

# Portable Mini Projector for Smart Phones

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## Abstract

The educational system in our society has more advancements. The black board class rooms are changed to smart class rooms. The proposed method is a portable mini projector which can be connected to any smartphones. This proposed system increases the portability of the smart class rooms. This is carried out by using Raspberry pi, where portability is the main aim which is achieved by providing more power battery backup and can be implemented as a future technology. The portability allows the user to carry the device anywhere and can use any time. The cost of the system is also affordable for all.

**Keyword-** Fresnel Lens, Focusing Lens, LCD Screen, LED, Mini Projector, Portable

## I. INTRODUCTION

A projector or image projector is an optical device that projects an image (or moving images) onto a surface, commonly a projection screen. Most projectors create an image by shining a light through a small transparent lens, but some newer types of projectors can project the image directly, by using lasers. A virtual retinal display, or retinal projector, is a projector that projects an image directly on the retina instead of using an external projection screen.

The most common type of projector used today is called a video projector. Video projectors are digital replacements for earlier types of projectors such as slide projectors and overhead projectors. These earlier types of projectors were mostly replaced with digital video projectors throughout the 1990s and early 2000s, but old analog projectors are still used at some places. The newest types of projectors are handheld projectors that use lasers or LEDs to project images. Their projections are hard to see if there is too much ambient light.

Movie theaters used a type of projector called a movie projector, nowadays mostly replaced with digital cinema video projectors.

An LCD projector is a type of video projector for displaying video, images or computer data on a screen or other flat surface. It is a modern equivalent of the slide projector or overhead projector. To display images, LCD (liquid-crystal display) projectors typically send light from a metal-halide lamp through a prism or series of dichroic filters that separates light to three poly silicon panels – one each for the red, green and blue components of the video signal. As polarized light passes through the panels (combination of polarizer, LCD panel and analyzer), individual pixels can be opened to allow light to pass or closed to block the light. The combination of open and closed pixels can produce a wide range of colors and shades in the projected image.

## II. METHODOLOGY

### A. Data Decoding

It is done using Raspberry pi. The data from mobile phones are accessed through Wi-Fi and the mobile screen is casted to Raspberry pi. A mobile application is used to interface them. The 3.5 inch LCD screen is connected to Raspberry pi where the image to be projected is formed. The Raspberry pi is loaded with Raspbian software. Raspberry pi works with 12V, 2A power supply. The adaptor used for Raspberry pi step downs 230V AC to 12V DC. The LCD screen is connected to GPIO terminals of Raspberry pi. The screen draws power from Raspberry pi. Raspberry pi Boots from Micro SD card, running a version of the Linux operating system.

### B. Optical Unit

It includes a three set of lenses which is used to project the image a high intensity white light is focused using condenser lens and it is passed through first Fresnel lens. This Fresnel lens helps the white light to cover the whole LCD screen. After that another Fresnel lens is used to focus to a point before reaching the focusing lens. Focusing lens is used to throw the image to the screen.

