a diagram used to visually organize information in a hierarchy, showing relationships among pieces of the whole. It is often created around a single concept, drawn as an image in the center of a blank page, to which associated representations of ideas such as images, words and parts of words are added. Major ideas are connected directly to the central concept, and other ideas branch out from those major ideas.

Mind maps can also be drawn by hand, either as "notes" during a lecture, meeting or planning session, for example, or as higher quality pictures when more time is available. Mind maps are considered to be a type of spider diagram. A similar concept in the 1970s was "idea sun bursting".




Intrusion Detection
Mirror State
Raspberry
Camera
Commands
Mobile Commands
Commands
Touch Screen
Mirror Display
Camera
Security/Intrusion Detection
Mirror State
Raspberry Pi
No
Yes
Alert
Message
Administrator's Mobile Device

SELECTION MATRIX

The variables identified for concept rating, ranking and combining

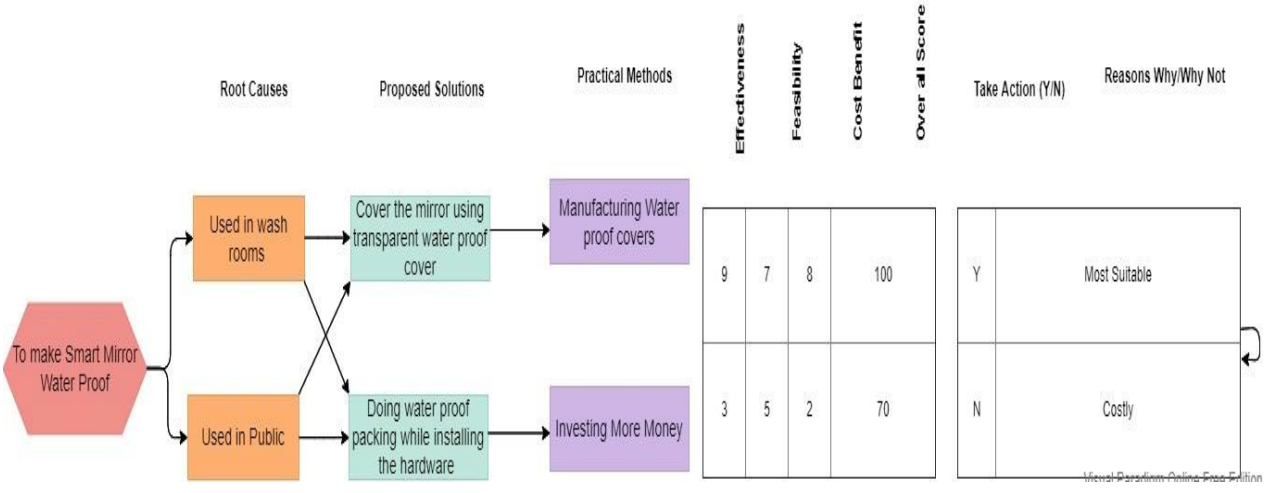
A selection matrix is a tool that allows you to compare an applicant's qualifications to the qualifications and functions of a job opening, as well as compare applicants to one another based on work-related factors.

A decision matrix is a chart that allows a team or individual to systematically identify, analyze, and rate the strength of relationships between sets of information. The matrix is especially useful for looking at large numbers of decision factors and assessing each factor's relative importance.

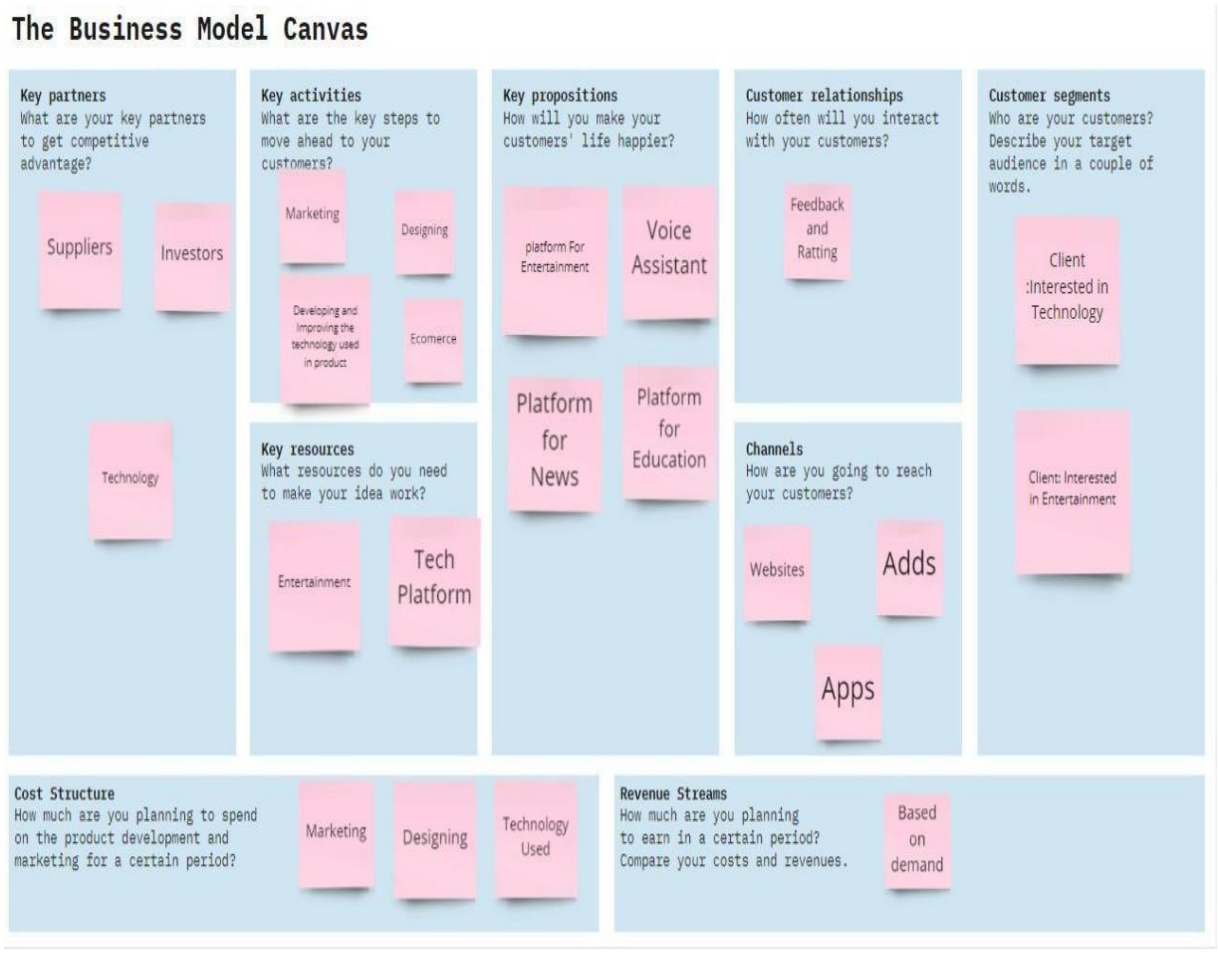
A decision matrix is frequently used during quality planning activities to select product/service features and goals and to develop process steps and weigh alternatives. For quality improvement activities, a decision matrix can be useful in selecting a project, in evaluating alternative solutions to problems, and in designing remedies.

