



Software User-Manual

For

8051Emulator

Version 1.0

Last Updated: 30th June' 2013

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Introduction

1.1 Document Perspective

The purpose of this document is to explain usability of 8051 Emulator application to the user. It is useful for performing academic experiments based on 8051 microcontroller and gives hands- on learning experience to the users as application displays the output of the associated circuits in the form of animations. This project is also helpful for embedded hobbyists without requiring the need for hardware.

1.2 Document Overview

The next chapter, Modules of 8051Emulator section, of this document gives an overview of architecture of the product.

The third chapter, using 8051Emulator, of this document is written primarily for the users and describes in details of the functionality of the product.

1.3 Document Convention

This document follows the IEEE formatting of requirements. It has used Calibri font size 12 throughout the document for text.

1.4 Reference

IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software User documentation.

IEEE Computer Society, 1998

Modules of 8051Emulator

2.1 Workbench

Workbench facilitates the user to build circuits. The circuits like LED Display, Seven segment displays, Stepper motor, DAC circuit interfacing with 8051, can be built.

The user can execute the code from the workbench and the appropriate results are displayed on the screen as well as in the Internals 8051.

An additional button is provided for the oscilloscope where voltage vs time graphs are generated based on user input when DAC circuit is connected to any of the ports of 8051 micro-controller.

2.2 Assembly Editor

The Editor is used to write the assembly code and execute it over the circuit built in the Workbench.

2.3 8051 Internals

This module displays the contents of the various registers of the 8051 Microcontroller in the Hexadecimal form during the execution of the assembly code written by the user.

2.4.File Menu

This menu is provided in the application in order to facilitate the file handling options.

2.4.1. New

The new button in the slider helps to create a new project.

2.4.2. Open

The open button in the slider helps to open the project which has been saved previously. It helps to make any changes to the saved project or for reconstructing the circuit or editing the assembly code written in editor page in order to execute different codes on the same circuit.

2.4.2. Save

The save button in the slider helps to save the project with the desired name.

2.5.Help

The help button provides the basic information about the 8051 Microcontroller. It consists of:

- i) User Manual
- ii) About 8051
- iii) List of experiments involving the 8051 microcontroller

Using 8051Emulator Application

3.1. Installing 8051Emulator Application

For the application to get installed properly on the tablet, use the following steps.

- Get appropriate 8051 emulator apk in internal storage of Tablet.
- Search for 8051 emulator apk in file manager and tap on it.
- Installation interface pops up, select package installer.
- Next, tapping on "Install" button, starts installation of package.
- After completion of installation, User can find "8051Emulator" application in Main menu of android.

3.2. Launching 8051 Emulator Application

When user taps on the application icon the Flash screen appears.



Fig 3.2.1- Splash Screen

After 5 seconds, application displays the launch screen. If the user wants to start the application click on the start button.



Fig-3.2.2 - Launch screen

To know about application developers' tap on "About Us" tab.

