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# FI-PI RASPBERRY-PI ADAPTOR BOARD FOR FIREBIRD-V



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# Fi-Pi Raspberry-Pi Adaptor Board for Firebird-V

## Abstract

The project aims at developing Raspberry-pi based Adaptor board for Firebird series Robots. As Raspberry- Pi can cater to more applications specifically in domain of image processing and IOT and provides a new feature of onboard computing which was not present in earlier versions Firebird series. Main features included in this Raspberry- pi based firebird are :-

- Different communication choices i.e through XBEE, Bluetooth, USB, DB9, or any serial communication protocol of your choice can be used for communication purposes.
- Interfacing Camera on board and live image capturing and video streaming enhances its capabilities and horizon of its applications in different domains.



## Completion status

The work flow of the project designed and its completion status is as follows:-

| Task                                     | Completion Status                    | Remarks   |
|--|--------------------------------------|---|
| Understanding Fire-bird and Raspberry-Pi | Completed                            | Firebird and Raspberry -pi were studied and pins of firebird mapped properly and BAsic operations of Raspberry -Pi werev studied                                      |
| Interfacing ADC and port Expander        | Completed                            | ADC MCP3008 and Port Expander MCP23017 were interfaced with raspberry-pi and fire-bird by enabling spi and i2c communication and installing packages serial and smbus |
| Powering circuit for pi                  | Completed                            | A circuit for powering Raspberry-pi using LM7805BT with 3A current capacity was designed  |
| Communication protocols                  | Completed                            | Communication protocols like XBEE,DB9,USB were tested by sending commands to firebird through pi  |
| LCD and Motion control                   | Completed                            | LCD in 4 bit mode was interfaced using pi and motors were operated at different speeds  |
| Camera interfacing                       | Completed                            | Camera was interfaced with pi and images, videos were saved on pi.  |
| Adaptor Board PCB                        | Completed and revised to new version | PCB was designed and tested with firebird.A newer version was designed with some changes  |
| Manual                                   | Completed                            | Both Hardware and Software manuals were designed incuding all the features ob board with their codes .  |



## 1.1. HARDWARE PARTS

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### 1.1 Hardware parts

- List of hardware
- Detail of each hardware: [Datasheet](#), [page 5](#), [Vendor link](#),
- Connection diagram

### 1.2 Software used

- MobaXterm [Download Link](#)  
Personal Edition 9.4
- Raspbian Jessie [Download Link](#)  
Disk Image Version 2
- Autodesk Eagle [Download Link](#)  
Version 8.2.1
- XCTU [Download Link](#)
- Win32 Disk Imager [Download Link](#)
- SD card Formatter [Download Link](#)
- DHCP server [Download Link](#)  
Version 2.5.2
- Serial Terminal [Download Link](#)

### 1.3 Assembly of hardware

Circuit diagram and Steps of assembly of hardware with pictures for each step

#### Circuit Diagram

Circuit schematic, simplified circuit diagram , block diagram of system

#### Step 1

Steps for assembling part 1



## 1.4. SOFTWARE AND CODE

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### Step 2

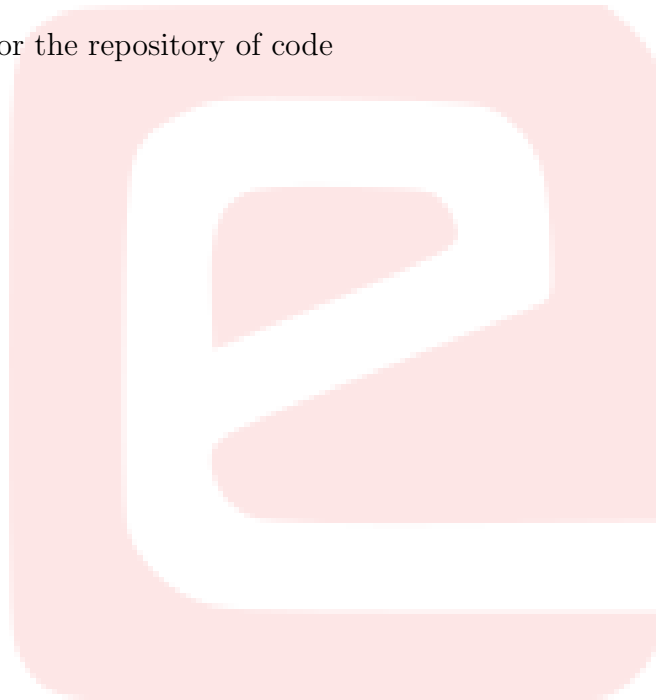
Steps for assembling part 2

### Step 3

Steps for assembling part 3

## 1.4 Software and Code

[Github link](#) for the repository of code





## 1.5 Use and Demo

Final PCB Image :-

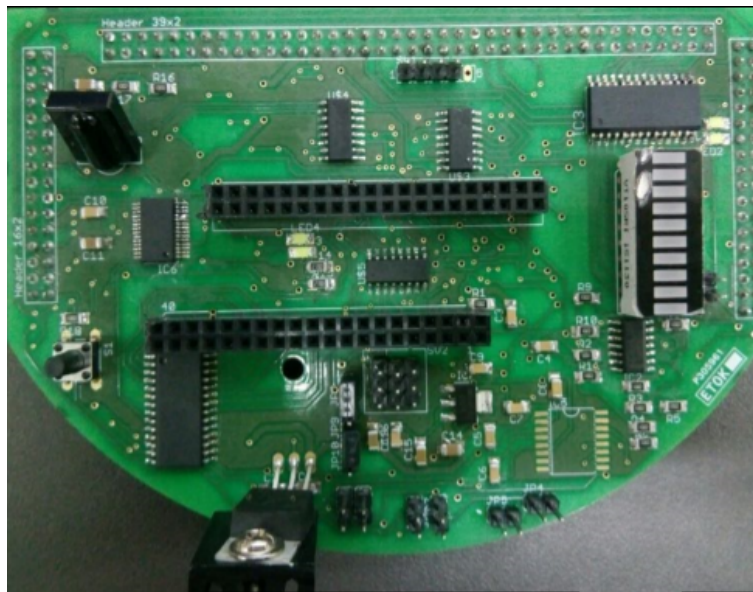


Figure 1.1:

## 1.6 Future Work

Raspberry-pi is a good option for IOT applications so a website can be designed which could be linked to the Raspberry-pi enabled Firebird and data from firebird can be regularly sent let be the sensor values and displayed on the site and stored for further applications.

It may help in tracking conditions of environment from internet and making plant watering bot by detecting plants in the garden through image processing and water them by detecting the humidity and hence watering accordingly.

## 1.7 Bug report and Challenges

Some changes in Hardware (PCB) have been made and a newer version of PCB is designed:-

- External powering port with external separate battery



## 1.7. BUG REPORT AND CHALLENGES

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- Raspberrypi pin header modified for plug and play directly
- Transistors are interfaced instead of jumpers for changing the communication platform from one to another and hence can be controlled through software means.
- Motors moved to Pi pin header and LCD to port expander beacuse LCD is somewhat useless as we can do ssh and check it on laptop and hence saving power.



# Bibliography

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