SMART BOOK READER

Providing a helping hand!

MANDAR MAHESH MORE
AND
MIHIR VISHAL DALAL

Kandivli Education Society's
B. K. SHROFF COLLEGE OF ARTS &
M. H. SHROFF COLLEGE OF COMMERCE
An Autonomous College | NAAC Re-accredited 'A' Grade
ISO 9001 : 2015 Certified • 'Best College 2017-18' award from University of Mumbai

PRN No.: 2017016401145387 Roll Number: A-45

2017016401141753 A-13

NAME OF STUDENT	Mandar More
	Mihir Dalal
TITLE OF PROJECT	Smart Book Reader
PROJECT FRONT-END	Python
PROJECT BACK-END	-
NAME OF GUIDE	Dr. Vishesh Shrivastava
TEACHING EXPERIENCE OF GUIDE	

Signature of the Student Signature of the Guide

Signature of the Coordinator College Seal

Date: ……

Certificate

This is to certify that the project titled **"Smart Book Reader"** is undertaken at the "**KES Shroff College**" by

Mr. Mandar Mahesh More [Roll No-45] and **Mr. Mihir Vishal Dalal [Roll No-13]** in documentation describing requirements and design of the system of BSc. I.T degree (Semester V) Examination.

It is further certified that the candidates have completed all required phases of the project.

_____ _____

Internal Examiner External Examiner

_____ _____

Project Guide Head of Department

Dr. Vishesh Shrivastava **Dr. Vishesh Shrivastava**

A

PROJECT REPORT

ON

“Smart Book Reader”

DESIGN AND DEVELOPED

BY

MANDAR MORE

AND

MIHIR DALAL

UNDER THE GUIDANCE OF

Dr. VISHESH SHRIVASTAVA

SUBMITTED IN PARTIAL FULFILLMENT OF ACADEMIC PROJECT

BACHELOR OF SCIENCE

IN

INFORMATION TECHNOLOGY

Semester V

Kandivli Education Society's

B. K. SHROFF COLLEGE OF ARTS & M. H. SHROFF COLLEGE OF COMMERCE

An Autonomous College | NAAC Re-accredited 'A' Grade

ISO 9001 : 2015 Certified • 'Best College 2017-18' award from University of Mumbai

Kandivali Education Society's, B.K SHROFF COLLEGE OF ARTS & M.H SHROFF COLLEGE OF COMMERCE

Affiliated to

UNIVERSITY OF MUMBAI

IT DEPARTMENT-2019-2020

ACKNOWLEDGMENT

We take much pride in presenting our project. During the development of our project, we would like to mention the names of certain individuals, without whose assistance, our project would have been difficult undertaking indeed.

We are hereby pleased to have this opportunity to express our deep sense of gratitude for my project on "**Smart Book Reader**", further we are very thankful to Dr. Vishesh Shrivastava, our internal project guide for providing us with the opportunity to undertake this project, whose valuable guidance and suggestions helped us in accomplishing our project. Last but not the least; we would like to thank all our friends, family members, non-teaching staff and colleagues for their support and individual help.

DECLARATION

I hereby declare that the project entitled, "**Smart Book Reader**" is done at **KES Shroff College**, has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university. The project is done in partial fulfilment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

Mandar Mahesh More

Mihir Vishal Dalal

Table of contents

1. INTRODUCTION

Books play a significant role in our life. They say that “When you open a book, you open a new world”. Books are packed with knowledge, insights into a happy life, life lessons, love, fear, prayer and helpful advice. Through reading, you expose yourself to new things, new information, new ideas, new ways to solve a problem, and new ways to achieve a goal. Reading might help you discover hobbies or exploring things you didn’t know you like. Exploration begins from reading and understanding. Reading helps you understand the world more. Through it, you begin to have a better understanding on a topic that interest you. Self-improvement start from reading, through reading you have a better understanding and better decisions to take in the future. You are limited by what you can imagine, all the worlds described in books as well as views and opinions by other people, will help you expand your understanding of what is possible.

This project majorly focuses on converting books into audio. The first and most obvious beneficiaries of this approach is that books can be made audible. The basic function is to capture a clear and visible image of the book through camera which is connected to the raspberry pi. This image will then be stored into the raspberry pi and retrieved back into text format. Basically, here the captured image is converted into text. This text will be than audible in audio format on speakers connected with raspberry pi. Thus, an image of a book is converted into audio which the user can easily listen too with ease.

Books can be made audible into multiple Indian languages through this project. User can select any one of the designed languages from the list provided in which the user wants to listen the book. This product also provides facility to select between male or female voice.

1.1. Background:

An audiobook (or talking book) is a recording of a book or other work being read aloud. The term "talking book" came into being in the 1930s with government programs designed for blind readers, while the term "audiobook" came into use during the 1970s when audiocassettes began to replace records. Spoken word recordings first became possible with the invention of the phonograph by Thomas Edison in 1877. "Phonographic books" were one of the original applications envisioned by Edison which would "speak to blind people without

effort on their part." The initial words spoken into the phonograph were Edison's recital of "Mary Had a Little Lamb", the first instance of recorded verse.

1.1.1. United States

In 1931, the American Foundation for the Blind (AFB) and Library of Congress Books for the Adult Blind Project established the "Talking Books Program" (Books for the Blind), which was intended to provide reading material for veterans injured during World War I and other visually impaired adults. Caedmon Records was a pioneer in the audiobook business, it was the first company dedicated to selling spoken work recordings to the public and has been called the "seed" of the audiobook industry. Caedmon was formed in New York in 1952 by college graduates Barbara Holdridge and Marianne Roney. Their first release was a collection of poems by Dylan Thomas as read by the author

Though spoken recordings were popular in 33⅓ vinyl record format for schools and libraries into the early 1970s, the beginning of the modern retail market for audiobooks can be traced to the wide adoption of cassette tapes during the 1970s. Cassette tapes were invented in 1962 and a few libraries, such as the Library of Congress, began distributing books on cassette by 1969. However, during the 1970s, a number of technological innovations allowed the cassette tape wider usage in libraries and also spawned the creation of new commercial audiobook market. These innovations included the introduction of small and cheap portable players such as the Walkman, and the widespread use of cassette decks in cars, particularly imported Japanese models which flooded the market during the multiple energy crises of the decade.

By 1984, there were eleven audiobook publishing companies, they included Caedmon, Metacom, Newman Communications, Recorded Books, Brilliance and Books on Tape. The companies were small, the largest had a catalogue of 200 titles. Some abridged titles were being sold in bookstores, such as Walden Books, but had negligible sales figures, many were sold by mail-order subscription or through libraries.

1986 has been identified as the turning point in the industry, when it matured from an experimental curiosity. A number of events happened: the Audio Publishers Association, a professional non-profit trade association, was established by publishers who joined together to promote awareness of spoken word audio and provide industry statistic. Time-Life began offering members audiobooks. Book-of-the-Month club began offering audiobooks to its

members, as did the Literary Guild. Other clubs such as the History Book Club, Get Rich Club, Nostalgia Book Club, Scholastic club for children all began offering audiobooks.

