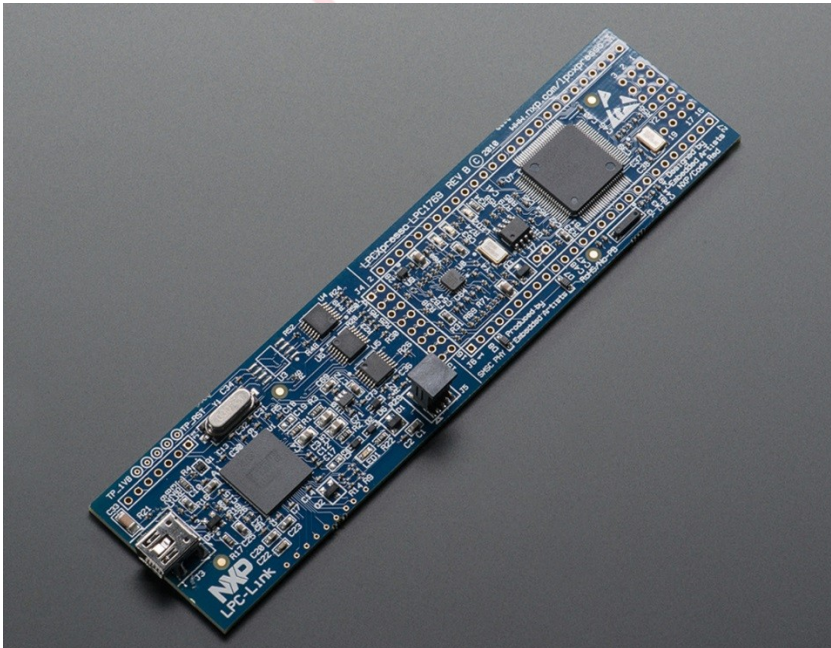




# 2016

## ***Interfacing Stepper Motor with NXP LPC1769 using LPCXpresso***



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**Reviewers:**

**Version: 1.0**

## Introduction:

LPCXpresso™ is a new, low-cost development platform available from NXP supporting NXP's ARM-based microcontrollers. The platform is comprised of a simplified Eclipse-based IDE and low-cost target boards which include an attached JTAG debugger. LPCXpresso™ is an end-to-end solution enabling engineers to develop their applications from initial evaluation to final production.

## Step 1: Open LPCXpresso IDE

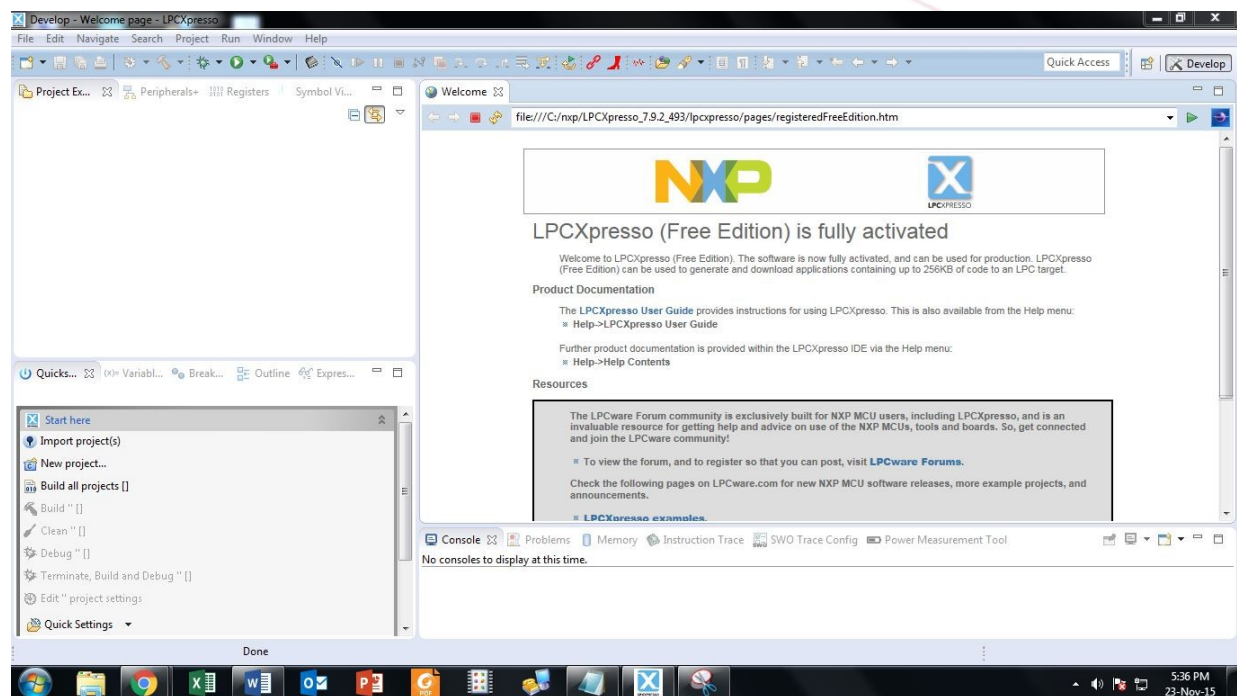


Figure 1

TENET  
TECHNETRONICS

**Step 2:** Before writing a code, we have to Import some Library Files to the Workspace. Click on **Import projects** on Quickstart Panel on the bottom left of the window.

