Contents

***Abstract*—This manual provides an introduction to Verilog programming using the Icoboard-Lattice FPGA.**

Download the codes from below link

```
https://github.com/pratibha444/icoboard/tree/master/codes
```

1 Components

The necessary components for this manual are listed in Table

Component	Quantity
Icoboard	1
Raspberry Pi 4	1
Male-Male Jumper Wires	20
Breadboard	1
Seven segment dispaly	1

TABLE I

2 Software Setup

2.1 Icoboard

For installing icoboard Open a terminal and execute the following commands.

```
git clone https://github.com/WiringPi/WiringPi.git
cd WiringPi && ./build
sudo apt install build-essential clang bison flex libreadline-dev gawk tcl-dev libffi-dev mercurial graphviz xdot pkg-config libftdi-dev

#Icoprog
#On termuxarch run as root user
#With termuxarch and pizero, this is the only tool required at the pi
svn co http://svn.clifford.at/handicraft/2015/icoprog
cd icoprog && make install

#Icestorm
#On termuxarch run as normal user without sudo
git clone https://github.com/cliffordwolf/icestorm
cd icestorm && make -j4 && sudo make install

#arachne-pnr
#On termuxarch run as normal user without sudo
git clone https://github.com/cseed/arachne-pnr
cd arachne-pnr && make -j4 && sudo make install

#Yosys
#On termuxarch run as normal user without sudo
git clone https://github.com/cliffordwolf/yosys
cd yosys && make -j4 && sudo make install
```

3 Hardware Setup

3.1 4 bit binary input

- The hardware connections between the Icoboard and Rasberry Pi 4 are available in below figures.

- In figure 2 and 3 the Icoboard and rasberry pi connections are shown. And fig 4 shows the Rasberry Pi pin configuration.
- Place icoboard on Raspberry Pi 4 and make the connections according to following steps:
- Take the wires and connect them to A5,A2,C3,B4 of the icoboard . These

pins are used to give input manually.

- Similarly make connection to GND pin and 3.3V pin of Icoboard
- Connect GND and 3.3V pin on the bread board
- Give the binary input using input pins .
- For example connect all the input pins to GND pin on bread board
- Now open the terminal give the following commands

```
cd icoboard
cd trunk
cd codes
cd Binary
make v_fname=binary
python binary.py
```

- The output is displayed on termianal as 0
- Similarly you can change the values.
- If 1 is to be given as input connect it to 3.3V pin and if 0 is to be given as input then connect it to GND pin.

3.2 Seven segment display

Make the connections according to the Tabel II.
The pin configuration of seven segment display is shown in fig 1.

- Open the terminal and execute the following commands

```
cd icoboard
cd codes
cd trunk
cd seven
make v_fname=seven
python seven.py
```