In 2014, Bob & Debra Deyan of Deyan Audio opened the Deyan Institute of Vocal Artistry and Technology, the world's first campus and school for teaching the art and technology of audiobook production. In 2018, approximately 50,000 audiobooks were recorded in the United States with a sales growth of 20 percent year over year.

1.1.2. Germany

The evolution and use of audiobooks in Germany closely parallels that of the U.S. A special example of its use is the West German Audio Book Library for the Blind, founded in 1955. Actors from the municipal theatre in Münster recorded the first audio books for the visually impaired in an improvised studio lined with egg cartons.

Later, texts were recorded by trained speakers in professional studios and distributed to users by mail. Until the 1970s recordings were on tape reels, then later cassettes. Since 2004, the offerings have been recorded in the DAISY Digital Talking Book MP3 standard, which provides additional features for visually impaired users to both listen and navigate written material aurally.

1.1.3. India

Audiobooks in India started to appear a little later as compared to the rest of the world. Only by 2010 did Audiobooks gain popularity in the Indian market. This is primarily due to lack of previous organized efforts on the part of publishers and authors. The marketing efforts and availability of Audiobooks has made India as one of the fastest growing Audiobooks markets in the world.

The lifestyle of urban Indian population and one of the highest daily commute time in the world has also helped in making Audiobooks popular in the region. Business and Self-Help books have widespread appeal and have been more popular than fiction/non-fiction. This is because Audiobooks are primarily seen as an avenue for self-improvement and education, rather than entertainment.

Audio books are being released in various Indian languages. In Malayalam, the first audio novel, titled Ouija Board, was released by Katha cafe in 2018. Now Indian companies are working towards Audio Books generation in the Indian Vernacular Languages.

1.2. Objective:

The main goal of this project is to build a project to ease the life of blind people who can't read due to blindness though it can be used by anyone. The project is built to increase the readability performance without any human interference.

Below we have discussed some of the main objectives of our project:

- The captured image will automatically get converted into audio without any human interferences.
- Providing an easy to use system.
- To make the user feel comfortable while using this system as there is no need to read the book any more as people can easily relax and just listen to it.
- Major aim is to make a product which proves to lend a helping hand to visually impaired personnel.
- It will also target the illiterate society who are uneducated and can't read or write.
- Reading e-books for a long period of time on a regular basis leads to dislocation of eye retina and strains the eyes, using this product this issue will be solved.
- To make audio available in multiple Indian languages.
- To give preference to the user to select between male and female voice.

1.3. Purpose and Scope:

1.3.1. Purpose

- The primary reason to select this project is to ease the day to day life of the visually impaired people.

- To give comfort to visually impaired person without anyone's help they can read the book by listening the content of the book using this system.

- To digitalize the entire book reading system.

- This product is cost-efficient to the user, it is not expensive. A normal citizen can easily afford this product.

- Illiterate people who can't read or write can get well verse and get acquainted with books even lacking general knowledge of alphabets and numbers just by listening to the book.

1.3.2. Scope:

- This project can be used by everyone to convert their books into audible book in their desired language from the list.

- This product can be implemented for individual person or an organisation.

- This product can be implemented on a large scale by NGO's and organisation working for well verse of blind people. Such NGO's and organisation need technologies and activities to keep blind people indulged into some or the other activity through-out. This converter can be made available to such organisations at a cheap cost. It will prove to be a better activity which can be performed to occupy the leisure time. Moreover, blind people can experience immense pleasure of reading the book by listening to the audio.

- This product can be implemented largely in rural areas where the population is illiterate. People can use this to read any kind of book and also use it in their daily life chores.

- It can also be implemented in education institutes to make learning easy and fun.

1.3.3. Applicability:

- It can be used in spoken languages classes where people are taught different languages which they desire to learn. students can learn by themselves using this system.

- The gadget can be accessible by anyone anywhere in the World.

- The gadget can be used in a Blind Schools or NGO's for blind people to make them indulge into reading good books. It can cover studies books, newspaper, stories books or novel and many more things related to reading.

1.3.4. Limitation:

- The pronunciation accent may differ depending upon geographical region.

- Since the text is converted to audio it wont be helpful for those who are both deaf and blind at the same time.

- If the text is not visible it cannot be converted properly.

- If the book which user wants to listen is long you have to change the page one by one, once it is over.

1.3.5. Features:

- Audio can be made audible in different languages.

- User can choose between male or female voice.

- No internet is used so speed will be faster.

1.4. Achievement:

It helped me to learn various features involved in Raspberry pi like,

- Capturing photos using Raspberry pi camera module.
- Firing an event on a button click.
- Configuring GPIO pins.

It helps me to explore different packages of Python Language like

- Pytesseract
  - To convert image into text format.
- Pyttsx3
  - To convert text into audio format.
- OpenCV
  - To render and process the images.

1.5. Organisation of report

This chapter included the main objectives behind building this project and the scope of the project defining on who all can be the user for the system and use it for making their day to day life easy. It also focused on the emergence of this system right from its discovery in united states to the going era technologies the system uses now.

The second chapter will majorly focus on the technologies used for the development of this project. It justifies the reason for using specifically that technology above all in the market.

2. SURVEY OF TECHNOLOGIES

2.1. Hardware Interfaces:

2.1.1. Raspberry pi 3b+

The Raspberry Pi 3 Model B+ was launched with a faster 1.4 GHz processor and a three-times faster gigabit Ethernet (throughput limited to ca. 300 Mbit/s by the internal USB 2.0 connection) or 2.4 / 5 GHz dual-band 802.11ac Wi-Fi (100 Mbit/s). Other features are Power over Ethernet (PoE), USB boot and network boot (an SD card is no longer required).

Setup Specification

- Processor: Broadcom BCM2837B0 quad-core A53 (ARMv8).
- Installed Memory: 1GB LPDDR2 SDRAM.
- System Type: 64-bit operating system @ 1.4GHz.

- Storage: Micro – SD Card.
- GPU: Broadcom Video core-IV.
- Ports: HDMI, 3.5mm analogue audio-video jack, 4x USB 2.0, Ethernet, Camera Serial Interface (CSI), Display Serial Interface (DSI).

2.1.2. Why Raspberry pi 3 model B+?

- We have selected this hardware because we want to build our system in such a way that we can program our hardware with same hardware itself no other tools required to build it.
- Another big reason is that it is having GPIO (general purpose input output pins) with the help of this we can add other hardware interfaces. As well as it is a microcontroller.

2.2. Software Interfaces:

2.2.1. Raspbian Operating System.

Raspbian is a Debian-based computer operating system for Raspberry Pi. There are several versions of Raspbian including Raspbian Buster and Raspbian Stretch.