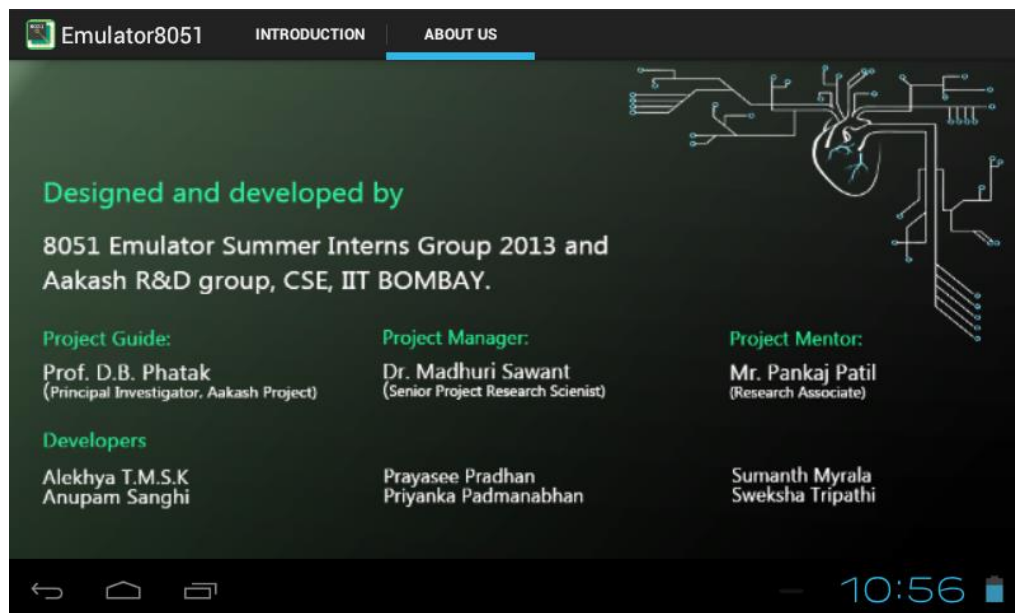


Fig-3.2.3 – About Us Screen

3.3 File menu

File menu facilitates user to do following:

- a) **New** - This option enables user to create a new project. When the user taps new button it gives an alert “Do you want to save the existing file?”. If user taps YES, it saves the existing file otherwise it creates a new project.



Fig-3.3.1- New Project Dialog Box

- b) **Open** -This option enables the user to open any existing project. Tapping this button shows, the list of existing files in a list view.

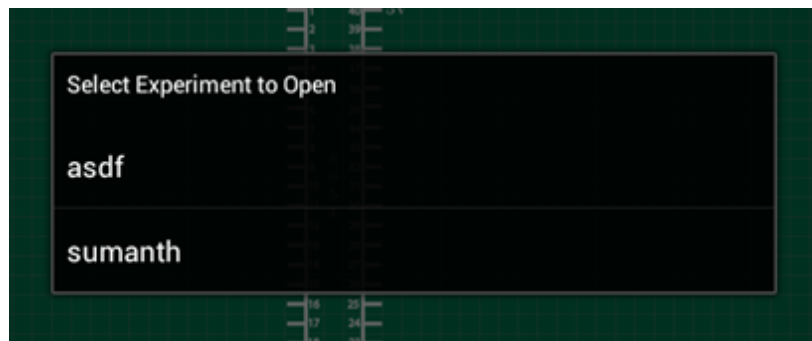


Fig- 3.3.2- Open Project Listview

- c) **Save** –This option enables the user to save the project. The user enters the project name.

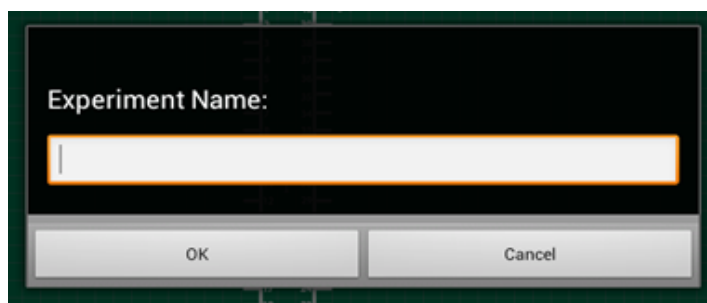


Fig- 3.3.3- Save Project Dialog Box

- d) **Delete**-This option enables the user to delete the existing project by long pressing on the existing project.

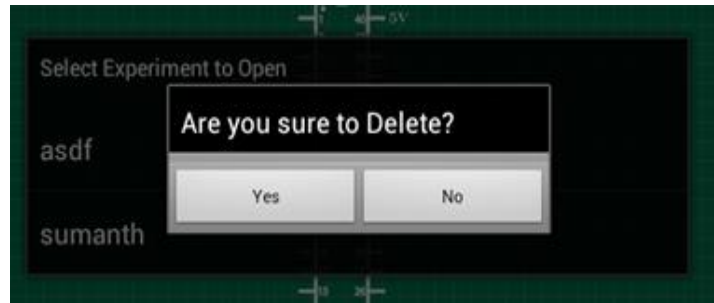


Fig-3.3.4- Delete Project Dialog Box

3.4.Creating New Project

3.4.1. Creating New Circuit

- After tapping the start button in the introduction screen, this Workbench screen appears with a Microcontroller on the grid. This comprises the workspace where user can connect the different circuits to the microcontroller.

