



Faculty of Computer Science and Information Technology

*Visual Informative Mirror Using Raspberry Pi*

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**Bachelor of Computer Science and Information Technology with Honours  
(Software Engineering)**

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# **Visual Informative Mirror Using Raspberry Pi**

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This project is submitted in partial fulfilment of the requirement for the  
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(Software Engineering)

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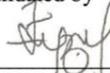
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## **ABSTRACT**

This project is to build a device that can convey an information such as weather, news headline and calendar which this information displayed in the mirror. In this era, people always having insufficient time daily to do their daily life. With this Visual Informative Mirror will help people with tight schedule became more productive in the morning because by looking at the mirror to prepared themselves, at the same time they can get updated on the weather, news and calendar. In this project also explain the how the Visual Informative Mirror works from planning phase until feedback phase.

## **ABSTRAK**

Projek ini adalah untuk membina peranti yang boleh menyampaikan maklumat seperti cuaca, tajuk berita dan kalendar di mana maklumat ini dipaparkan di dalam cermin. Pada zaman kini, kebanyakan orang tidak mempunyai masa yang cukup pada setiap hari untuk melakukan kehidupan seharian mereka. Dengan adanya Visual Informative Mirror ini akan membantu orang yang mempunyai jadual yang ketat menjadi lebih produktif pada waktu pagi kerana dengan melihat cermin untuk menyiapkan diri, pada masa yang sama mereka dapat maklumat terbaharu berkenaan dengan cuaca, berita dan kalendar. Dalam projek ini juga menerangkan bagaimana Visual Informative Mirror ini dilakukan dari fasa perancangan sehingga fasa maklum balas.

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## CHAPTER 1 INTRODUCTION

### 1.1 Introduction

In millennial era, majority of people have their own smartphone and they use it on daily basis whether for personal or professional purposes. The good thing about this technology is that all their information is usually put as reminder, note or agenda inside their electronic device which can be put inside their pockets. Thus, it plays an important role in increasing a person daily productivity and time management.

Indeed, a small device such as smartphone come with lots of advantages to improve productivity and time management. But due to time constraint, some people always keep forgetting to review their agenda for the day before leaving home each morning to do their daily activity or work. In addition, they also in a hurry to prepare themselves in front of mirror and at the same time do other chores in other parts of the house.

Although in the morning people struggles with the time constraint, people tend to look into the mirror either before leaving the house or preparing themselves. Therefore, it is a good way to make this morning routine as solution for the problem which is time constraint by building a Visual Informative Mirror to make everything more efficient and organized before leaving the home. The device will help people to keep an update on their daily agenda before leaving the house by looking at the mirror. Besides, Visual Informative Mirror also can preview an update weather for a whole day in their location so that they can prepare for incoming weather later in that day. This Visual Informative Mirror also will equip with an automatic light built-in the mirror so that, a person using the mirror will no need to keep moving back and forth to switch on or off the light like using traditional method.

## 1.2 Problem Statement

Due to time constraint, people always forget to review their agenda for the day before leaving home and this may affect their daily schedule and time management. In addition, they have no time to do other activity while getting dressed in front of the mirror as the mirror is likely to stay in static place. This will decrease people morning daily productivity.

## 1.3 Objective

The objectives for this final year project include:

1. To identify system requirement and design the Visual Informative Mirror.
2. To build a Visual Informative Mirror using Raspberry Pi.
3. To test the Visual Informative Mirror for conveying information on the display.

## 1.4 Scope

This Visual Informative Mirror created to make the user become more productive and more organized in the morning before the user leaving home. The user for this Visual Informative Mirror is targeting for people that have tight schedule which the user needs to keep update with their daily agenda in the morning.

## 1.5 Brief Methodology

This project will use Agile Model as the methodology (Pino, 2018). This model consists of six development phase which being illustrated in Figure 1.1.