2.2.2. Why this software?

There are many other operating system for raspberry pi, but we have selected Raspbian OS as it is convenient and easy to use.

2.3. Programming language

In terms of programming languages, we had chosen python as it contains all the necessary packages required for our project and syntax also there are less restrictions on syntax. Also python is very easy to learn and understand as well as python is used everywhere, and it is an open source software.

2.3.1. Python.

Python is a high-level programming language for broadly useful programming. Made by Guido Van Rossum and first discharged in 9991, python has a plan rationally that accentuates code intelligibility, strikingly utilizing noteworthy whitespace. Python is a platform independent language and more efficient and easier.

2.3.2. Why Python?

Following are the features which attracted us to use python for our project.

Applications: Python can be used to develop different applications like web applications, graphic user interface-based applications, software development application, etc. It makes an interactive interface and easy development of applications.

- Multiple Programming Paradigms: Python is also used because of it providing continuous support to several programming paradigms. As it supports object-oriented programming and structured programming

- Robust Standard Library: Python has a large and robust standard library to use for developing the applications. The standard library helps in using the different range of modules available for Python. As this module helps you in adding the functionality without writing any more code

- Compatible with major platforms and systems: Python is mainly compatible with major platforms and systems because of which it is used mainly for developing applications

- Access to database: Uses of Python also helps in accessing the database easily.

- Code Readability: Python code is easy to read and maintained. It is easily reusable as well wherever it is required. Python's having simple syntax, which allows the different concepts to develop without writing any additional code.

- Many open source frameworks and tools: Python is open source and easily available. This also helps in costing the software development significantly

.

3. REQUIREMENTS AND ANALYSIS

3.1. Problem definition:

Problem Statement justifies the reasons that caused the emergence of the current system. It defines the need for evolution in the field of technologies advancement.

Following are some of the reasons causing the need for the system where we can listen to the book instead of reading it.

- **Disability:**

Blind people who want to indulge into reading, but unfortunately cannot due to their disability. Visually impaired people often lack the ability to read due to birth defect, genetic problems or accidents. Reading habit forms conceptual importance in contemplation of the social beings. Visually impaired people must not be left behind or feel neglected by the society due to their disability. So thus, to facilitate the disability of visually impaired persons this product will lend a helping hand.

- **Illiteracy:**

Reading is an integral part of a person's life from birth till existence on this planet. According to the global research association the population of illiterate people is quite high in the rural areas of India. According to 2011 census, any person aged seven and above and has the ability to read and write is considered as literate. The average literacy rate in India stands at 74.04%. Development of a country mainly depends on socio-economic growth along with the literacy rate of the people. Also, there are chances that illiterate people may become prey to fraudulent people or organization. Also, if such people want to read books but due to their lack of education they can't read. Such people can opt for this product.

- **Bad body posture:**

Reading e-books have their own set of disadvantages and adverse effects on human life. Continuously reading e-book on electronic devices need to sit in a specific position avoiding sunrays and other effecting environmental parameters on the electronic device. According to a survey in New York 75% work performed on electronic devices is while sitting. In a study performed in San Francisco State University majority of students had a slummed position. Sitting fixed in a particular position for long hours can lead to body pain sometimes also causing spondylitis. It may also lead to bad body posture. It also lead to bad eyesight.

- **Eye straining:**

Reading e-books on electronic devices like mobile, personal computers, tablets, smart watches, etc strain eyes. Thus, dislocating the eye retina, resulting in myopia or hypermetropia.

3.2. Software Requirements Specification:

A software requirements specification (*SRS*) is a detailed description of a software system to be developed with its functional and non-functional requirements. A Software requirements specification document describes the intended purpose, requirements, describes the nature of a project.

3.2.1. Functional Requirements:

a. User have facility to click image using a button provided in the product.

b. When the button is clicked a flashlight will come into action and flash will be on to avoid poor light condition.

c. Camera module captures the image of book.

d. This product stores captured images. The captured image is converted into text and then that text is audible on the speakers.

e. This product converts the capture image through camera module into audible state.

f. The user can select multiple language in which the user wants to listen the book from the designed languages.

g. User can select between the pitch and tone of the voice heard i.e. choose between male and female voice.

h. The audio can be paused, replayed, stopped.

3.2.2. Non-Functional Requirements:

a. **Usability:**

- The user can use this product to listen to the book without reading it.

- It will help the user to decrease their work

- It helps the user to protect their eyes from retina dislocation and inconvenience of reading in darkness, adjusting light problems while reading a handy book.

b. **Reliability:**

- User can blindly rely on this product because it will read out the words which user will capture the images of from the book.

- User can listen to the book instead of reading it with no physical activity needed which relaxes human brain.

c. **Performance:**

- This product will work very smoothly.

- If the user wants to change the language, they can the change the language of the product.

- The user can also change the voice from male to female and female to male.

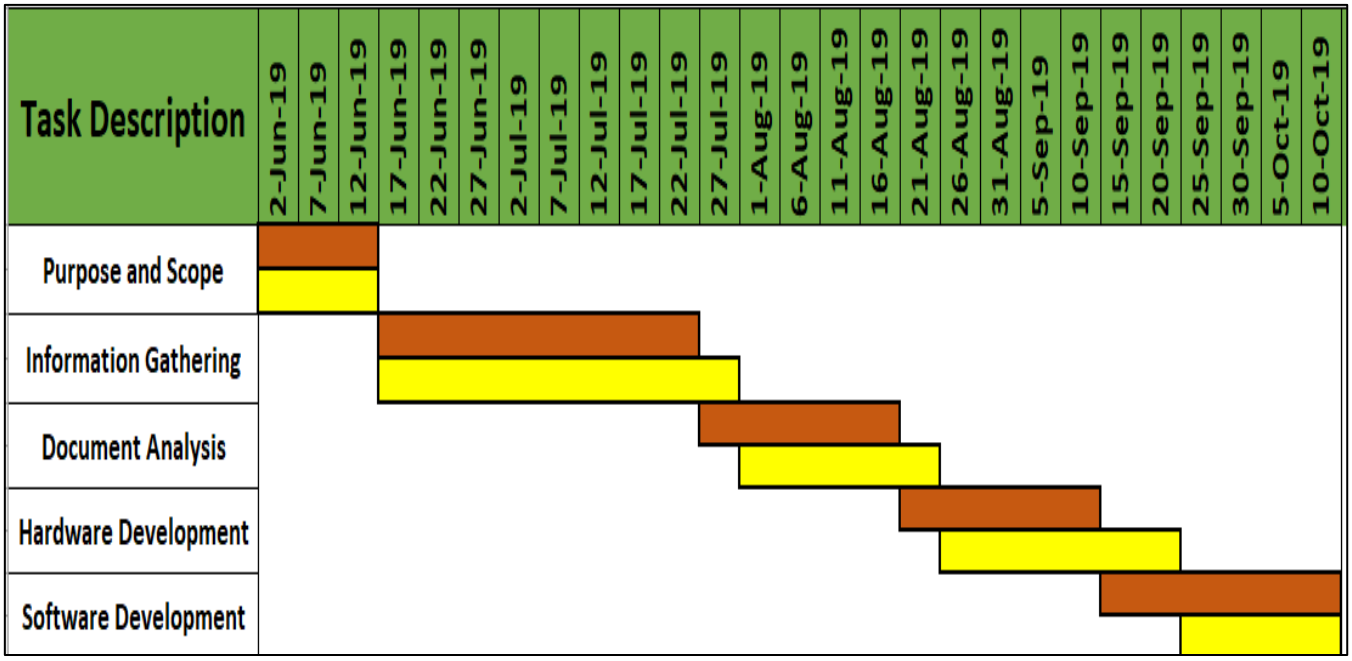
- User can pause, stop or replay the audio.