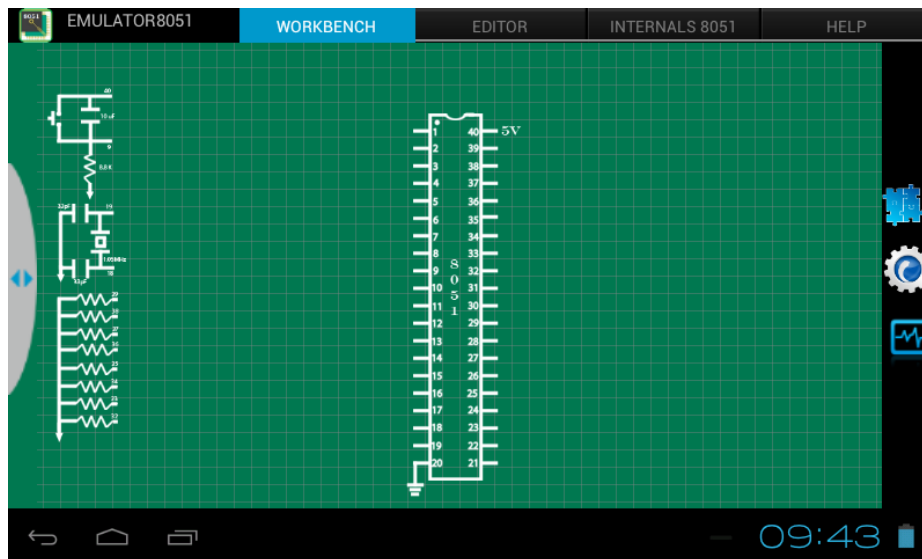


Fig-3.4.1.1- Create New Circuit Screen

- In this workbench user can see the Build button at the right of the screen. When user taps this button, user is able to see the four port options where the inbuilt circuits for each of the port can be selected.

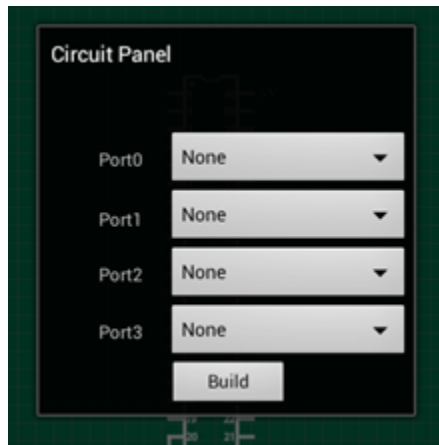


Fig-3.4.1.2- Microcontroller Port Selection

- Select the port with the required circuit to be connected with the microcontroller.

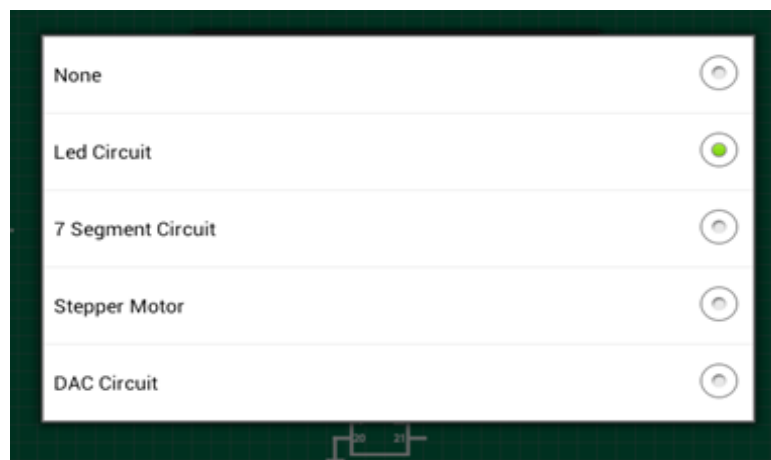


Fig-3.4.1.3- Interface Circuit Selection

- Now tap the build button in the circuit panel so as to connect the selected circuit to the pins of the microcontroller.