Identify alternatives. Depending upon the team's needs, these can be product/service features, process steps, projects, or potential solutions. List these across the top of the matrix.

Identify decision/selection criteria. These key criteria



Business model canvas:



Many companies nowadays are struggling to understand the unprecedented complexity of developing business models for products and services based on the Internet of Things (IoT). This article aims at investigating what are the elements to be taken into account in order to create a business model for IoT-based products/services and what are the main challenges faced in this process. To address these questions, we review the literature on the creation of business models for the IoT and we analyse data from an action research involving the generation of a business model for an IoT-based product - SMART MIRROR WITH INBUILT AI - in a small company. We explore how this process occurred and the challenges faced.

The recent world has become a place of intense competition among the people. Human race has become more goal oriented and strives to be the best in all aspects whether its sports, business or entertainment. We all, ultimately, strive to be the best. Following the news, adapting the varied weather conditions are some of the interruptions that hinder our daily progress. Activities like these consume a lot of our time and can be very distracting which might affect our day-to-day activities. People value their appearance greatly and spend a ridiculous amount of time in front of a mirror throughout their daily routine. And this is the exact time where a lot of important things can be performed. But spending time with a smartphone, managing daily tasks, while preparing for the day would be a hard task. Therefore, a device with certain technology is required which allows a person to efficiently complete all the work needed for them to prepare for the day. And all of this has to be done at the same time and in one place. Hence, an Artificial Intelligence based Smart Mirror. The objective of our company is to provide an interactive display with the simplest interface to access various information that is needed to prepare well for the day. By using a 2-way mirror and an LCD display information like weather, time, calendar, news, voice-controlled AI, YouTube, home automation service and many more functions can be performed simultaneously together.

SKETCHES/PROTOTYPE

Product prototyping is a tool and an activity that has recently gotten a lot of attention in the product development research community.

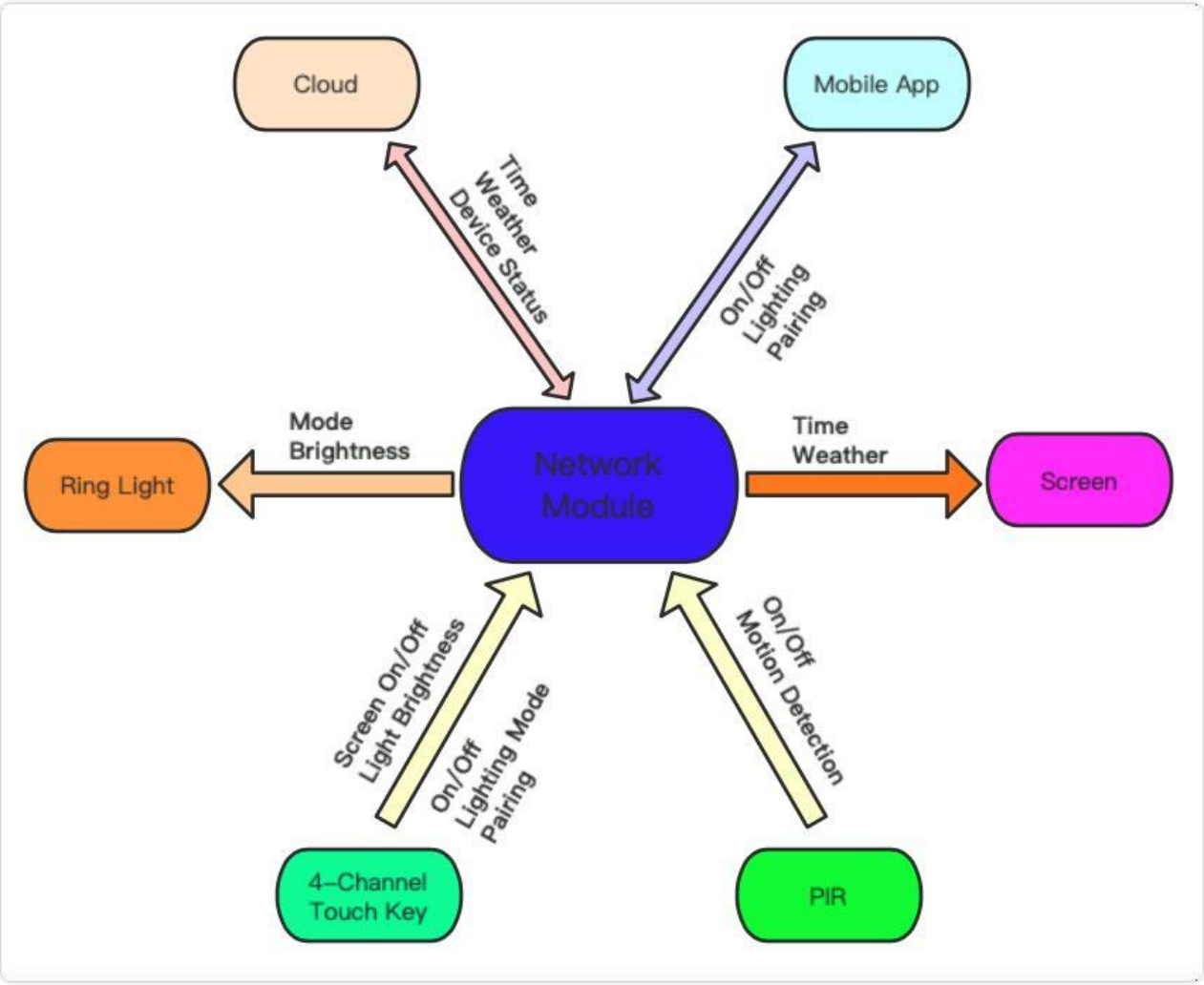
Early-
stage prototyping has become more popular as the use of Design Thinking in many business and product development sectors has grown. become an important activity. Contrary to the ‘proof-of-product’ role that prototyping often is given in traditional engineering design, prototyping in DT takes on a more exploratory role. Instead of validating ideas, prototyping can be used to stimulate imagination or be used as a tool for building to think. Thus, the speed of prototyping and subsequent testing become critical factors.

By utilizing digital tools, it is feasible to create highly flexible prototypes that validate short

learning cycles at an affordable cost. The following are the features in the smart mirror.

- Information display such as weather and time.
- Three lighting modes: warm white, cool white, and natural white.
- Human motion detection
- 4-channel touch key for on/off, mode switching, brightness up, and brightness down.
- Remote control with the mobile app.
- Powered by lithium battery.
- Wireless charging.
- Self-designed mirror shape.

Then, we figure out how to make these features work, as shown in the following block diagram.



Hardware selection

Microcontroller

Use Tuya's Wi-Fi and Bluetooth LE combo module as the microcontroller. Tuya provides a series of proprietary network modules with various specifications and methods of soldering to address different needs of IoT product development.

Screen

Choose an easy-to-develop screen with a low resource footprint, such as MF219 from Spotpear.

MF219 is a 2.19-inch UART LCD screen with 240 × 376 resolution. It has a built-in ASCII character set and provides access to the dot matrix display data RAM (DDRAM), which allows graphic display at any position on the screen. The UART interface enables serial communication. Developing with the powerful driver, you can design a nice and pretty user interface with a few lines of code. A host of integrated SoC resources and instruction sets make the development much easier.