3.3. Planning and Scheduling:

3.3.1. Gantt Chart

Planned

Actual



- This chart lists the tasks to be performed on the vertical axis, and time intervals on the horizontal axis. The width of the horizontal bars in the graph shows the duration of each activity. Gantt charts illustrate the start and finish dates of the terminal elements and summary elements of a project. Terminal elements and summary elements constitute the work breakdown structure of the project. Gantt charts are usually created initially using an early start time approach, where each task is scheduled to start immediately when its prerequisites are complete.
- The Gantt chart here describes particularly five tasks carried out in phase -1 of defining the system design and analysing the requirements. This Gantt chart describes a time duration of specifically 5 months and 10 days above it. It specifies the planned duration for each task as well as the actual time taken by all the tasks to complete actually.

The first task depicted in the chart is purpose and scope. Here we have defined the purpose of the project specifying where it can be used and what are the reason that demanded the emergence of this system. This task took approximately 10 days to complete and was completed well in time as planned

The second task in chart is information gathering. Here we gathered all the requirements of hardware & software that are necessary for successful completion of our project. The task was planned to complete approximately within 34 days but rather it took 5 more days than planned duration.

The third activity is document analysis. In this activity we created the necessary documentation that would justify our project and work. It states all the objectives and applicability of the system. It was Document analysis was planned to start by 28th of July but because of the delay caused by the second task document analysis started on a later time than decided between 1st to 6th august. and was successfully completed by 26th of august.

The fourth task defined is hardware development. In this task we studied the essential hardware required for the project and obtained the same from the market and initialised all the components and performed the setup of the hardware components as well as established well defined connection between them. the task was intended to complete in 2 weeks, but it caused 6 to 7 days more to complete.

The fifth task is software development. In this activity we decided the workflow of the system and its life cycle and process. We also performed some software setup required for the project to work like configuring the raspberry pi operating system etc. We came across few errors, some of which were resolved, and some were not, as result the graph doesn't have any ending date or completion date.

3.4. Hardware requirements and Software Requirements:

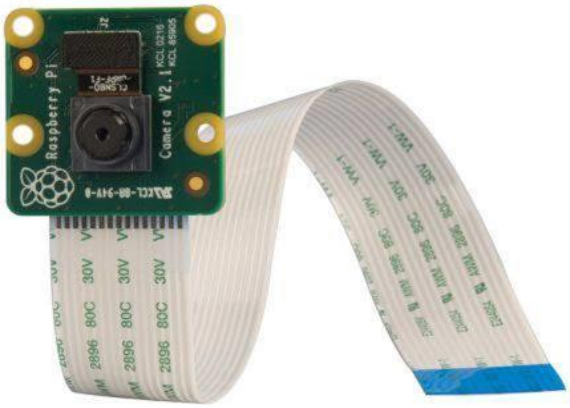
3.4.1. Hardware Requirements:

- **Raspberry pi 3 model B+**

- The Raspberry Pi 3+ uses a Broadcom BCM2837B0 SoC with a 1.4 GHz
- The Raspberry Pi 3, with a quad-core ARM Cortex-A53 processor, is described as having ten times the performance of a Raspberry Pi 1.
- Benchmarks showed the Raspberry Pi 3 to be approximately 80% faster than the Raspberry Pi 2 in parallelised tasks.

➢ Pi Camera

Raspberry Pi Camera Module is used to connect to your Raspberry Pi and take pictures, record video, and apply image effects.



Features:

- Camera is supported in the latest version of Raspbian, Raspberry Pi's preferred operating system
- fixed focus lens on-board
- 5-megapixel native resolution sensor-capable of 3280 x 2464-pixel static images
- Supports 1080p30, 720p60 and 640x480p90 video
- Size 25mm x 23mm x 9mm
- Weight just over 3g

- Connects to the Raspberry Pi board via a short ribbon cable (supplied)

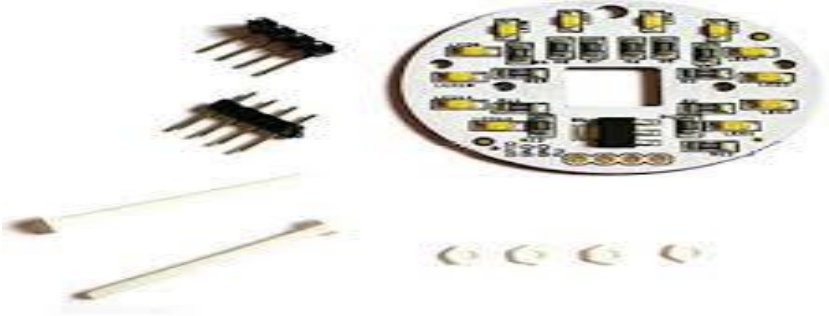
➢ Speakers

It is used to give text extracted audio via this speaker.

Any compatible speakers from the market can be used which can be connected to the audio jack which is further connected to the raspberry pi.

➢ LED Flash

- The LISIPAROI is an additional light source for your Raspberry Pi camera module, available in both white LED's for standard Raspberry Pi camera modules. The LISIPAROI can be used as a flash or steady light source.
- The white version is perfect for the standard camera module, illuminating your subject or providing much needed lighting when the lack of light causing an issue in your photos or video.
- Used to capture image in low lightning conditions.



Features:

- Infrared LEDs
- Flash or steady light
- Attaches to existing camera module
- Brightness Control
- Additional mounting points
- Perfect for security or time lapse photography

3.4.2. Software Requirements:

➢ **Raspbian Operating System**

- Raspbian uses PIXEL, Pi Improved X-Window Environment
- It is Lightweight as its main desktop environment as of the latest update.
- It is composed of a modified LXDE desktop environment and the Open box stacking window manager with a new theme and few other changes.
- The distribution is shipped with a copy of computer algebra program Mathematica and a version of Minecraft called Minecraft Pi[7] as well as a lightweight version of Chromium as of the latest version.
- Raspbian is highly optimized for the Raspberry Pi line's low-performance ARM CPUs.