*Figure 1.1 Agile Software Development Methodology*

In plan phase, gathering the related information specifically on the Internet of Thing (IoT). After all the information is gathered, the project title is proposed to the supervisor. This planning phase include few meetings with the supervisor to ensure the project title is suitable to be used. In the design phase, all the information that gathered in previous phase is analyzed to make sure all the requirement is fulfilled, and the goal of the project can be achieved at the end of the project. In the development phase, task being split into two major part since Raspberry Pi is a combination of software and hardware. In the hardware part, the component needs to be connected to the correct connection. For example, the connection of the wire to the Visual Informative Mirror. In the develop phase of software, all the coding must suitable to the features of the project. After the

development phase, the product is tested to ensure all the objective especially the features are achieved. In the release and feedback phase, the final product released to the supervisor to be tested for final testing and the feedback information is collected. If the final product is not fulfilling the requirement and goal, changes is made until satisfied the project's goal.

By using Agile model, we can make any changes in the project compare to the traditional method which are usually more rigid. Therefore, agile is selected as the methodology for this project.

## 1.6 Significant of Project

This project will help the users of Visual Informative Mirror be more prepared in the morning for their daily agenda by only looking at the mirror. In addition, it also helps the user on their electricity cost whereby the Visual Informative Mirror equipped with automatic lamp. It will utilize the sensor to light on the lamp when the user stand near the Visual Informative Mirror. Thus, this project also will create awareness to the people on environmental conservation.

## 1.7 Project schedule

Project scheduling is a mechanism to communicate what tasks to get done and which organizational resources will be allocated to complete those tasks in what timeframe (Ray, 2017). Since the developing a Visual Informative Mirror consist a lot of task, the project schedule plays important role to ensure all the task is completed accordingly to the plan. The project schedule help to keep all task and progress of the project. Other than that, project schedule also helps on allocation of the resources based on the task so the risk of delaying on project can be reduced. Refer to appendix for the Gantt Chart.

## 1.8 Expected Outcomes

This project will help the people to keep up to-date on their daily agenda before leaving home and will increase the daily productivity by utilizing Visual Informative Mirror which can review their daily agenda and weather so that they can be prepared before leaving home.

## 1.9 Thesis Outline

### 1.9.1 Chapter 1: Introduction

In Chapter 1 is focusing on the overview of the proposed project that already approved by the supervisor. In Chapter 1 consist of introduction, problem statement, objective, scope, brief methodology, project schedule, significant of project and expected outcome. In the introduction and problem statement section, explaining the background of the problem that want to be solved later at the end of the project.

In objective section, explaining the goal of this project which to tackle back the problem that already gathered in the previous section. For the scope section, explaining which parties or user that been targeted to use this final product. In methodology section, justify the approach the used in this project and describe each phase in the approach used. In project schedule, explain what the project schedule and the benefit to this project. For the significant and expected outcomes section, describes the benefit of the project and explaining how this project help the user to overcome the problem that gathered.

### 1.9.2 Chapter 2: Literature Review

For literature review in Chapter 2, research is conducted to review the existing or similar

product. The requirement for this literature review is to find three existing product and analyze the drawback of each product. This literature review mostly conducted by doing research on reading sources from the Internet.

### 1.9.3 Chapter 3: Methodology

In Chapter 3, explaining the methodology used for the proposed project. In this chapter also all the requirement analysis is conducted to make sure the project is fulfilled and satisfied all the requirements. Lastly, in this chapter also come out with suitable diagram and the design of the project.

### 1.9.4 Chapter 4: Development and Implementation

For chapter 4, explaining about the development and implementation of the Visual Informative Mirror. In this chapter show how the hardware and software part are build and combine together as one proposed system.

### 1.9.5 Chapter 5: Testing

For the chapter 5, discussing on the result of the Visual Informative Mirror using the testing cases. In this testing, will test the interface such as calendar, headline, weather and clock.

### 1.9.6 Chapter 6: Conclusion and Future Works

For the chapter 6, discussing the constraints and limitation facing during developing the Visual Informative Mirror. In this chapter also discussing about the future work that possible to be implemented to increase the functionality of the interface.