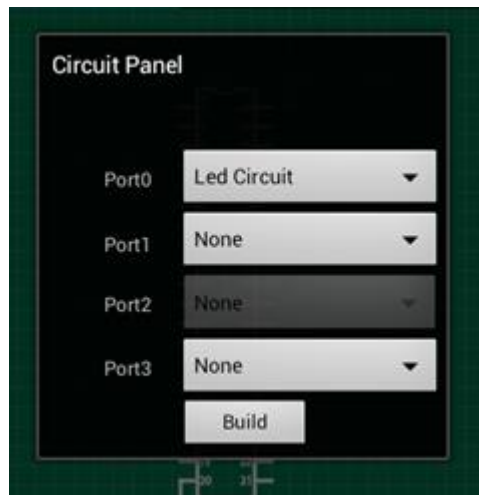


Fig-3.4.1.4- Port Disabling for Led and 7 Segment Display

- Then the selected circuit is connected to the pins of the Microcontroller as shown.

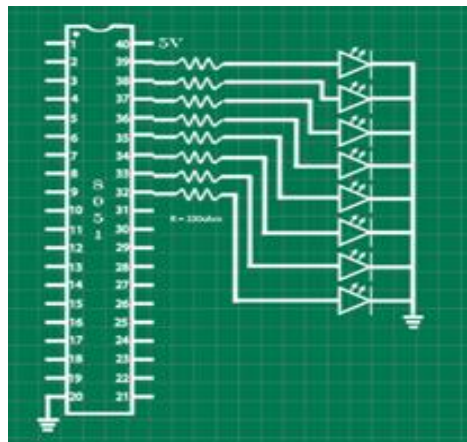


Fig-3.4.1.5- Interface circuit mounted on Port of Microcontroller

3.4.2. Writing assembly Code

After tapping the Editor tab, the editor screen appears.

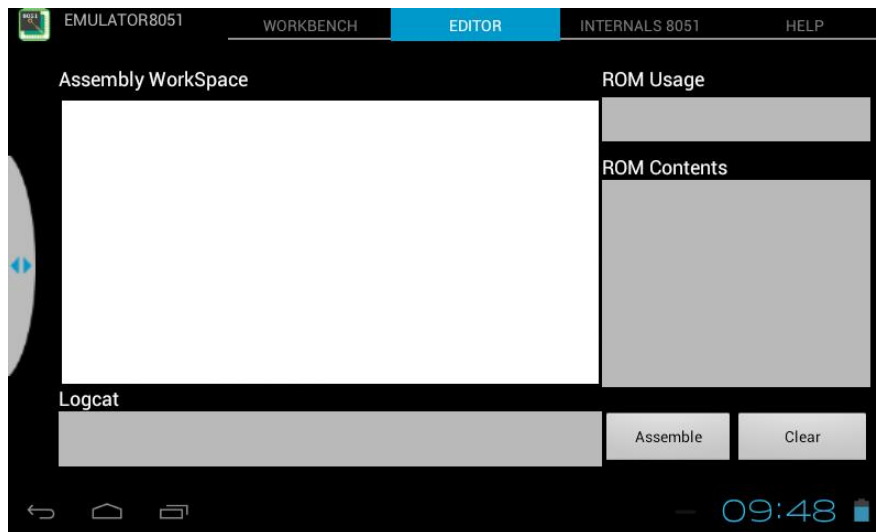


Fig-3.4.2.1-Assembly Code Editor

- a) **Assembly Workspace:** The assembly workspace is the input panel where user enters the assembly code. After entering the assembly code, user should tap the Assemble button.
- b) **Log Cat:** Log cat is the error display panel. Any errors in the assembly code are displayed on the log cat panel at the bottom of the screen. It also displays the line number of the error.