3.5. Preliminary Project Requirements

Throughout the world there is an increase need for speaking service like google assistant. Our system deals with the same thing but it is not learning agent, it deals with clicking a photo extracting text from photo and convert that text into audio form.
The function and operation of the system are as follows:

- Global operation.
- Portable.
- Blind Helper.
- Illiterate Helper.
- Low cost compared to other e book readers.

➢ Target Market:

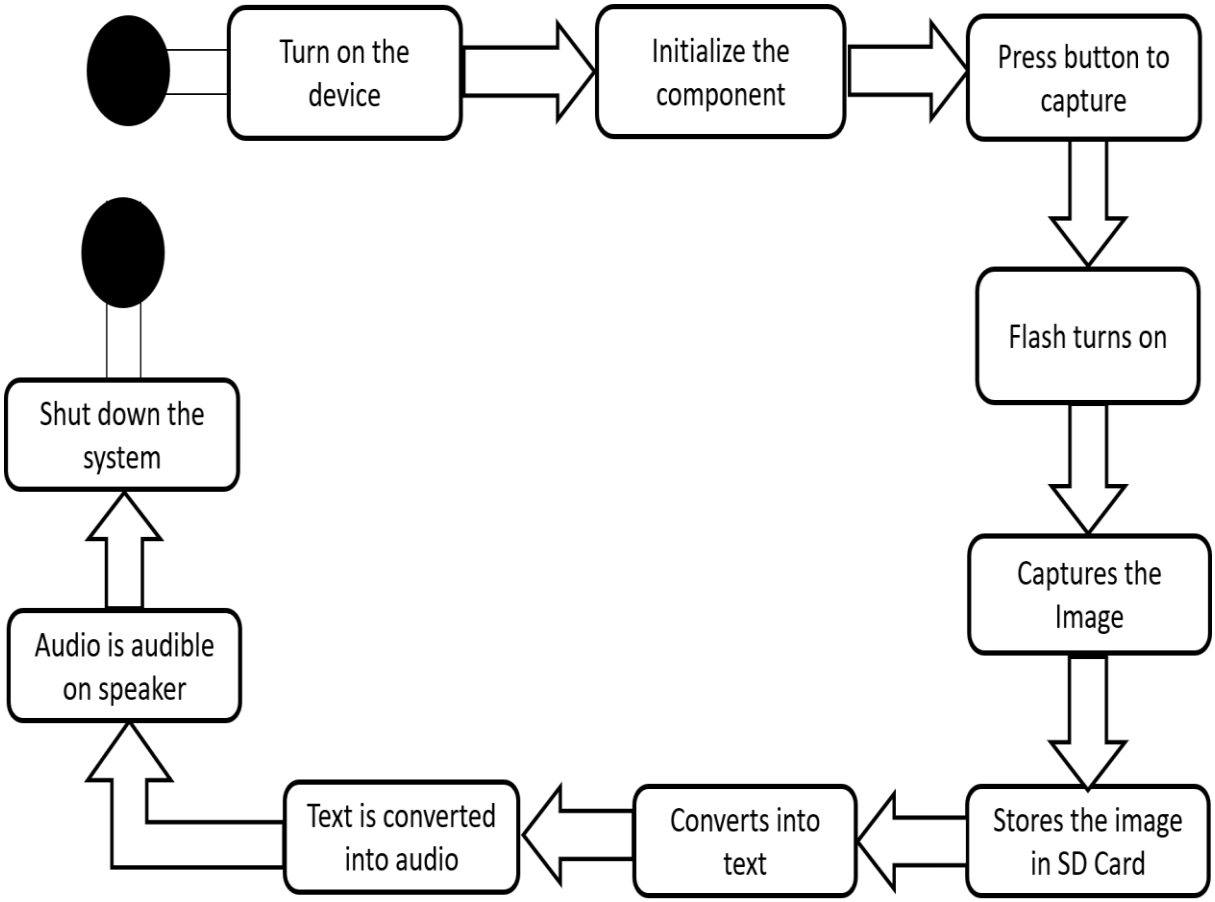
- Our customer can be classified into only one group:
    - Universal user

➢ Universal user:

Gender: Male/Female
Education: Basic (Read and Listen)
Location: any
IT Knowledge: not mandatory
Profession: any
user: any