## CHAPTER 2 LITERATURE REVIEW

### 2.1 Introduction

In this literature review chapter will explained and study the overview of relevant and recent existing system in the market (“Writing a Literature Review,” 2019). The purpose of this literature review is to help understand comprehensive on the existing system and proposed system. Literature review will used various type of sources such as articles, journal and especially website to captured as many information of the relevant and recent existing system.

By the information gathered, all the existing system that in market will be compared to the proposed system. The information such as the background, features, strength and weakness will be highlighted in comparing both of existing and proposed system. The existing system has been chosen for this chapter is FRAME IT Smart Mirror, SÉURA Smart Mirrors, Google Nest Mini and Apple HomePod.

### 2.2 FRAME IT Smart Mirror

FRAME IT Smart Mirror developed by MirroCool company which their main office located in San Francisco. The team come from different variety of industries background such as Mirror Production, Visual Monitoring and Access Control. With the knowledges and skills that they combine together, the company produce a mirror that act like a personal assistant.



*Figure 2.1* FRAME IT Smart Mirror taken from mirrocool.com

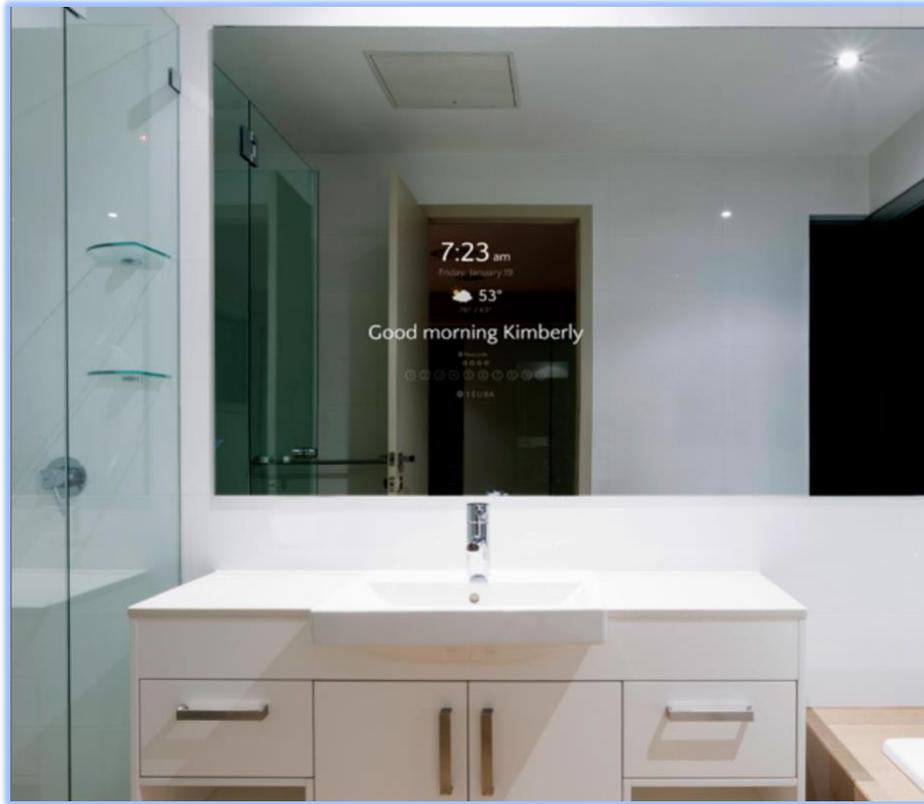
The mirror connected to the smart device and calendar such as smartphone and synced automatically using the MirroCool application that supported on both IOS and Android devices. In addition, application used to customize the setting or preferences to the FRAME IT Smart Mirror. The main features for this mirror are Message Board, which this message board can alerts and display Personal Welcome, Appointment, Meeting, Birthday Notification, To-do list, Weather and display Traffic information to favorite destination. The FRAME IT Smart Mirror also built-in high definition camera sensor which this can be utilized to take a photo and home security system. How this home security system work is by detecting motion when the “Away” mode is activated, and if the mirror does not recognize intruder as primary user it automatically takes a picture and send it to the MirroCool application with alert notification.