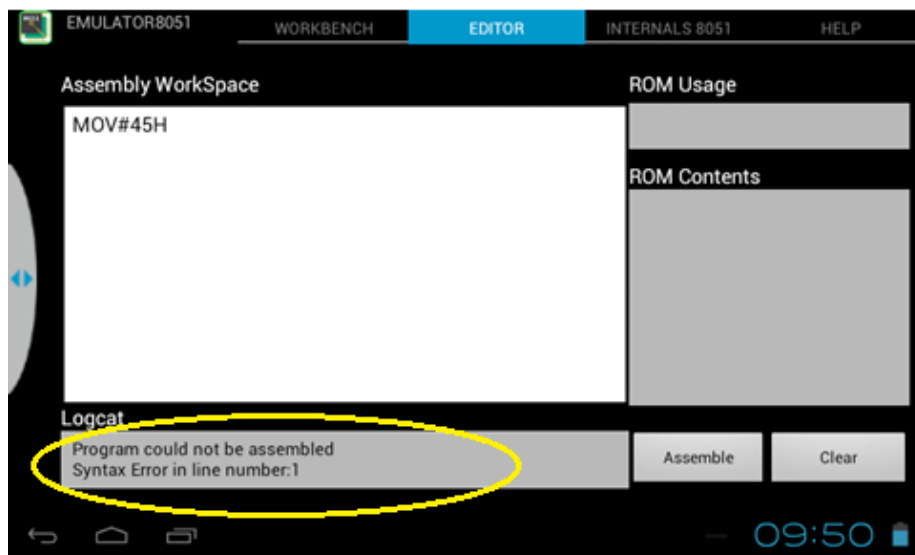


Fig-3.4.2.2- Error Log cat

- c) **ROM Usage:** After assembling, the total memory usage is shown on the memory panel provided on the right side of the screen.

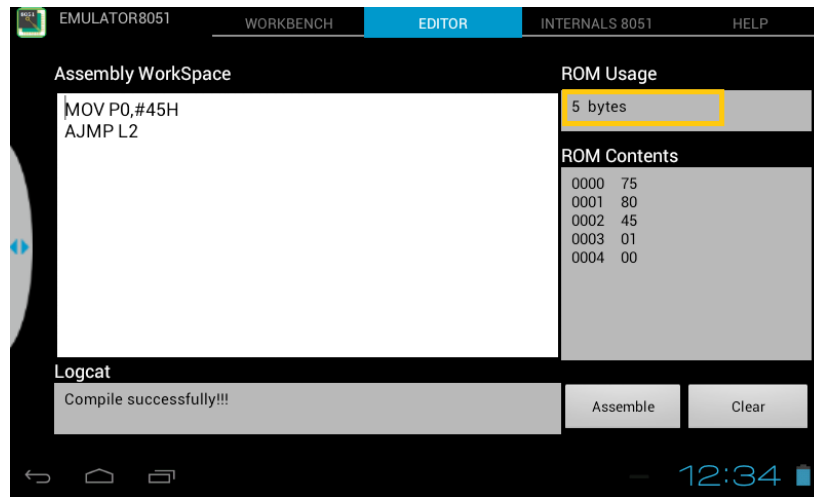


Fig-3.4.2.3- Showing Total Memory Usage

- d) **ROM Contents:** After assembling the assembly code the contents of the ROM (Read Only Memory) are displayed on the ROM contents panel on the right side of the screen.

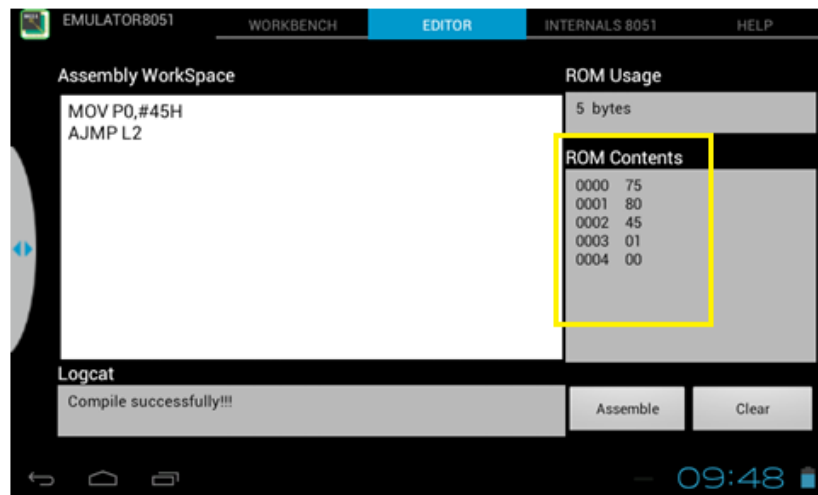


Fig-3.4.2.4- Rom content display with successful compilation of Assembly code

3.4.3. Executing Assembly Code

- The user can also view the Run button below Build. After assembling the code, the user can access this run button and can view the animated output on the workbench.