3.6. Conceptual Model

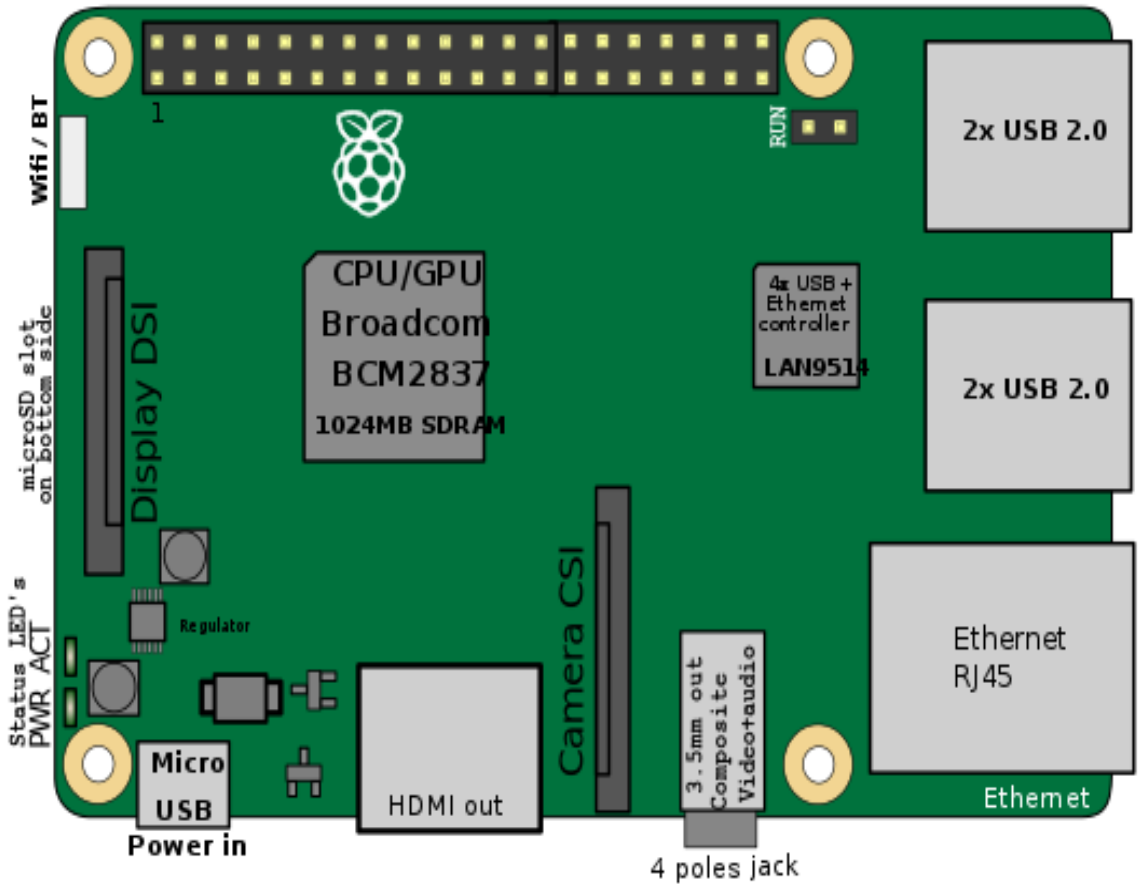
3.6.1. Flow Chart



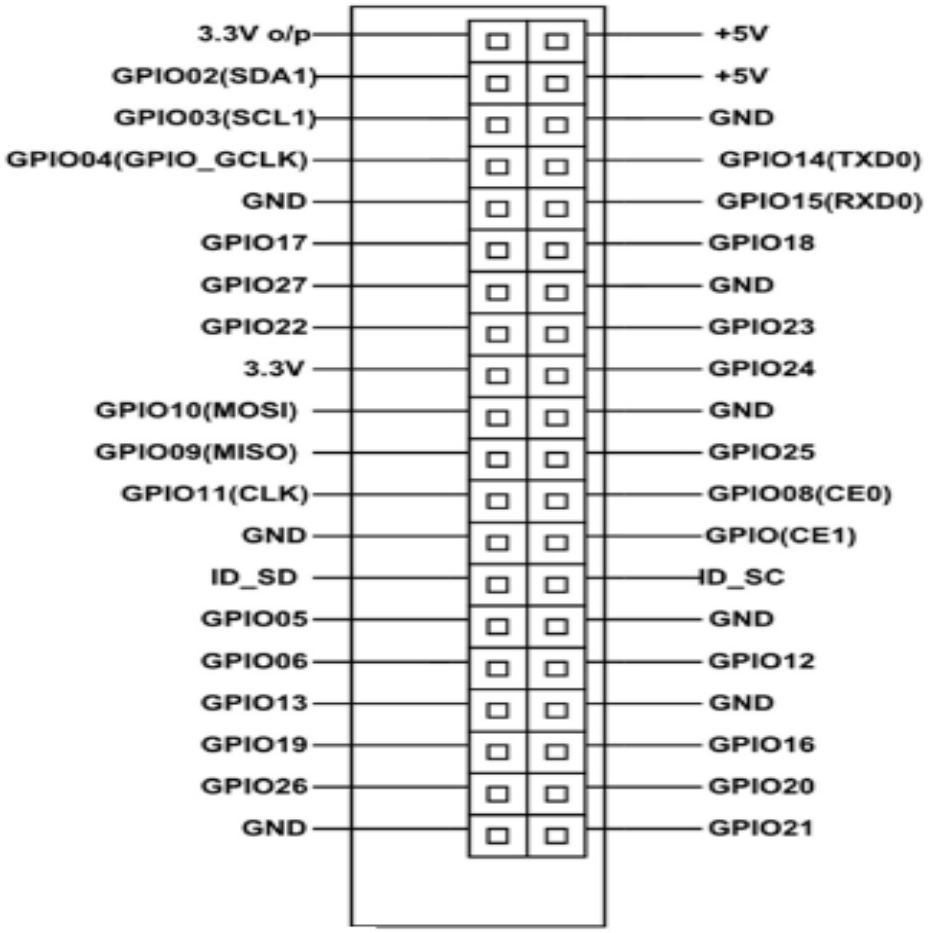
4. SYSTEM DESIGN

4.1. Architectural diagrams:

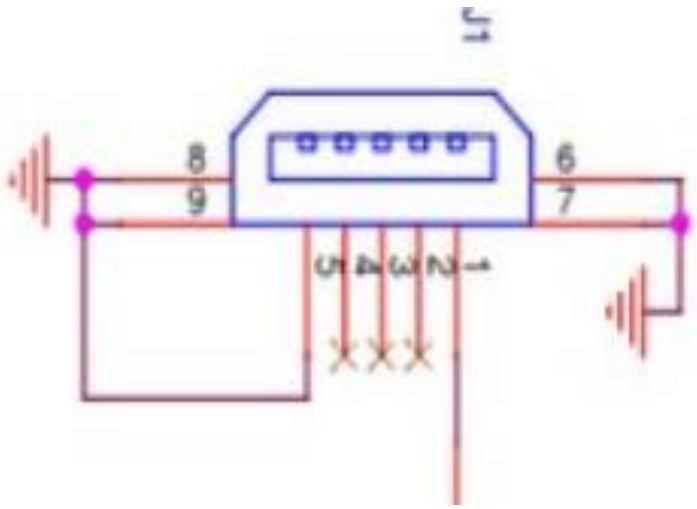
4.1.2. Raspberry pi



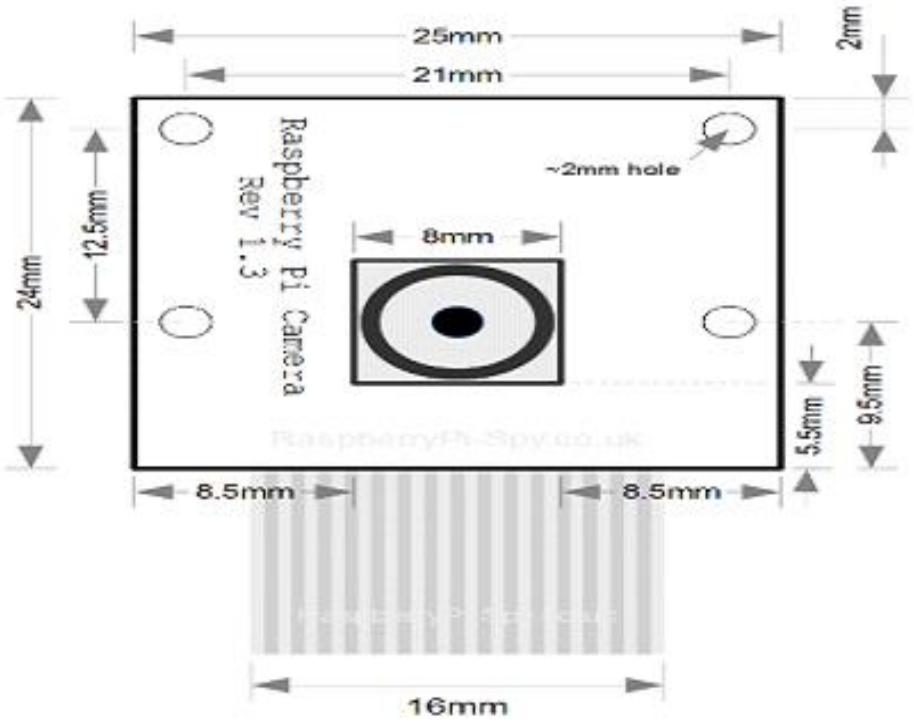
4.1.3. GPIO pins



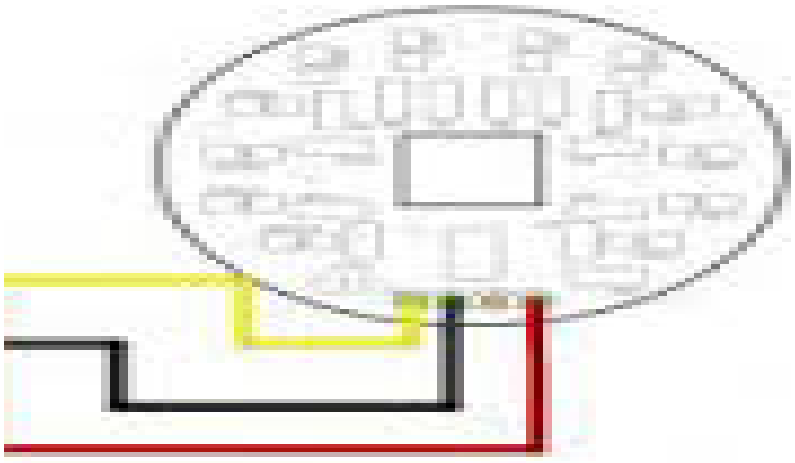
4.1.4. Power supply



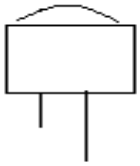
4.1.5. Camera module:



4.1.6. Flashlight

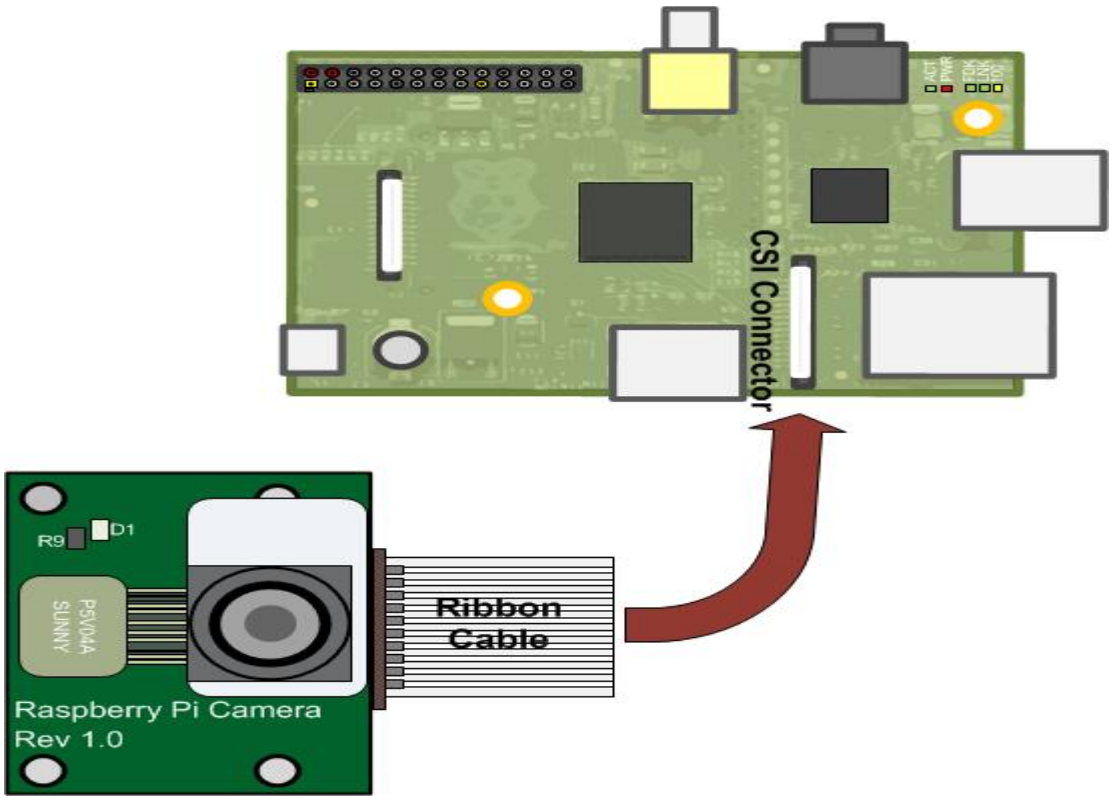


4.1.7. Button

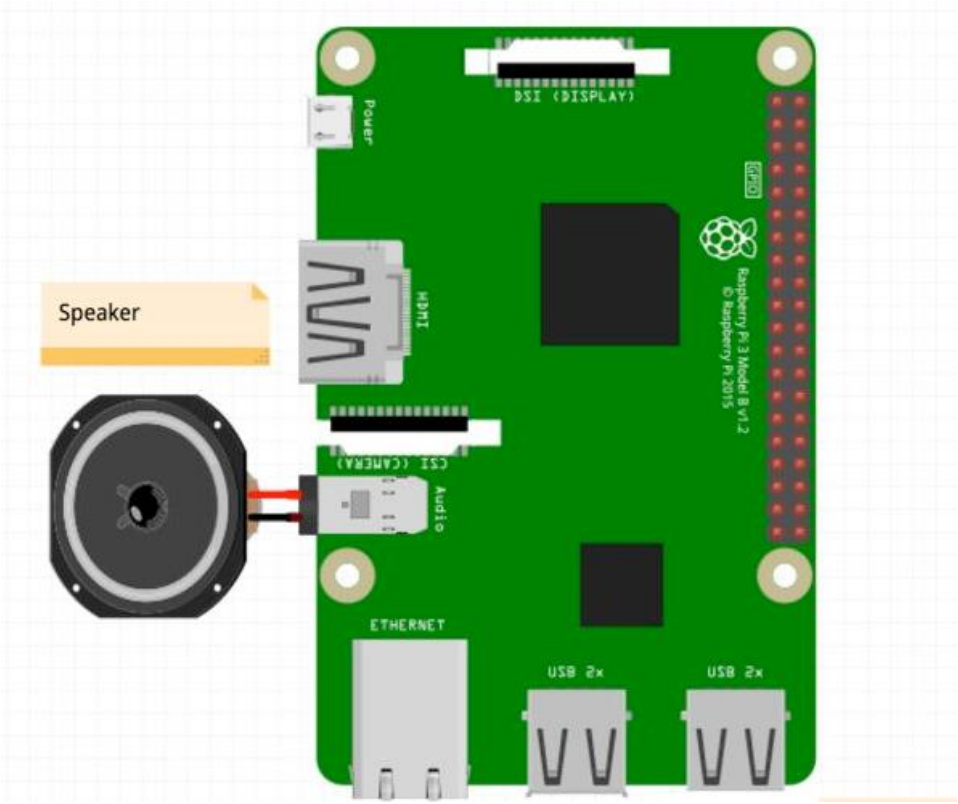


4.2. Circuit diagram

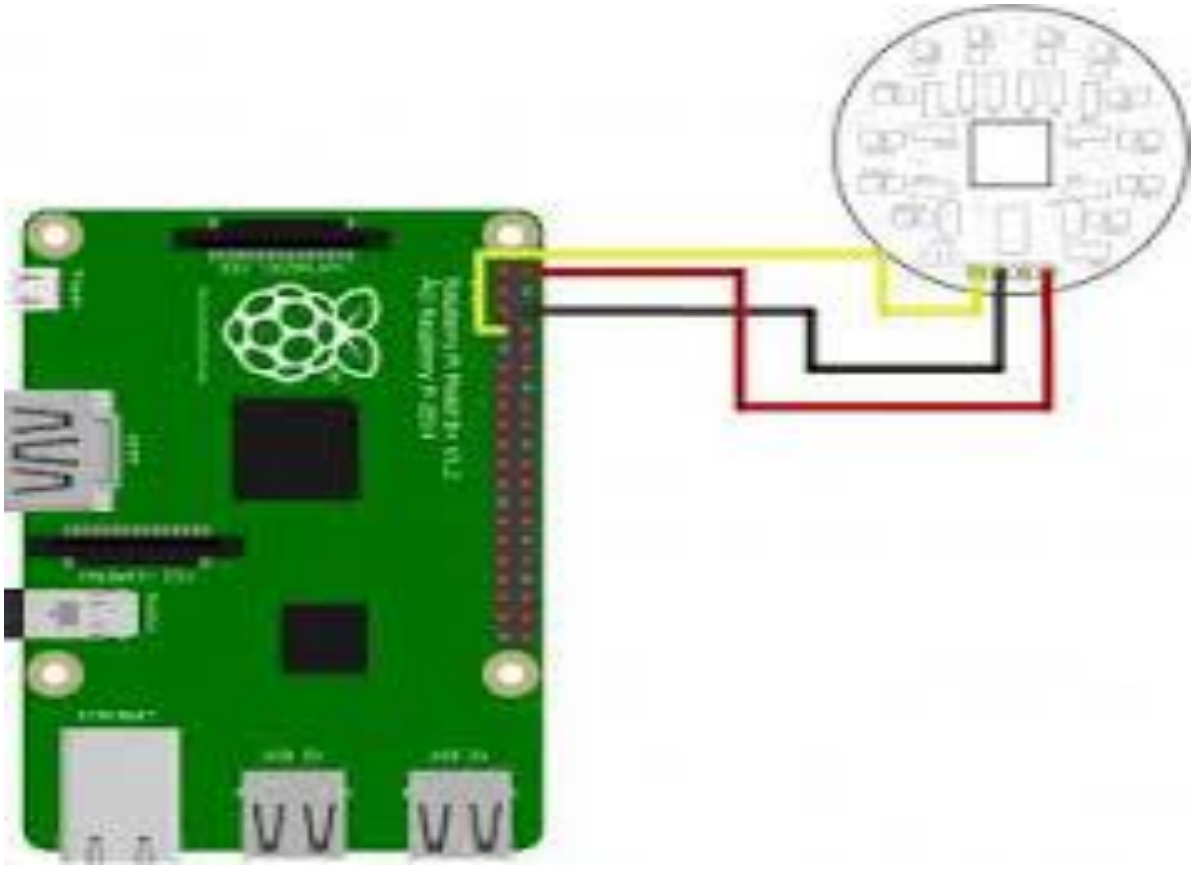