The advantages of this FRAME IT Smart Mirror is it can recognize the faces and stores as many of user profile so that each of the user can have different message board accordingly to the user profile that the user customized using the MirroCool application. Other than that, the mirror utilized the camera to have a Facial Gesture Recognition features so that the user does not have to touch the mirror or use voice to switch into different widget in message board. Furthermore, FRAME IT Smart mirror come with free cloud storage so that user can store, backup and protect their file or application setting.

The main disadvantages of this FRAME IT Smart Mirror is the cost of the product because can cost around \$270.00 (RM1115.91) after discount from \$359.00 (RM1483.75) accordingly to current currency (Bank Negara Malaysia, 2019). In addition, free cloud storage only offers one gigabyte of cloud space. If the user wants extra cloud storage which is ten gigabyte, they user need to pay yearly subscription which cost another \$9.99 (RM41.49) per years.

### 2.3 SÉURA Smart Mirror

SÉURA Smart Mirrors is a product from Wisconsin, United States which developed by company called SÉURA. The vision for this smart mirror is to enable user or customer be more efficient and effective by transforming normal mirror into personal digital hub.



*Figure 2.2 SÉURA Smart Mirrors taken from seura.com*

SÉURA Smart Mirrors using Android based platform device which preload with Mail, Calendar and Weather widget. Since the smart mirror using Android platform, it comes with the google play which user can download and install thousands application directly to the smart mirror. To interact with the SÉURA Smart Mirrors, voice and touch control is used since this smart mirrors act like a tablet but four times larger than average tablet. In other hand, this smart mirrors can control and view Security Camera that connected to the mirror by the onboard WIFI/Bluetooth combo module. It also can dim the light, open garage and it can control many more smart devices from one single mirror.

One of advantage of this SÉURA Smart Mirrors is it user friendly, user will quickly adapt and know how to handle the smart mirror since it used Android platform. It not like other smart mirror, SÉURA Smart Mirrors can reply an email comfortably and directly through the mirror due

to its larger screen. By utilizing large screen than normal tablet, the customizable of widget and application will be easier rather than traditional tablet. It also supports wide range of connection integration which will take advantage of connecting multiple connection.