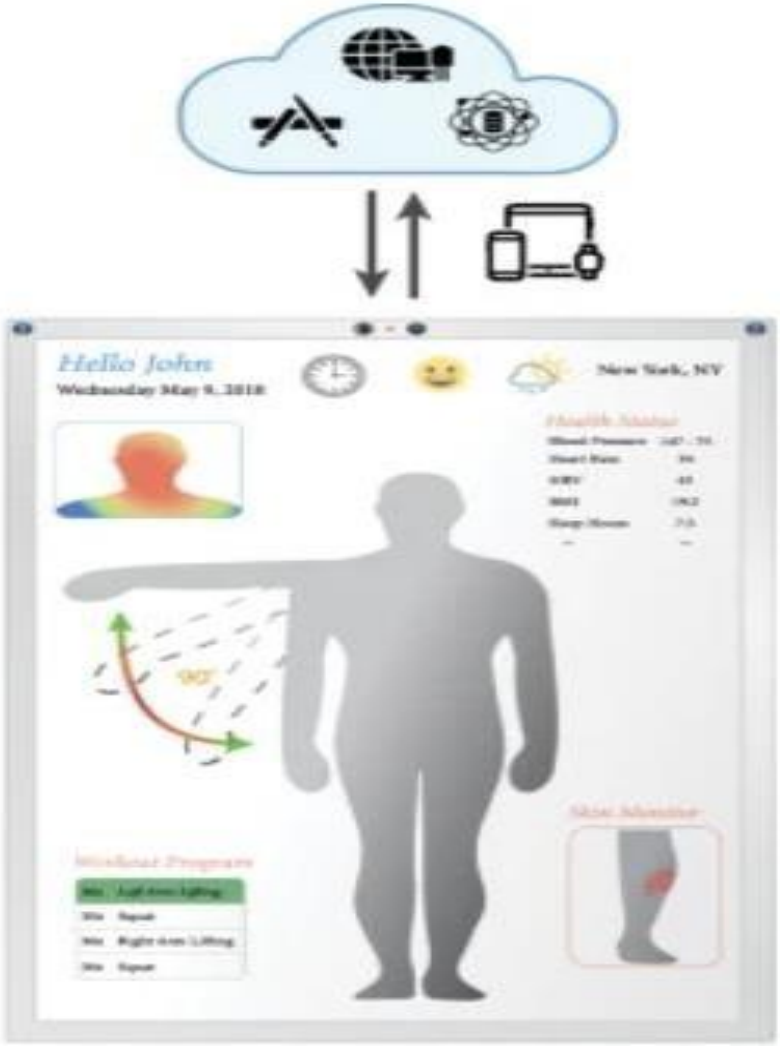
Touch keys

The BS814A-1 touch IC enables touch sensing. The BS81x is a series of ICs with 2 to 16 touch keys. It can detect human body contact using external touchpads. The high level of integration enables applications to be implemented with minimized external components. The BS81x series are equipped with serial or parallel interfaces to allow communication with an external MCU for device setup and for touch pin monitoring purposes. The special internal circuitry is employed to ensure excellent power noise rejection to reduce the possibility of false detections, increasing the application reliability under adverse environmental conditions. With auto-calibration, low standby current, excellent resistance to voltage fluctuation, and other features, this range of touch key ICs can provide a simple and effective approach to touch key operation in a wide variety of applications.

Features

- Operating voltage: 2.2V to 5.5V
- Low standby current
- Auto-calibration
- Reliable touch detections
- Standby and normal operating modes
- Maximum key on duration time detection
- Adaptive voltage drop function

- Level hold: selectable active low or active high
- NMOS output with internal pull-high or CMOS direct output
- Sensitivity adjustment using an external capacitor
- Minimized external components




TEMPERATURE
22.0 °C
Living room

PRODUCT SPECIFICATION

To build a smart mirror, you need three main components: a two-way glass/acrylic surface to act as a mirror, a display such as a PC monitor or smartphone/tablet, and a device to run the mirror's software. The Smart Mirror has scope in the field of AI. The facial recognition technology used can be future enhanced as a means of security. A smart mirror consists of a monitor and a tiny computer behind a two-way mirror. It can show the time, weather, calendar events, and daily news. Basic smart mirrors only display information, but advanced options are touch-enabled and come with a camera, a microphone, speakers, and various sensors.

Materials

Hardware

Tuya's Wi-Fi and Bluetooth LE combo module, PCB assembly, LED driver, LED bead, Touchpad, Screen, Spring, XH connector wire, Lithium battery, Wireless charging , Transmitter and receiver, Structural channel made by laser engraving, Structural channel made by 3D printing, Flat-head self-tapping screw, Flat-head self-tapping screw, Jumper wire, PIR sensor

Computer Hardware

Smart Mirror is equipped with a high-speed, quad-core processor, 2 GB RAM, built- in internal storage, Wi-Fi and a Bluetooth adapter.

Built-in Display

Smart Mirror has a built-in, 5-inch, High-Definition display screen visible only when activated. The mirror connects with the Internet and your smart device through your home Wi-Fi network as well as through Bluetooth.

Dedicated Mobile App

The Smart Mirror App allows to set the information you wish to see and that is of value to you. It is 100% customizable to your needs.

Built-in HD Camera

The High-Def camera is designed for hand free control. With the use of gestures and facial recognition, you control the mirror. The built-in HD camera doubles as a security camera and takes selfies. You can switch it on or off in the “Privacy” mode.

Personal Assistant

Dates & Times Reminder

Smart Mirror displays the current date and time as well as traffic information to your most current destinations, such as work and home. You take the bus and train? The public timetables are displayed to help you catch your transportation on time. Sync with your calendar.it will keep you updated of upcoming meetings and not-to-miss events. Compatible with Google calendar, iCloud.

Feed Widgets (Weather, News, Social Networks, etc.)

Choose from a wide array of widgets; e.g., weather forecast, breaking news, and social networks like Facebook, Google+, Twitter and many more.

CHAPTER 2

PRODUCT DEVELOPMENT

Product development process

A smart mirror is an advanced mirror incorporated with technologies such as sensors, cameras, displays, and connectivity equipment. These mirrors are majorly used in various industry verticals such as automotive, retail, residential, healthcare, and others. The functions of smart mirrors can differ depending on their utility. For instance, in the residential sector, it can be used for recognizing people, talking to them, and learning an individual's habits as a part of a smart home. In addition, in the automotive sector, smart mirrors can be used as side-view and rear-view mirrors for enhanced safety purposes. Moreover, in the field of retail, smart mirrors are incorporated for suggesting customers with trending outfits. For instance, Ralph Lauren, a leading fashion brand, incorporated the concept of connected fitting rooms in its Manhattan outlet for an enhanced customer experience and to help retailers to make smart merchandising decisions.

Multi User Profiles

Face Recognition System

Smart Mirror stores as many user profiles as you desire. Thanks to our built-in HD camera connected with a super-fast processor and our sophisticated algorithm, it will instantly detect and recognize the distinctive facial features and display the data of associated user's profile.

Facial Gesture Recognition

Smart Mirror also recognizes facial gestures to control the device. No need to touch the mirror. No need to use your voice. You want to switch between different widgets? Move your eyes top-right or top-left corner. How about take a selfie? Just blink your eye. How cool is that!