4.2.1. Camera connection



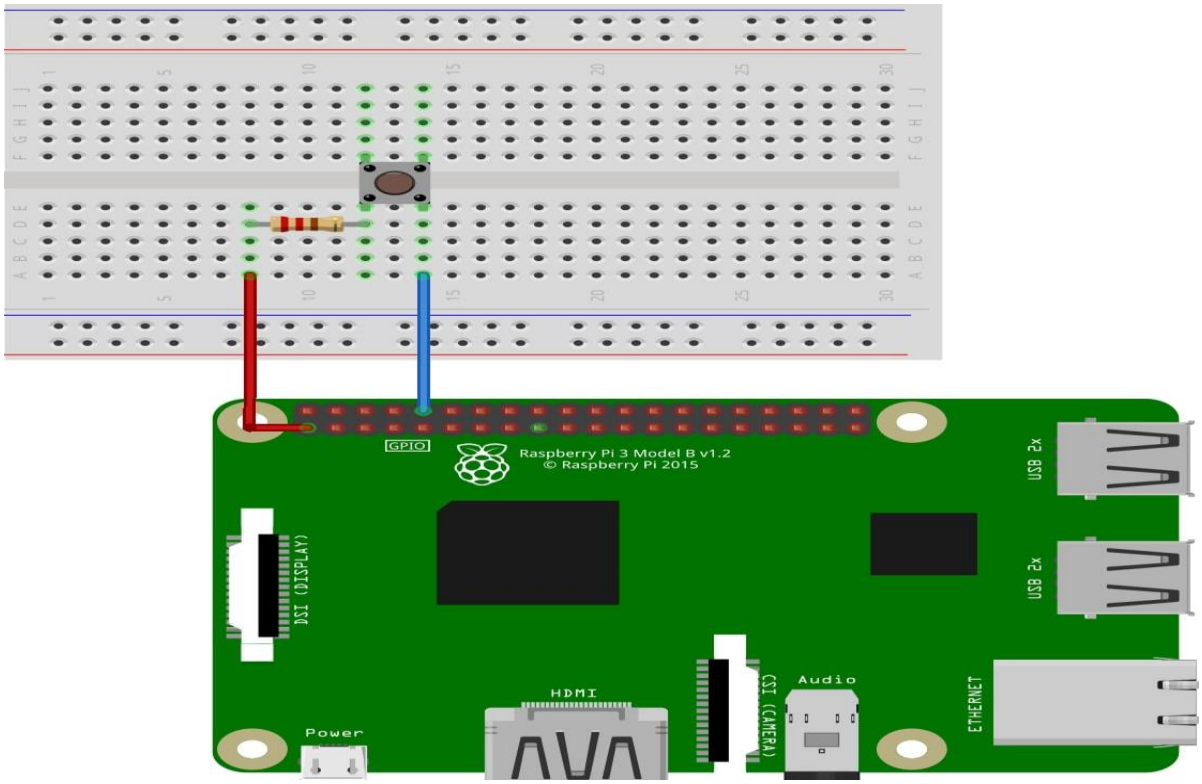
4.2.2. Speaker connection



4.2.3. Flash connection



4.2.4. Button connection



4.3. Block diagram