### III. BLOCK DIAGRAM

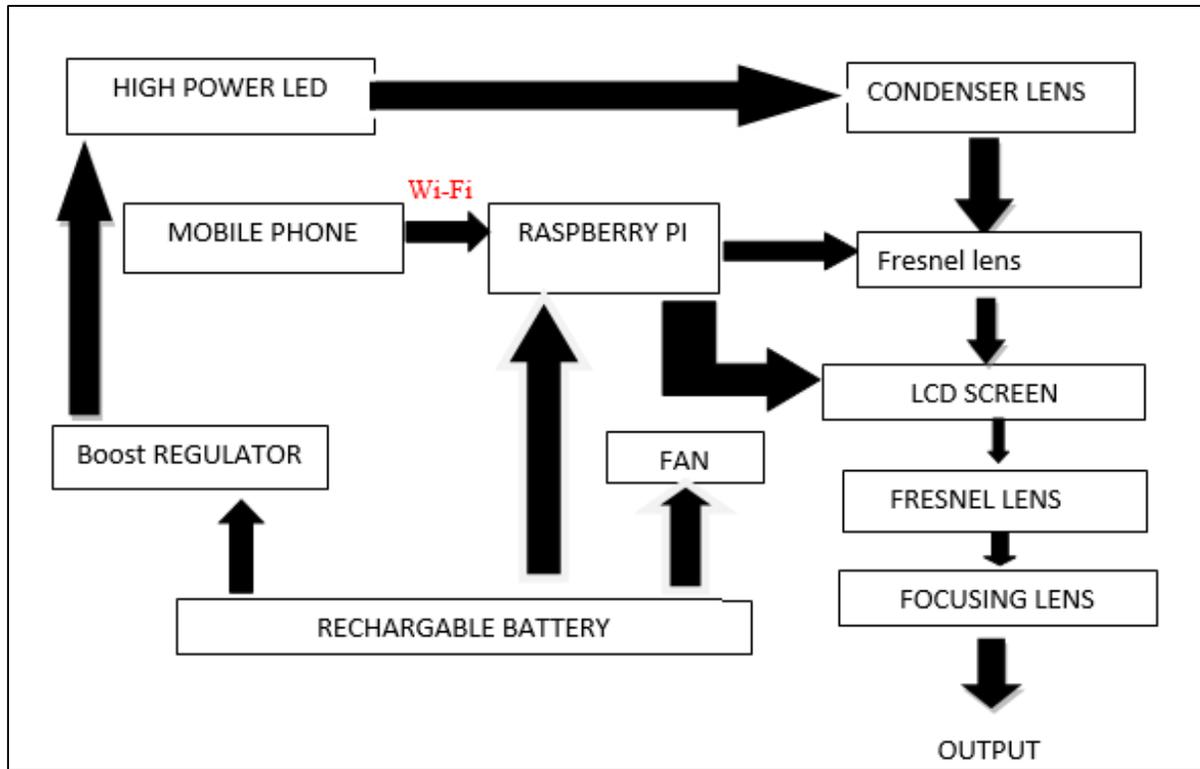


Fig. 1: Block diagram of mini projector

#### A. Design Steps

- 1) Raspberry pi programming
- 2) Connecting back panels removed LCD
- 3) Screen casting using Wi-Fi
- 4) Arrangement of lenses