Privacy

If you have privacy concerns, change your setting for the “Privacy” mode, and the built-in camera is then fully disabled. Set up your feature settings using the mobile app and program which widget you want to loop and at which interval.

Home Security System

Security Camera

More than just a personal-assistant, Smart Mirror is also a home surveillance device. In the “Away” mode, the display is disabled and MirroCool looks like an ordinary mirror, but the camera is switched on and operates in motion detection mode. If the camera detects a face, which is not a recognized “home users”, it will take pictures of the “guest” and sends them instantly to your mobile app followed up with an alert notification.
It’s up to you to decide whether to call the police or not, at the click on a button.

Design for Manufacture

The major driving factors of the smart mirror market are surge in adoption of advanced driver assistance systems (ADAS) in the automotive sector, rise in demand for connected devices, and transition to digital stores in the retail industry. However, high cost and concerns regarding confidentiality of private information are some of the factors that hamper the growth of the market. On the contrary, increase in adoption of smart homes is expected to create lucrative growth opportunities for this market.

The key players operating in the smart mirror market are Japan Display Inc., Gentex Corporation, Magna International IncSamsung Electronics, Murakami Kaimeido, Seura, Perseus Mirrors, Ficosa, Dension, and Electric Mirror.

Products and Services:

The global smart mirror market was valued at $1,750.0 million in 2017, and is projected to reach $4,118.7 million by 2025, registering a CAGR of 11.5% from 2018 to 2025. Europe was the highest contributor to the global market in 2017, registering a CAGR of 10.3% during the forecast period.

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The smart mirror is another smart display device that has potential for home use, as well as in the clothing and cosmetic sectors.

A smart mirror is an interactive mirror equipped with cameras, sensors and an electronic display. While the technology isn't totally new, the integration of voice assistants has led to expanded use across several industries.

In the smart home, a smart mirror can display information such as upcoming schedules and unread emails. The device can also play music in the bathroom, let users monitor their other smart home gadgets, receive makeup suggestions and make phone calls.

"Retail and smart homes remain the reference industries for smart mirrors, with beauty and apparel at the forefront of the retail side," The firm's devices can log and display health data, as well as allow users to play music and control smart home devices.

Capstone Connected Home and Electric Mirror unveiled new Android and Google Assistant-

equipped products at CES 2019, while Kohler has released an Alexa-powered smart mirror that enables users to interact with the built-in voice assistant.

Another major industry adopting smart mirrors is retail; in particular clothes retailers. Smart mirrors used by firms in this sector can identify what products customers are wearing, as well as suggest other products shoppers might like. Combined with augmented reality technology, customers can also try on clothes virtually.

Spanish fashion brand Zara has installed a smart mirror in one of its stores. The mirror displays other items in stock for consumers depending on what they are trying on.

The Mastercard Smart Mirror lets consumers browse items, have store attendants bring them and pay by card without leaving the fitting room.

The HI Mirror serves as a daily beauty consultant, using an embedded camera to analyze a user's skin wrinkles, blemishes, dark spots and clogged pores, and tells the user what they can do to improve their skin condition.

According to data published by Research and Markets, the value of the smart mirror market is expected to grow from US$2.8 million by 2018 to $4.4 billion by 2023.

Smart mirrors, due to the huge amount of data collected from users, look set to become a medium for providing personalized experiences both at home and in retail stores.


GLOBAL SMART MIRROR MARKET
TOP IMPACTING FACTORS
Growing adoption of smart mirrors in the automotive sector
Rise in demand for connected devices
Transition of digital stores in the retail industry
High initial cost
Security of private information
Increase in adoption of smart home coupled with advances in industry 4.0
2017
2025

Estimate the manufacturing cost

Designing : We will be spending amount on the design of the product. The design will depend on customer choice. While purchasing, we will be giving a list of design and from that, the customer can choose any design.

Technology used : We have used technology which sounds like a smart phone and there is an inbuilt voice assistant in the mirror.

A morning routine can be enhanced with an impressive smart mirror that is ready to feed you whatever information you need at a glance as you get ready to start your day, such as weather, time, local news, and more. Having such a magic mirror is no longer a thing of our imagination. It is from fiction to reality. You can indeed build your own smart mirror rather easily with some tools and know-how. Here is how to make it happen. The mirror is designed to provide three types of light, cool white, natural white, and warm white, which can mimic sunny and overcast lighting conditions. A 4-channel touch key coupled with a PIR sensor ensures a good user experience. We put a wireless charger in the lithium battery-powered smart mirror to enhance its utility value even more. And our ultimate goal is to make it IoT-enabled, so this mirror can be controlled with our mobile phone from anywhere.

Economics of Product development projects.

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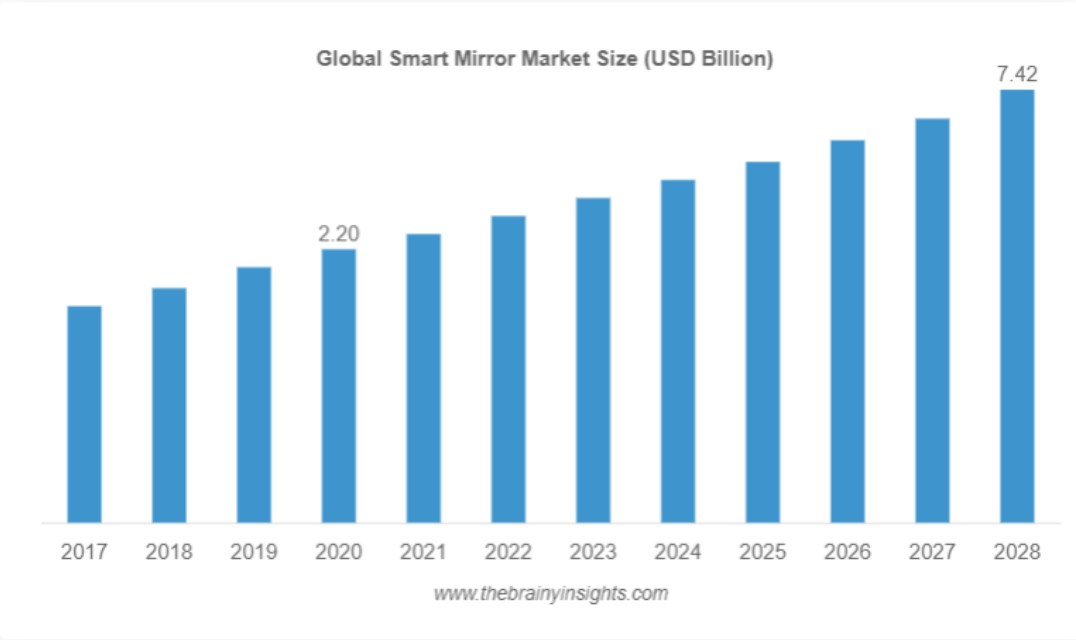

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In the smart home, a smart mirror can display information such as upcoming schedules and unread emails. The device can also play music in the bathroom, let users monitor their other smart home gadgets, receive makeup suggestions and make phone calls.