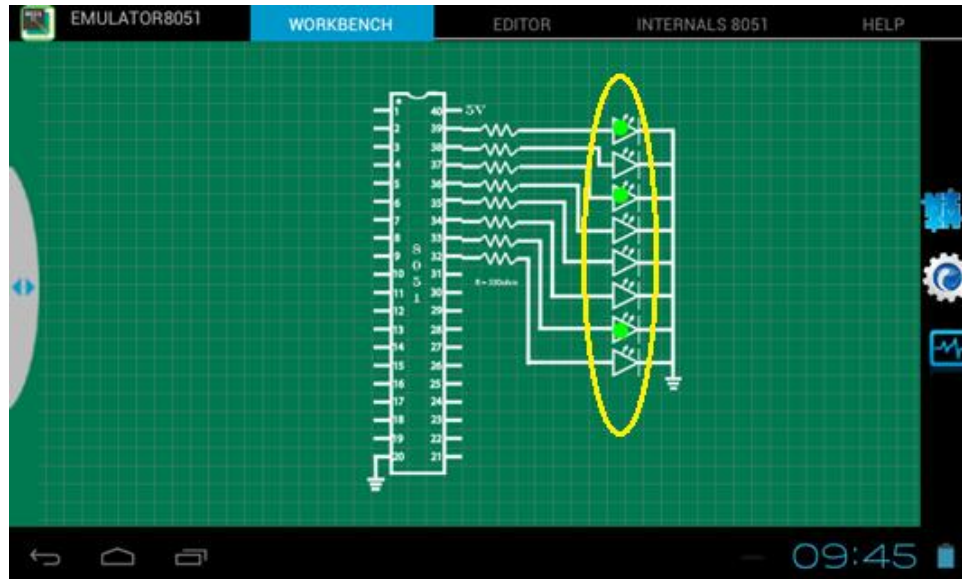


Fig-3.4.3.1- Showing Animation after Code Execution

3.4.4 Checking Content of 8051 Internals

After executing the code, to check the Register contents of the 8051 tap on the Internals 8051 tab.

The Internals screen of the 8051 emulator displays the values of :

- CPU registers
- Registers
- Data Pointers
- Timer and counter Registers
- Interrupt Registers
- Ports

These values are displayed in the Hexadecimal format.

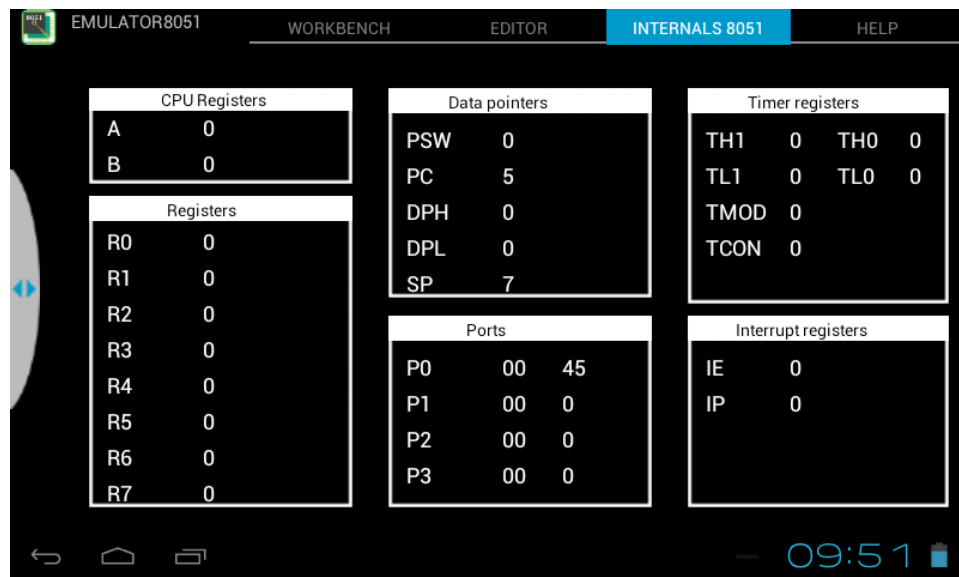


Fig-3.4.4.1- Showing Internal Register Contents After Execution of Code

3.5. Help

The help screen contains three major options

- a) **User Manual:** The user manual is the guide to use the Emulator 8051 Application. It gives the complete information required to use this application.

