USER'S MANUAL

FOR

Interfacing of traffic light with BeagleBone Black

Introduction:

The element14 BeagleBone Black is identical in technical design and functionality as the specified BeagleBoard.org product (BeagleBone Black) and runs on the version of the software provided by BeagleBoard.org to element14. General support for this board is available from the BeagleBoard.org community.

Setup:

1. Connect beaglebone black to PC with +5v supply and USB cable.
2. Open terminal in ubuntu.
3. Type sudo su ---enterType password.
4. Then type minicom –s---enter
5. Goto serial port setup-
   - Press A
   - Change /dev/ttyUSBxx to /dev/ttyACM0—enter
   - Press G
   - Press Enter
6. Save setup as dfl – enter
7. Goto EXIT – enter
8. Now system will boot and then type username and password and you booted into beaglebone black.
9. Type su –enter.

CONNECTOR DETAILS:

Connector Number	PIN Number	PIN Description	PIN connects to accessory board	Function
P9	1,2	GND	GND(25pin)	GND
P9	5	VCC(5V)	VCC(26pin)	VCC
P9	11	GPIO0[30]	FRC21pin	Out
P9	12	GPIO1[28]	FRC-22pin	Out
P9	13	GPIO0[31]	FRC-19pin	Out

P9	14	GPIO1[18]	FRC-20pin	Out
P9	15	GPIO1[16]	FRC-17pin	Out
P9	16	GPIO1[19]	FRC-18pin	Out
P9	24	GPIO0[15]	FRC-15pin	Out
P9	23	GPIO1[17]	FRC-16pin	Out
P8	11	GPIO1[13]	FRC-13pin	Out
P8	12	GPIO1[12]	FRC-14pin	Out
P8	13	GPIO0[23]	FRC-11pin	Out
P8	14	GPIO0[26]	FRC-12pin	Out
P8	15	GPIO1[15]	FRC-9pin	Out
P8	16	GPIO1[14]	FRC-10pin	Out
P8	17	GPIO0[27]	FRC-7pin	Out
P8	18	GPIO2[1]	FRC-8pin	Out

TABLE 1

How to get GPIO pin number:

- Once you have decided the pin number which you would like to use as a GPIO, you need to find out its corresponding reference number.
- For example, if you would like to use pin 12 on P8 expansion header, Then find out its default function. Note down the entire signal name. In this case, pin 12 is GPIO1_12.So any GPIO you come across would be referenced as GPIOX_Y. Identify X,Y.
- Use the formula below to find the corresponding reference number:
  Reference number =((X*32)+ Y)
  Hence, pin 12 would be referenced as gpio 44 in the kernel.

To use GPIO pin as GPIO in programs follow the steps :

- To make GPIO pin xx as output type command in terminal(xx—pin number)
  echo xx > /sys/class/gpio/export -- press enter
  echo out > /sys/class/gpio/gpioxx/direction --press enter
  for example:
  echo 44 > /sys/class/gpio/export
  echo out > /sys/class/gpio/gpio44/direction

- To make GPIO pin xx as input type command in terminal(xx—pin number)
  echo xx > /sys/class/gpio/export -- press enter
  echo in > /sys/class/gpio/gpioxx/direction --press enter
  for example:
  echo 44 > /sys/class/gpio/export
  echo in > /sys/class/gpio/gpio44/direction
- After making GIPO pin as output, To change the initial value of output pin type command in terminal(x—1/0,xx—pin number)
  echo x > /sys/class/gpio/gpioxx/value –press enter
  for example:
  echo 0 > /sys/class/gpio/gpio44/value
  OR
  echo 1 > /sys/class/gpio/gpio44/value

PROCEDURE:

1. Make a connection as shown in above Table1.
2. Make pin as input or output as told in function block of Table1.
   Export gpio pins:
   echo 45 > /sys/class/gpio/export
   echo 44 > /sys/class/gpio/export
   echo 23 > /sys/class/gpio/export
   echo 26 > /sys/class/gpio/export
   echo 46 > /sys/class/gpio/export

echo 47 > /sys/class/gpio/export
echo 27 > /sys/class/gpio/export
echo 65 > /sys/class/gpio/export
echo 30 > /sys/class/gpio/export
echo 60 > /sys/class/gpio/export
echo 31 > /sys/class/gpio/export
echo 50 > /sys/class/gpio/export
echo 48 > /sys/class/gpio/export
echo 51 > /sys/class/gpio/export
echo 49 > /sys/class/gpio/export
echo 15 > /sys/class/gpio/export

Set direction for pins:

echo out > /sys/class/gpio/gpio45/direction
echo out > /sys/class/gpio/gpio44/direction
echo out > /sys/class/gpio/gpio23/direction
echo out > /sys/class/gpio/gpio26/direction
echo out > /sys/class/gpio/gpio46/direction
echo out > /sys/class/gpio/gpio47/direction
echo out > /sys/class/gpio/gpio27/direction
echo out > /sys/class/gpio/gpio65/direction
echo out > /sys/class/gpio/gpio30/direction
echo out > /sys/class/gpio/gpio60/direction
echo out > /sys/class/gpio/gpio31/direction
echo out > /sys/class/gpio/gpio50/direction
echo out > /sys/class/gpio/gpio48/direction
echo out > /sys/class/gpio/gpio51/direction
echo out > /sys/class/gpio/gpio15/direction
echo out > /sys/class/gpio/gpio49/direction

3. Make pin as input or output as told in function block of Table1.
4. Make New folder with name Lift elevator and go to that folder using command
   mkdir traffic_light—press enter
   cd lift_traffic_light—press enter
5. create and open a file with command
   vim traffic_light.c
6. write a program and save it.
   Now compile and run the program using command
   gcc traffic_light.c -o traffic_light –press enter

./traffic_light –press enter
OR
g++ stepper.cpp –o stepper –press enter
./stepper -- enter