Planning :

Our company vision is to create a mirror. It's not an ordinary mirror. This Mirror has a similar function which we have in mobile phone / laptop. This Mirror has in built AI (Artificial Intelligence) . Through AI we can implement speech recognition which has more benefit. Instead using physical power to operate the mirror, we can use our voice to operate / use the mirror. The main purpose of this mirror is to provide entertainment for the people. Not only for entertainment, we can use it for education, news and many more. Currently there is no product which is similar to the smart mirror in the market. We want to implement this product, so people can enjoy it. The mission of our company is to give a high-tech gadget in an affordable price. We don't want to be like Apple, who sell their product in a high cost, which is not used / enjoyed by many people. So, we want our product to be used / enjoyed by every people. We introducing more variants, so people can buy which model they want and they can enjoy it. We want our customer to enjoy our product, that our prime goal.

Market Analysis and Insights : Global Smart Mirror Market

The smart mirror market is expected to witness market growth at a rate of 10.45% in the forecast period of 2021 to 2028, and is estimated to reach the value of USD 7,266.57 billion by 2028. Data Bridge Market Research report on smart mirror market provides analysis and insights regarding the various factors expected to be prevalent throughout the forecast period while providing their impacts on the market's growth. The increase in demand for the product for various industrial applications globally is escalating the growth of smart mirror market.

The smart mirror, also called virtual mirror, refers to the type of mirror that is embedded with electronic and smart technologies such as augmented reality, IoT, and high-quality electronic displays, among others technology. These mirrors can be controlled with the use of smart phones, computers or tablets, and are used in automotive industry and in retail shop to give better comfort to the users.

The rise in demand for connect devices across the globe acts as one of the major factors driving the growth of smart mirror market. The increase in demand for smart mirrors in the retail industry owning to the technological advancements in artificial intelligence, gesture recognition technology, augmented reality, and connect devices, and presence of large number of start-ups accelerate the market growth. The rise in demand for advanced driver assistance system (ADAS) as it provides the driver a better and safer driving experience, which provides self-dimming, secure driving environment, automatic brightness adjustment and self-cleaning further influence the market.
Additionally, shift toward digitalized manufacturing, technological innovations, presence of stringent passenger safety regulations, rapid urbanization and transition from traditional stores to digital stores in retail industry positively affect the smart mirror market. Furthermore, high demand for smart homes extends profitable opportunities to the market players in the forecast period of 2021to 2028.

On the other hand, high cost associated with the mirrors and security of confidential and personal data are expected to obstruct the market growth. Lack of awareness is projected to challenge the smart mirror market in the forecast period of 2021-2028.

This smart mirror market report provides details of new recent developments, trade regulations, import export analysis, production analysis, value chain optimization, market share, impact of domestic and localized market players, analyses opportunities in terms of emerging revenue pockets, changes in market regulations, strategic market growth analysis, market size, category market growths, application niches and dominance, product approvals, product launches, geographic expansions, technological innovations in the market. To gain more info smart mirror market contact Data Bridge Market Research for an Analyst Brief, our team will help you take an informed market decision to achieve market growth.

Global Smart Mirror Market Scope and Market Size

The smart mirror market is segmented on the basis of component, technology, type, functionality, augmented reality feature and application. The growth among segments helps you analyze niche pockets of growth and strategies to approach the market and determine your core application areas and the difference in your target markets.

- On the basis of component, the smart mirror market is segmented into hardware, software, andservices.
- On the basis of technology, the smart mirror market is segmented into smart material, andembedded technologies.
- On the basis of type, the smart mirror market is segmented into exterior mirror and interior mirror.
- On the basis of functionality, the smart mirror market is segmented into connected, and non-connected.
- On the basis of augmented reality feature, the smart mirror market is segmented into AR-smartmirror, and non-AR-smart mirror.
- On the basis of application, the smart mirror market is segmented into automotive, healthcare,retail and marketing, consumer and others.

CHAPTER 3

Product Economic Feasibility

Economic analysis

Smart mirrors feature three components: a two-way mirror, digital display and computer. Unlike standard mirrors, smart mirrors need light to pass through from behind the glass to view the display. That's why you need a two-way mirror, like you'd find in a police station. By application, the hospitality and retail smart mirror market segment is expected to grow at the highest growth rate during the forecast period

Among the application segment, the hospitality and retail smart mirror segment is expected to grow at the highest CAGR during the forecast period. Smart mirrors are often used in the retail sector wherein retailers try to catch the interest of potential clients and encourage them for frequent or regular visits. Additionally, they can display useful information, ranging from price and size availability to the fabric used. Smart mirrors allow shoppers to share their shopping experiences on social media. The increasing adoption rate of smart mirrors in North America and Europe for the hospitality and retail sectors is also driving the smart mirror market.

By type, the interior mirror holds the largest share of the automotive smart mirror market

The interior mirror segment is expected to hold the largest market share. The automotive market for the interior smart mirror was valued at USD 1,249.7 million in 2017 and is expected to reach USD 2,432.1 million by 2023, at a CAGR of 6.05% during the forecast period. At present, the interior auto/self-dimming mirrors are more often used in cars and light commercial vehicles.

Financial models

The smart mirror market forecast $2,046.4 million in 2018 and is projected to grow $ 4,415.4 Million by 2026, growing at a CAGR of 9.5% in the forecast period.

A smart mirror is a technological advanced mirror within an inbuilt display screen behind the glass. It displays anything a user wants on the mirror surface like weather forecast, upcoming appointments, news feed, current time and many more. It acts like a mobile handset on the mirror with an image of the user so that the user can check all the necessary information in the mirror itself.

Customer centricity is essentially taking customer service to the next level by creating a two-way street for businesses and their customers to interact and exchange ideas with the purpose of improving products. Having a business model that revolves around customer centricity helps the organization to achieve a positive and personalized experience for its customers. you need to involve the customer as much as possible in order to develop customer relationships.

We have designed an intelligent mirror keeping in mind the up-coming future advancement in the field of home automation environment. The prototype of the magic mirror is powered and controlled by the Raspberry Pi 3 and all the final output in form of real time data feeds are displayed on LED screen fixed with a two-way mirror. We have built a working model to demonstrate various functionalities of the mirror using voice commands. It gives a layout that can be extended in future to accommodate even more functionalities. In our future work we will try to add advanced gesture controls, automated salutation using face recognition of the end user and also understand that how advanced artificial intelligence can be implemented to the mirror so that it can automatically take care of all the requirements of the end user. Efforts have been made to build an

efficient and intelligent smart mirror that optimizes our time of doing works and increases our daily productivity. The Smart Mirror will play an important role in the field of IoT and home automation. Not only this can function as a normal mirror but can also provide other functionalities like weather forecast, calendar, time, etc.

which makes it more desirable. The functionality of the mirror can be expanded by connecting it to other home appliances, mobile devices, etc. Smart Mirror can be a great example of how AI can be integrated into home appliances to make our life easier, efficient and more enjoyable. In future, Smart Mirror can be made smarter by upgrading the AI. There is still a great scope to improve the AI. Soon, normal mirrors will be replaced by smart mirrors if they can be made affordable.

Sensitive analysis

Joint ventures and product development among key market players, along with the growing usage of smart technology among people across the globe, are expected to drive the smart mirror market growth.

However, the high costs of smart mirror are likely to hamper the growth of the market.

According to the regional analysis of the market, the Europe smart mirror market share is anticipated to grow at a CAGR of 8.3%, generating a revenue of $1,558.0 million during the forecast period.