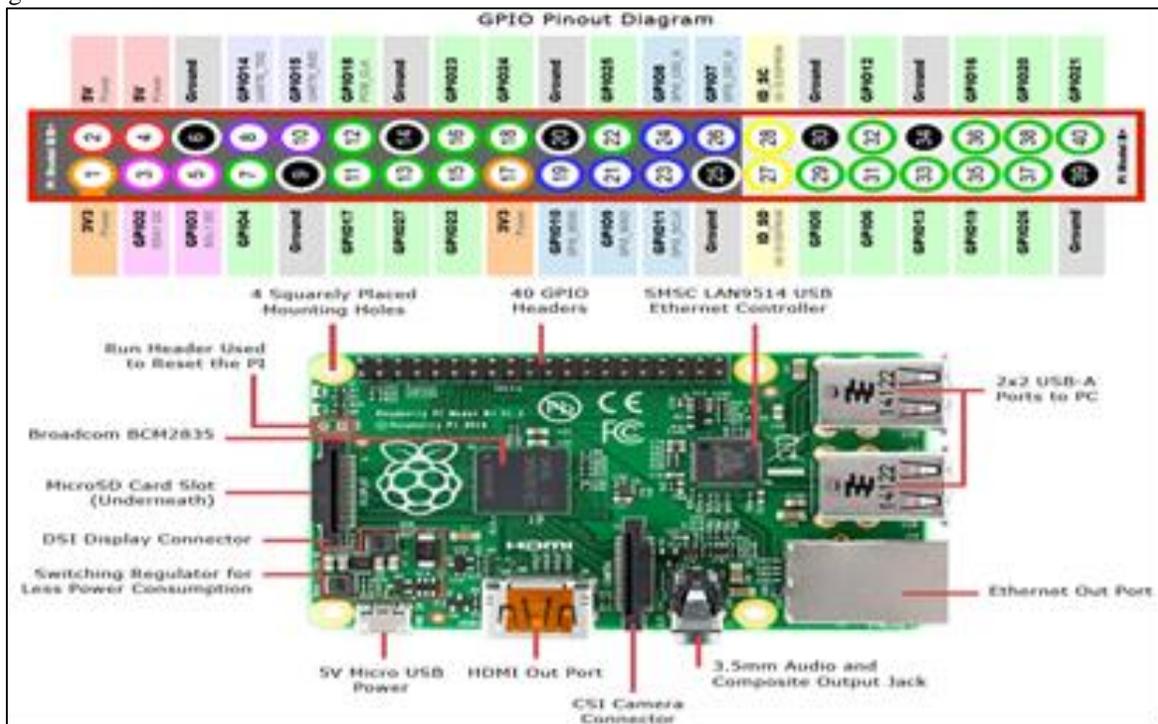


Fig. 2: Raspberry Pi Kit

### 1) Raspberry Pi Programming

The raspberry pi is loaded with raspbian software available at raspberry pi official site. The software is downloaded from there as zip file and then it is extracted. The SD card is formatted. The .img file of the raspbian software is burned to SD card. Then SD card is put on the raspberry pi kit. The raspberry pi is set to auto open browser command.

### 2) Connecting Back Panels Removed LCD

The LCD used is raspberry pi LCD and it is connected to the GPIO ports of the raspberry pi. The back panels of the LCD are removed carefully.

### 3) Screen Casting

Screen casting is done using an application from Google Play store. The raspberry pi and mobile phone are interfaced using that application.

### 4) Arrangements of Lenses

The lenses used are Fresnel lens, focusing lens and condenser lens. The condenser lens is used to make the white light source in straighter directional. The Fresnel lenses are used here are two. They are used to magnification and light gathering purposes. The focusing lens are used to throw the image to a distance.



Fig. 3: Software download for Raspberry PI



Fig. 4: Programming Raspberry PI



Fig. 5: Connecting back removed LCD to Raspberry PI

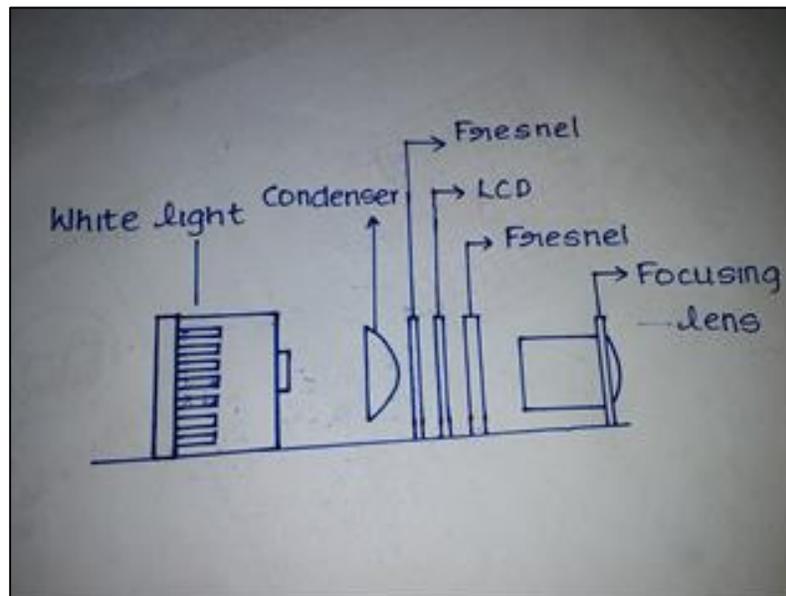


Fig. 6: Arrangement of Lenses

#### IV. CONCLUSION

The system gives an advanced option of connecting mobile phones by using Wi-Fi. The small size of this mini projector makes users very easy to carry it. This mini projector does not need any external power supply and at the same time gives comparatively good projected image.

The proposed system has several advantages over the existing projectors. They are:

- Portability
- Small size
- Low cost
- Less transition time
- User friendly

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