Seven segment display	**Icoboard**
a	A5
b	A2
c	C3
d	B4
e	B7
f	B6
g	B3
COM	3.3v

TABLE II

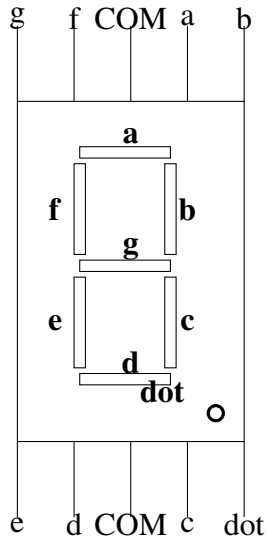

Fig. 1: SSD pin configuration

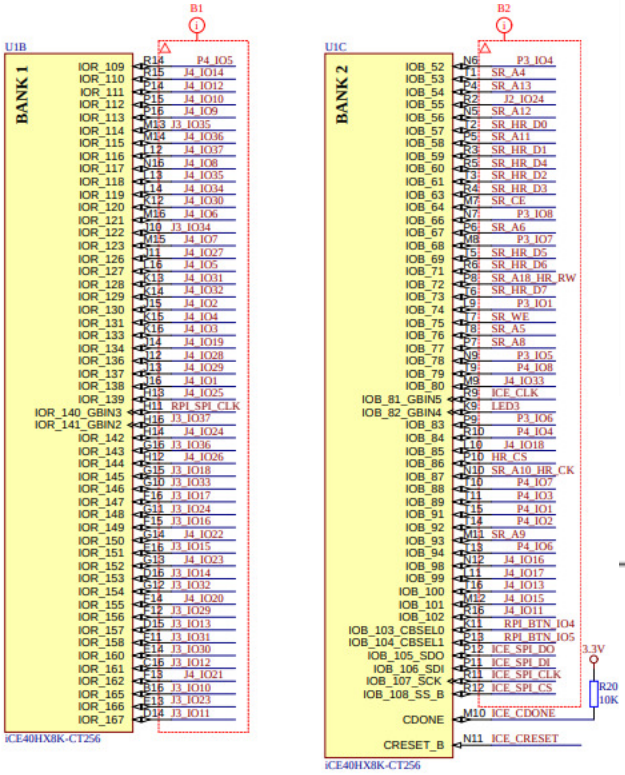

Fig. 2: Icoboard pin configuration

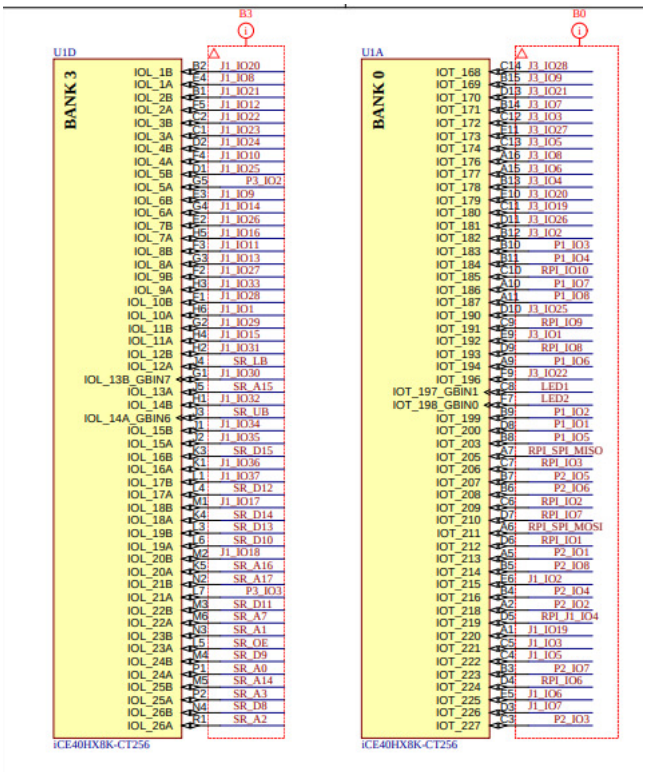

Fig. 3: Icoboard pin configuration

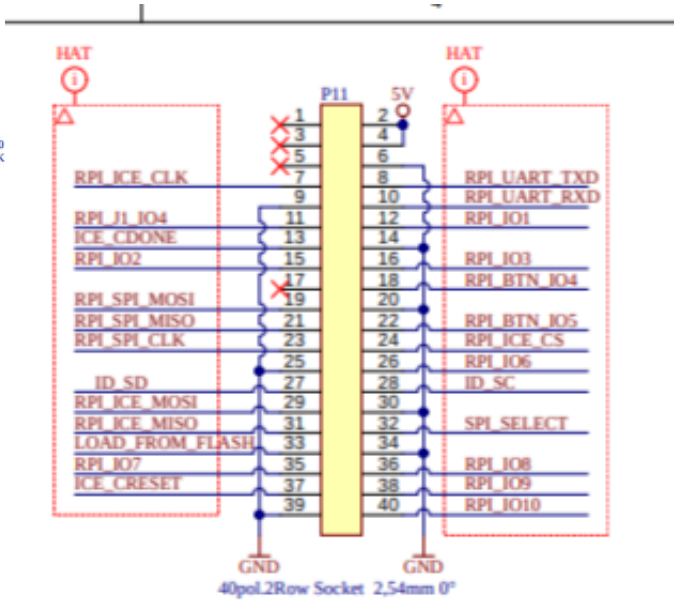

Fig. 4: RasberryPi pin configuration