MINIMUM VIABLE PRODUCT

Smart mirrors feature three components: a two-way mirror, digital display and computer. Unlike standard mirrors, smart mirrors need light to pass through from behind the glass to view the display. That's why you need a two-way mirror, like you'd find in a police station

- Most have us have a wish to be efficient in our everyday lives. We want to accomplish tasks easily, we want to manage our schedules, and most of all we simply want to feel in control of our lives as they unfold. The advent of smart technologies has helped to fill this need, as everyday objects are integrated with increasingly sophisticated levels of technology.

- However, there are still a vast number of unexploited niches in our homes where technology could make our lives smoother and more convenient, and it is this technical problem that our group will address with our product, the Smart Mirror. The household mirror is often taken for granted in our daily routine, but really, it’s one of the products that stand to gain the most functionality out of a tech upgrade. Mirrors are a focal point of our attention almost every single day, and yet we rarely physically touch them. This makes it an exceptionally easy hub to display important information on, from the time of day to your favourite website’s leading headlines.

Influence of the quantitative factors.

Our revenue system is based on the demand of the product.

And we will introduce some paid app which can be accessed by the smart mirror not on any other smart phone. We plan to make this product affordable as much as possible but we also need profits from our products and probably everyone won't be able to afford this technology.

- Now let's take an overview of our product, the Smart Mirror itself. At its heart the mirror is powered by a microcontroller, the Raspberry Pi 2, a platform on which to build all of our functionality. There are three things required for the Pi to host our display: First, we needed to download a web browser. With "Chromium" being a popular and easy choice for the Pi, we installed that. Second, we needed the Pi to open Chromium in what is known as "Kiosk Mode". This means that, upon initial start-up, the Pi will automatically load Chromium without any input from the user, and will do so without displaying any toolbars.

- Owing to the rising penetration rates of urbanization, the demand for aesthetically appealing advanced products with the ability to better serve the consumers' requirements, such as time schedules, multiple features in one device, has been driving the demand for smart mirrors globally. Moreover, the huge millennial population has been adopting smart mirrors due to the increased spending for their regular work hours tracking and luxury standards. For instance, the Fossil Group launched touchscreen smart mirrors for the tech-savvy millennials in India.

- Smart mirrors are seeing a surge in new users, including the older age population, owing to the fact that wearable makers, such as Apple and Smart mirrors, among others, are adding health-monitoring features that appeal to older people and keep them updated about their health status in real-time. For instance, Apple features a fall detection app and an EKG monitor to the Apple Watch Series 4, while Smart mirrors added a feature to detect sleep apnea.

Chapter 4

Entrepreneurial Competence

SWOT analysis

SWOT Analysis is a strategic planning method used to evaluate strengths, weaknesses, opportunities, and threats, in a business project or a manufacturing business. These four factors are called SWOT (strengths, weaknesses, opportunities, and threats). This process involves the specific determination and objectives of a manufacturing or business project that identifies internal and external factors that support and that does not support the achievement of the business objectives.

40SWOT analysis can be applied by analyzing and emulate the things that affect the four factors, then apply them in the picture in the SWOT matrix, apply the strengths map to take advantage of the opportunities, how to overcome the weaknesses that prevent the advantages of opportunities are able to deal with the threats that exist, and the last is how to overcome the weaknesses (weaknesses) that can make threats become real or create a new threat. Manufacturing business entrepreneurs must be responsive to changes that occur and seek to respond to challenges by altering or adjusting the structure of the organization at every level of hierarchy, forming new structures within the company that are suitable for more precise employee performance improvements with consumer demands as users of the business products. Such is the responsibility for innovative change of production and engineering.

STRENGTH

Access to tons of data.

Data is the smart mirrors' biggest strength. From your resting heart rate to an in-app food diary, you're given access to several kinds of health-related information about yourself. When you want to know what you accomplished today or a week ago, you can check the app on your smartphone at any time. At the end of each week, Smart mirrors emails your cumulative stats of the week. This is why people who love data are obsessed with owning this device.Competition amongst friends.

The watch connects wirelessly to the Smart mirrors' app on your phone. From there, you create a

profile which includes your stats, accomplishments (trophies you get for reaching goals), and the ability to connect with like-minded, health-conscious people. People who live for the competition can push themselves further after seeing what their friends have accomplished. If you don't want people to see your accomplishments, you can easily make it private.

Apps for workouts and more.

This smartwatch can customize workouts. Although most Smartmirrorss come with a Coach app (an integrated workout app created by Smartmirrors), you can download workout apps created by other companies too, such as the C25K running app.

Health isn't just about getting off your feet either. The Smartmirrors Versa comes with a "relaxation" app; a 2 or 5-minute session that helps you to concentrate on your breathing. This is helpful for people who have anxiety or panic attacks.

A dozen Smartmirrors watches to choose from.

You've several options of Smartmirrorss to choose from; the Zip, Ionic, Alta HR, Charge 3, Versa… the list goes on and on. Each one is a little different, both in appearance, built-in app selection, and ability. For instance, according to Smartmirrors, the Versa can survive in waters 50 meters deep. And every hour it vibrates as a reminder to take 250 steps.

WEAKNESS

An Over-reliance on steps.

Although the Smartmirrors measures everything from your sleep schedule to calories burned, it only cares about steps for fitness. Steps are a simple and easy measurement, but they're not the end-all to fitness. What about weight lifting? You're likely to burn more calories when introducing resistance

training into your routine, but you don't take many steps doing it.

Other health indicators, like nutrition intake, body fat percentage, and body measurements should be retained as well.

More estimates than determinants.

Inaccuracy is a problem for all Smartmirrorss. You're told the total amount of steps and calories burnt per day. But the steps are measured not by a physical step, but by wrist movement. In fact, it's possible to reach your step goal by sitting in one spot and fidgeting around. Likewise, if you're walking and stop moving the wrist the watch is on, it'll have difficulty counting your steps.

The "calories burned" section is just an estimate. Likely an overestimate. You shouldn't take that number as gospel. And don't eat back those calories; otherwise, you might overeat and gain the weight you're trying to lose.

Too much comparison isn't helpful.

The competition is a strength for some people, but a weakness for others. Comparing yourself to what your friends achieve is supposed to make you more fired up to work harder. It can cause burnout too

It may lead you into a dark hole, where you feel inadequate and 'less than' for not keeping up with your friends. This can take the fun out of improving your health. You don't want it to feel like a chore, otherwise you won't continue with it.

OPPURTUNITY

More apps needed ASAP.

The Smartmirrors needs more apps. Although you've got a collection of free and paid apps, it's nothing compared to the ultimate competitor: Apple. The Apple watch offers dozens of apps, ranging from Spotify to fun exercises. The Smartmirrors options look like slim pickings in comparison.

Branch into new measurements.

Rather than relying heavily on steps, Smartmirrorss should expand into monitoring other areas of health, such as nutrition intake and body measurements. Fitness isn't just about moving (cardio); weight lifting is a huge part for men and women. Smartmirrorss don't have a way to take these measurements into account at the moment. This means they're leaving out a segment of people who could become customers but have no need for the watch as is.

THREAT

A big fruit problem.

Smartmirrors is one of the leaders in smart tech. For many people who want a mirror for accountability, they hit social media and ask which is better: the Smartmirrors or the normal mirror? What you're expecting to get out of your mirror determines the answer, which isn't good for Smartmirrors. They should be the answer, but they're not.

Small guy competitors.