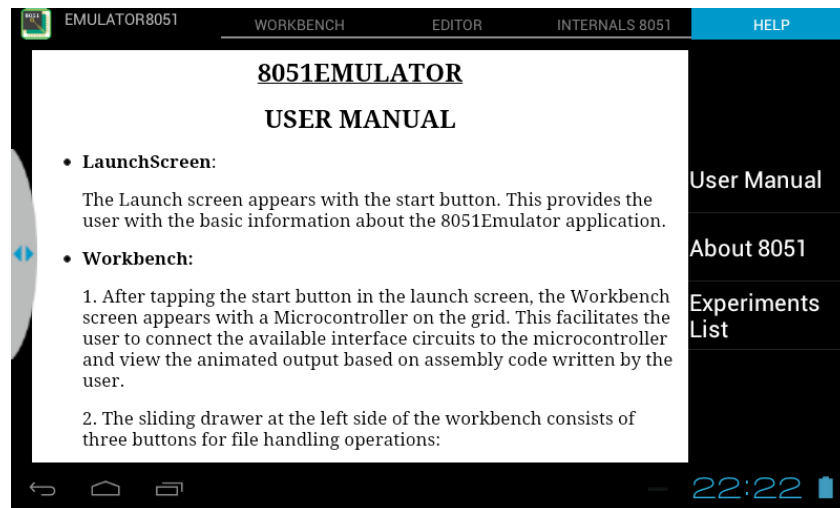


Fig-3.5.1- User Manual

- b) **About 8051:** It gives the basic knowledge about the 8051 Microcontroller .It includes the:

- 8051 Architecture
- 8051 Assembly Instruction
- 8051 Interfacing

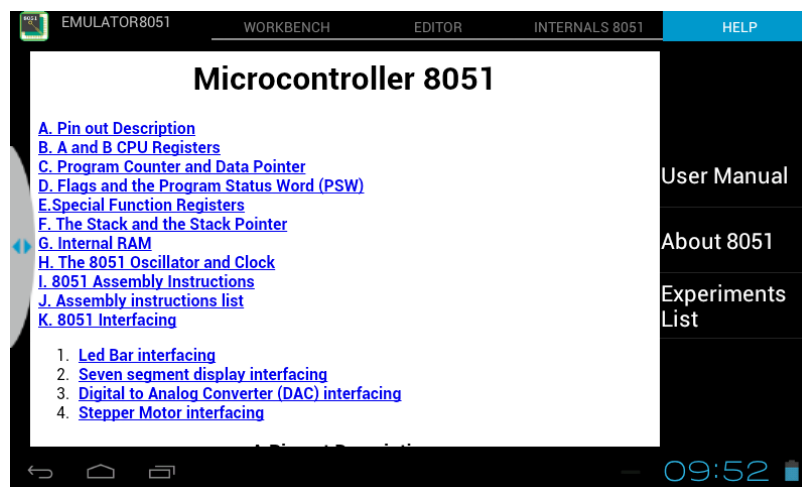


Fig-3.5.2- About 8051

- c) **List of experiments:** This shows the list of experiments involving the 8051 microcontroller

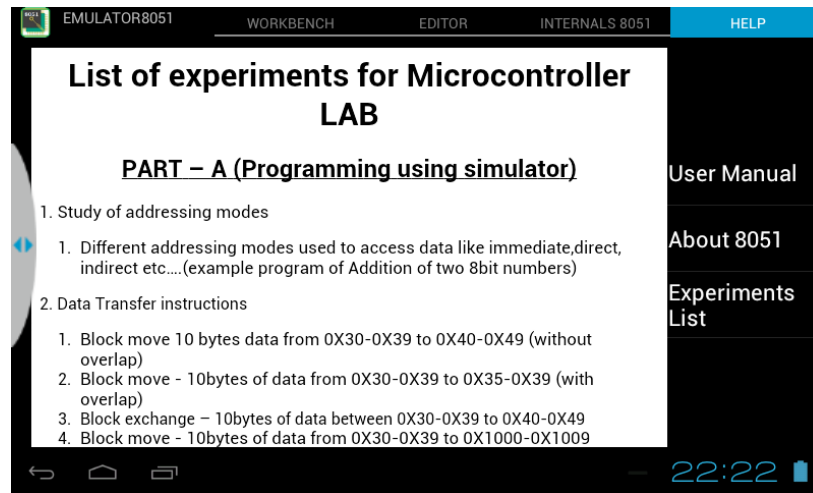


Fig-3.5.3- List of Experiment