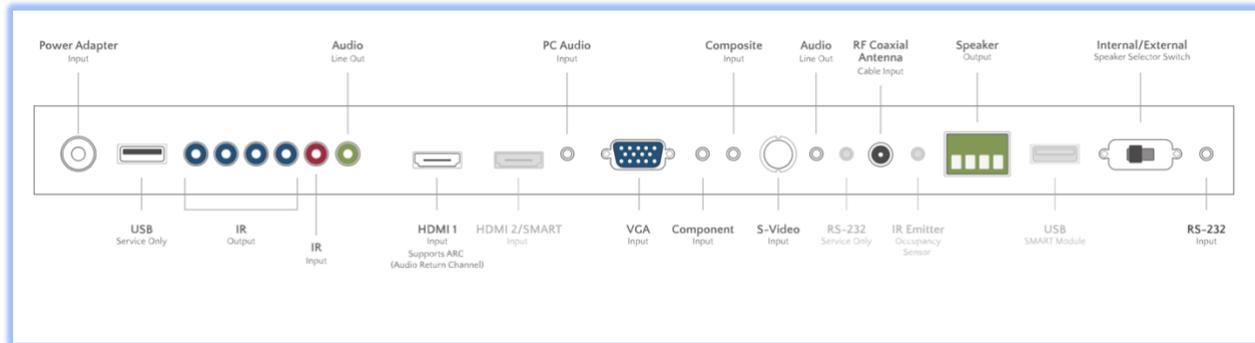


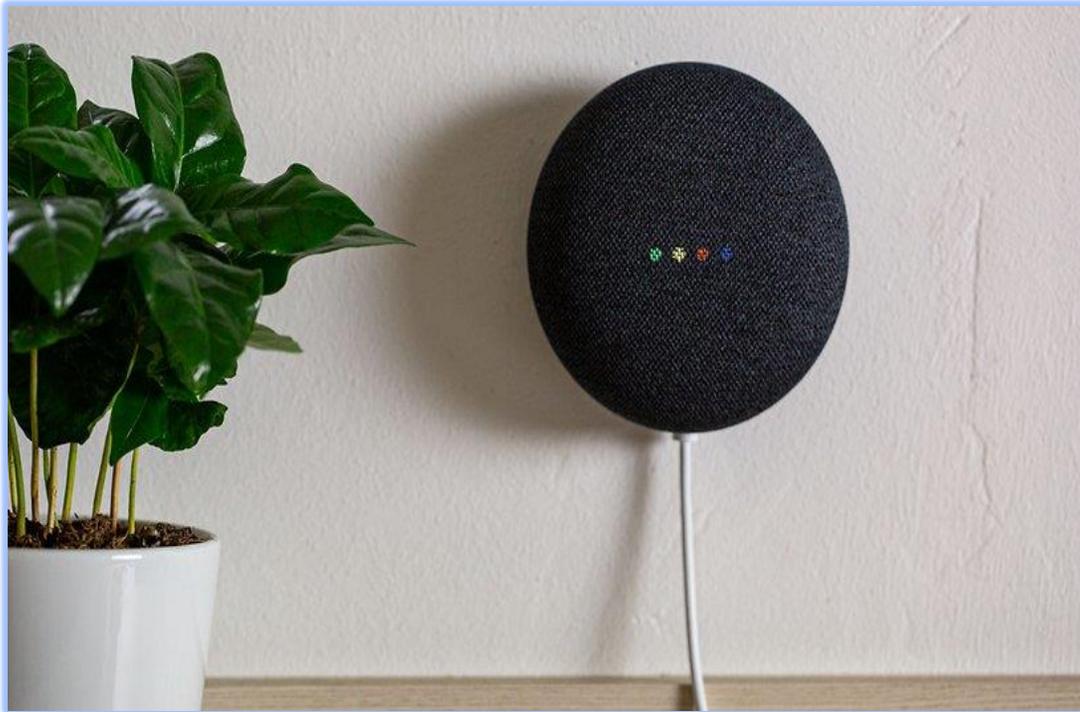
Figure 2.3 Connection for Integration taken from seura.com

The main disadvantage for SÉURA is a cost. The cost for this smart mirror depending on the size of the mirror, the cheapest option for this mirror that have dimension of 30” width times 42” height is \$6,999 which converted to Malaysian ringgit it will cost RM28926.87 accordingly to current currency (Bank Negara Malaysia, 2019). The price will go up to \$9,499+ which will be RM39259.37+ for the custom option. Other than that, having too much interactive with the mirror will make the user not productive and not efficient rather than using tablet which they can do pretty much same as the mirror.

## 2.4 Google Nest Mini

Entry level smart wireless speaker developed by Google which released in November 2016 to complement their Google Home into smaller version. First generation of smart speaker is known as Google Home Mini, but two years later in October 2019 Google has introduced new generation of their smart wireless speaker called Google Nest Mini. This Nest Mini is the same as the previous generation but improves in the sound quality and machine learning. Since the smart speaker

integrated with Google Assistant, it a popular choice for user to make the Google Nest Mini as their IoT devices.



*Figure 2.4* Google Nest Mini taken from androidpit.com

Google Assistant is a virtual assistant that utilized artificial intelligence for two ways communication between the user and smart devices which in this case Google Nest Mini using voice. Like other IoT devices, Google Nest Mini can search and read something from the internet, arrange the schedule, set up alarm, show information from the Google account and many more. In addition, the Google Nest Mini can do home automation by using the voice command if the devices supported by the Google such as smart lights, smart outlets, smart locks and smart thermostats (Greenwald, 2019).