It's not just Apple that Smartmirrors needs to worry about. Smaller competitors are trying to break out into the wearable tech scene too. If they can offer the things that Smartmirrors doesn't, they'll be a headache for Smartmirrors sooner than later.

A Smartmirrors wants to know a lot about you. Especially your location. If you go for a walk or run, the app will ask you to turn the locations setting on your phone. Then, as you walk, the watch tracks you. Tack on knowing your age, gender, resting heartbeat, sleep patterns and you've got to wonder… is Smartmirrors using this information for more than just personal accountability? And if this information were to leak, what would that mean for the people affected?

Enterprise Resource planning

A promotion requires more work and effort in a job. Based on organizational policies, these promotion-based decisions are taken on different aspects. These can be the length of service, experience, seniority, performance, etc. Performance at the job is very important at our company because if every employee does his job right, then outcome would be tremendous. Based on the performance of our employees they will get suitable bonuses and promotions, if they can lead well then, they will get placed at a higher designation. Transfer of employees is must and essential in our organization for the purpose of minimizing politics between employees, to ensure cordial relationship between employees, to increase transparency in work, to obviate syndicate of employees for unethical purpose and to obviate nepotism in the organization. Employee transfers isconsiderable, as most essential when a position of employee is a top-level in hierarchy. They are also based on performance and talent.

Supply chain management

Our company plans on creating a new market which is a great advantage. This strategy revolves around searching for a business in which very few firms operate and where there is no pricing pressure.

The strategy aims to capture new demand, and introducing a product with superior features. It helps the company in make huge profits as the product can be priced a little steep because of its unique features.

Since it's a new market we can also attract many potential customers to our products with the unique features in our products and if it satisfies the customers, we will have a huge customer base in this market even before we have competitors.

OPPORTUNITY IDENTIFICATION:

The identification of vertical for business opportunity depends upon trends and benefits the consumer is seeking. The report by wearables.com states that 55% of people in a developed or developing countries see the benefits of voice assistant AI technology not only in their personal life but their work life as well and 68% of smart phone owners even think that Alexa will replace their phone voice assistant at some point. The top reasons why people are going to buy a ,smart mirror is so that they don't have to pull out their phone to see information to see their notifications when at home at your own comfort are because they are already use some kind of interactive devices and like the added functionality not a smart mirror. In addition to these benefits of using smart mirror, consumer is also identified several fitness and medical reasons for wanting a smart device.
Consumers would use fitness trackers if it helps them get a lower rate on their health insurance. In addition to the potential healthier life style that can be achieved and monitored through utilizing smart mirrors, users can also use these to their retail experience . Many consumers are willing to exchanged information for rewards when they store, notifications about deals when they are in store recommendations for restaurants nearby, and communicate through smart mirrors.

CUSTOMER VALUE PROPOSITION

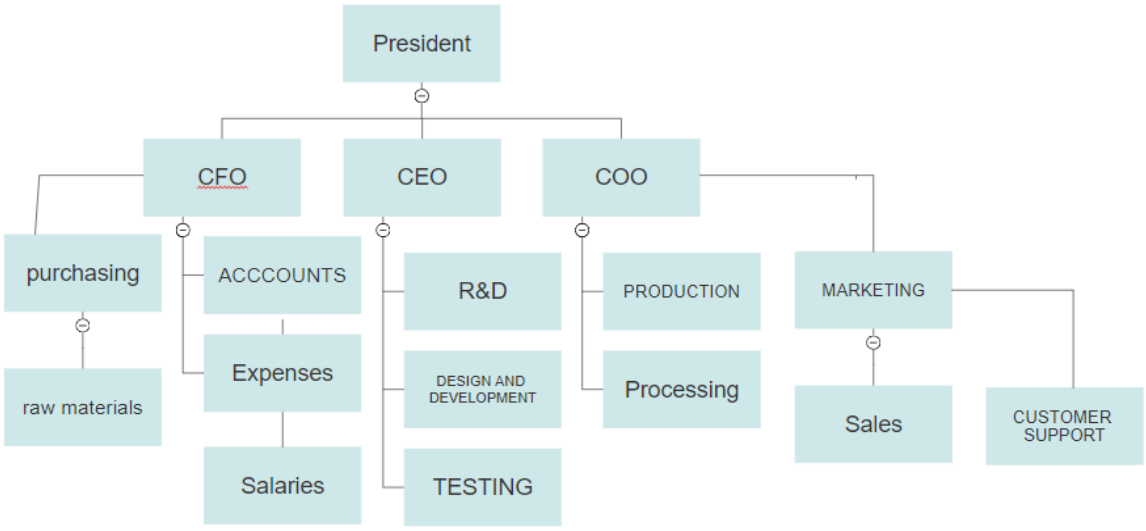
- You know insights of customers certain research methods contain questions to be answered which are crucial for assessing and understanding customers . it extends to the knowledge the customer process about smart mirrors and technology the kind of apps / functions that appeal most customers the medium through which they are use when loading for smart mirror information and experience.

- With a deeper and further analysis revealed that customers like using smart devices like smart mirrors for a variety of reasons .we find that a lot of people like to remotely control mirror settings music the play from there smartphones, track various fitness level, watch movies, web careers ,news ,weather forecast as well as quickly access smartphone apps information and notification home monitoring via there smart mirrors we also found that all the many blogs and magazines have encouraged smart mirrors and devices like that to be technological advancements . various forms of social media talks of application and how inseparable smart devices are which has life.

- A Guessing that most people between the ages of 18 and 34 currently make up the millennials age group ,and they are currently more millennials that are baby boomers and are report to have a large amount of direct purchasing power and also considerable amount of indirect spending all the peak buying power is still decades away . Their purchasing power will only rise once baby boomers retire and millennials move into their rules within the workplace.

Concept of Entrepreneurship

Organizing and Organizational Structure :



Organization refers to a collection of people, who are involved in pursuing defined objectives. The president is the leader of the company's executive group. Their role is creating, communicates and implements the organization's vision, mission and overall direction. They can hire, fires and manages all employees of the company. CEO is chief executive officer.it is the highest-ranking person in a company. CEOs are often responsible for expanding the company, driving profitability, and in the case of public companies, improving share prices. CEOs manage the overall operations of a company. The role of design and development plan section is to provide investors with a description of the product's design, chart its development within the context of production, marketing. A Software Tester is responsible for designing testing scenarios for usability testing.

COO is chief operating officer. It is the second-highest C-suite executive ranked after CEO. The COO makes sure that the vision and mission set by the CEO and board of directors are converted into the actual strategic plan. CFO is chief financial officer refers to a senior executive responsible for managing the financial actions of a company. The CFO's duties include tracking cash flow and financial planning .Production managers plan, coordinate and control manufacturing processes so that products are delivered on time and within budget.

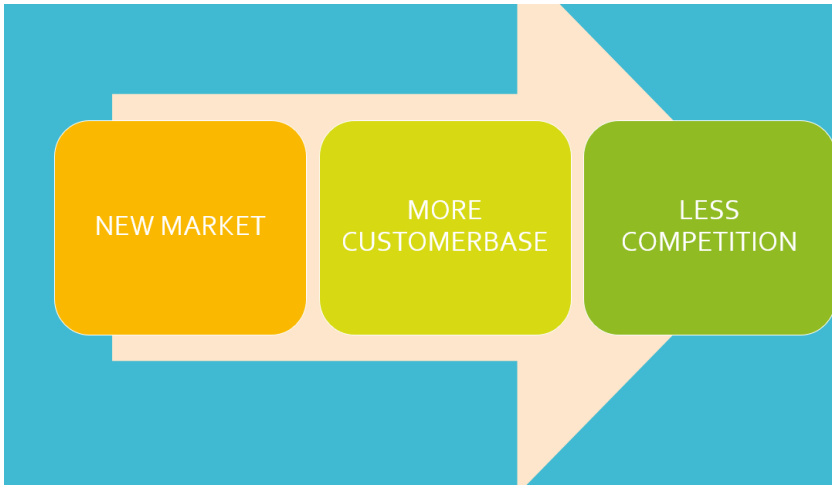
PROMOTIONS, PERFORMANCE & TRANSFERS

A promotion requires more work and effort in a job. Based on organizational policies, these promotion-based decisions are taken on different aspects. These can be the length of service, experience, seniority, performance, etc. Performance at the job is very important at our company because if every employee does his job right, then outcome would be tremendous. Based on the performance of our employees they will get suitable bonuses and promotions, if they can lead well then, they will get placed at a higher designation. Transfer of employees is must and essential in our organization for the purpose of minimizing politics between employees, to ensure cordial relationship between employees, to increase transparency in work, to obviate syndicate of employees for unethical purpose and to obviate nepotism in the organization. Employee transfers isconsiderable, as most essential when a position of employee is a top-level in hierarchy. They are also based on performance and talent.

TRAINING & DEVELOPMENT

In the past few years, training and development have emerged as a crucial element of strategy. More company owners have realized that investing in employee training and development not only serves as a motivation, but it also enables the organization to create a highly skilled workforce. At our company, the training period will be of 6 months and this training will ensure that the employee will know what the company is all about and what is his role in the company. At the end of the training period the employee will be assessed by a test to determine his position in the company. Development of the employee's skill is the main goal of the training; we hope the training we give will improve the skills of the employee and let him do his job better.

CREATING AND CAPTURING NEW MARKET:



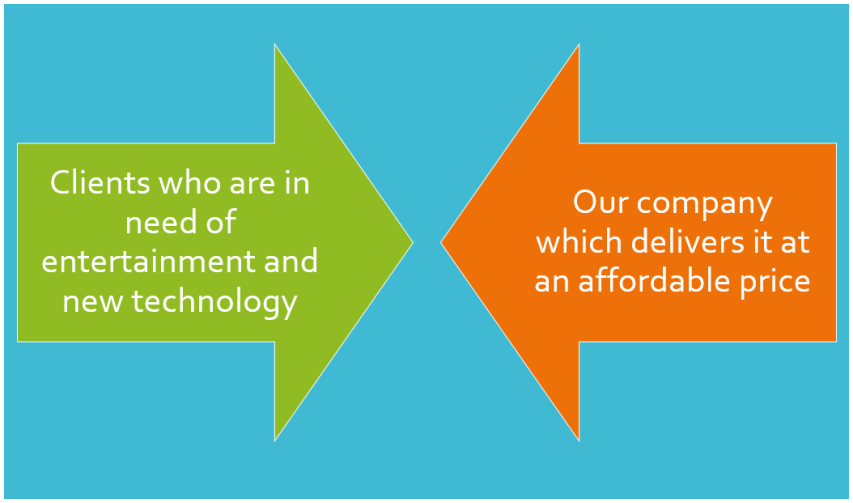
Our company plans on creating a new market which is a great advantage. This strategy revolves around searching for a business in which very few firms operate and where there is no pricing pressure.

The strategy aims to capture new demand, and introducing a product with superior features. It helps the company in make huge profits as the product can be priced a little steep because of its unique features.

Since it's a new market we can also attract many potential customers to our products with the unique features in our products and if it satisfies the customers, we will have a huge customer base in this market even before we have competitors.

Thirdly since this a completely new market we won't have competitors in this field which gives us time to establish our brand well and we can make huge profits from our products while still managing to make our products affordable to our customers.

MASS MARKETING STRATEGY



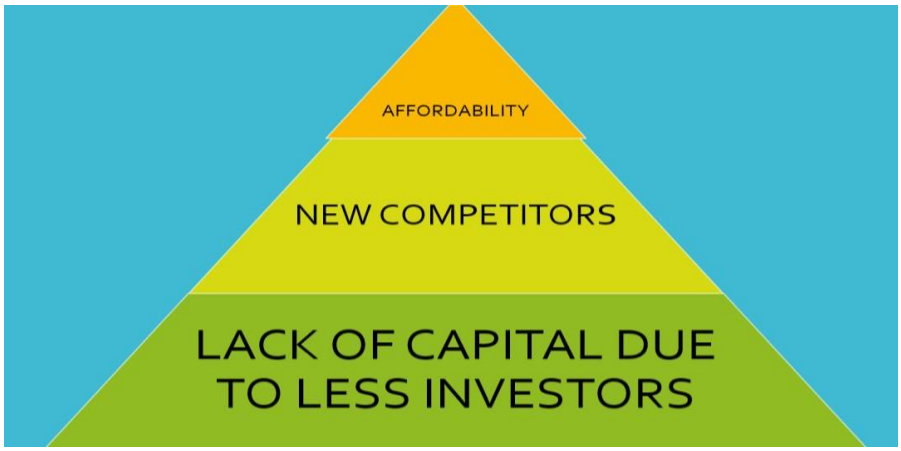
People these days are in constant need of entertainment and new forms of technology. Everyone wants to have their hands at the latest technology available. People are addicted to technology more these days.

Mass marketing is a strategy marketing strategy in which a firm decides to ignore market segment differences and appeal the whole market with one offer or strategy . Mass marketing is a strategy that focuses on high sales and low prices and aims to provide products and services that will appeal to the whole market. By reaching the largest audience possible, exposure to the product is maximized, and in theory this would directly correlate with a larger number of sales or buys into the product.

Since the target audience is broad, the number of successful hits is high despite the low probability of a single person turning up, and if all the efforts in one particular area goes in vain, the eventual loss is less compared to one in a narrowly focused area.

For a mass marketing campaign to be successful, the advertisement must appeal to a set of product needs that are common to most consumers in a target market.

CHALLENGES FACED IN THE NEW MARKET



1) LACK OF CAPITAL DUE TO LESS INVESTORS:

Since this is a new market and the business idea is new, we will have trouble finding investors forour business idea as investors usually feel kind of skeptical about investing in something new. Solack of capital is the first t

2) NEW COMPETITORS

We will start having new competitors in this field sooner or later and they might even offer better deals than our products. Also if the new competitors have found a good investor, they might makebetter products.

3) AFFORDABILITY

We plan to make this product affordable as much as possible but we also need profits from our products and probably everyone won't be able to afford this technology.

CHAPTER 5

CONCLUSION

As a conclusion, the application is the new technology for smart life. We have designed a futuristic smart mirror that provides natural interaction between users and the ambient home services. The mirror display is provided by a flat LED display monitor which displays all the necessary information which are useful for the user. The mirror also provides a picture-in-picture sub-display to facilitate the display. Overall, the prototype provides an easily extendable framework that can be utilized to provide even more functionality to the user. The system can be made much more useful to the users by adding more functionality like integrating light settings, speech processing, etc.

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