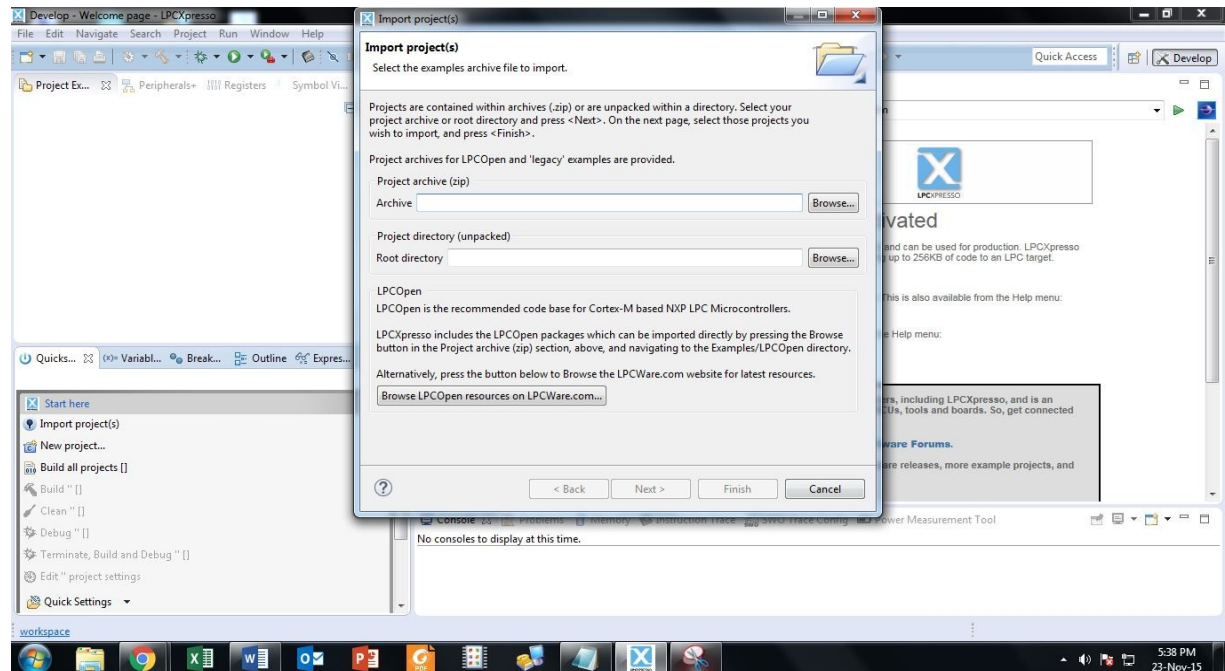


Figure 2

**Step 3:** Browse file, open the LPC1000 folder.

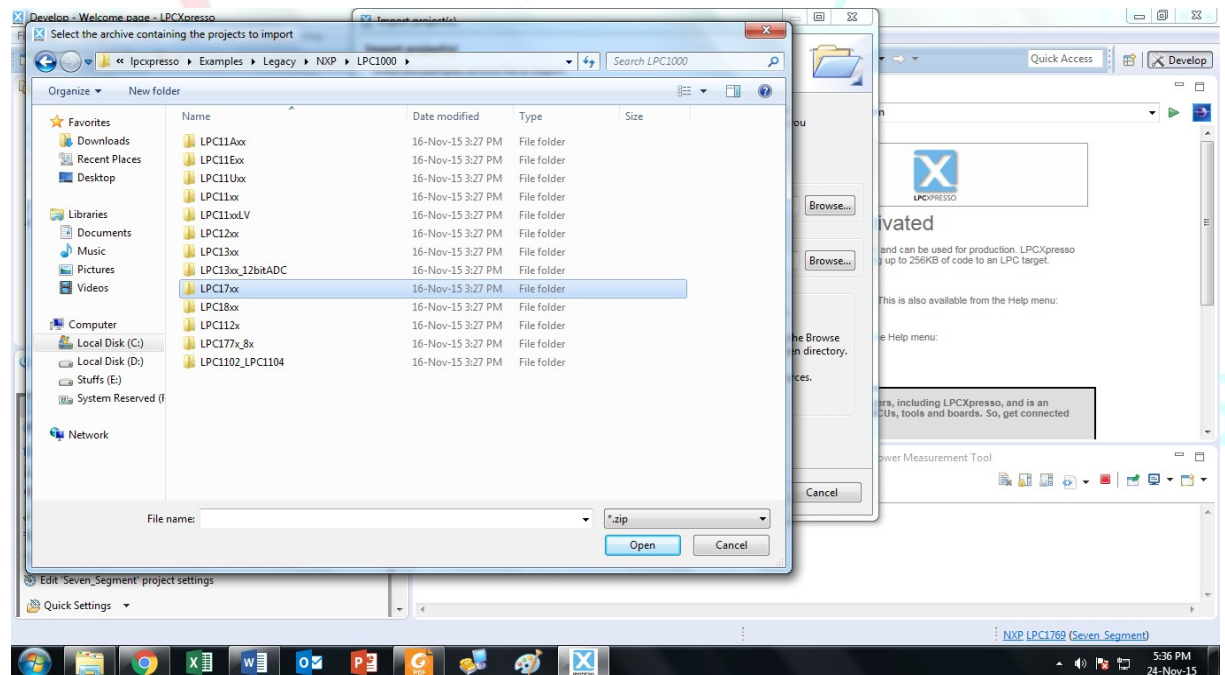


Figure 3

**Step 4:** Select the appropriate archive file. Let us select LPCXpresso176x\_cmsis2. We can select CMSIS CORE library that include LPC17xx.h header file.

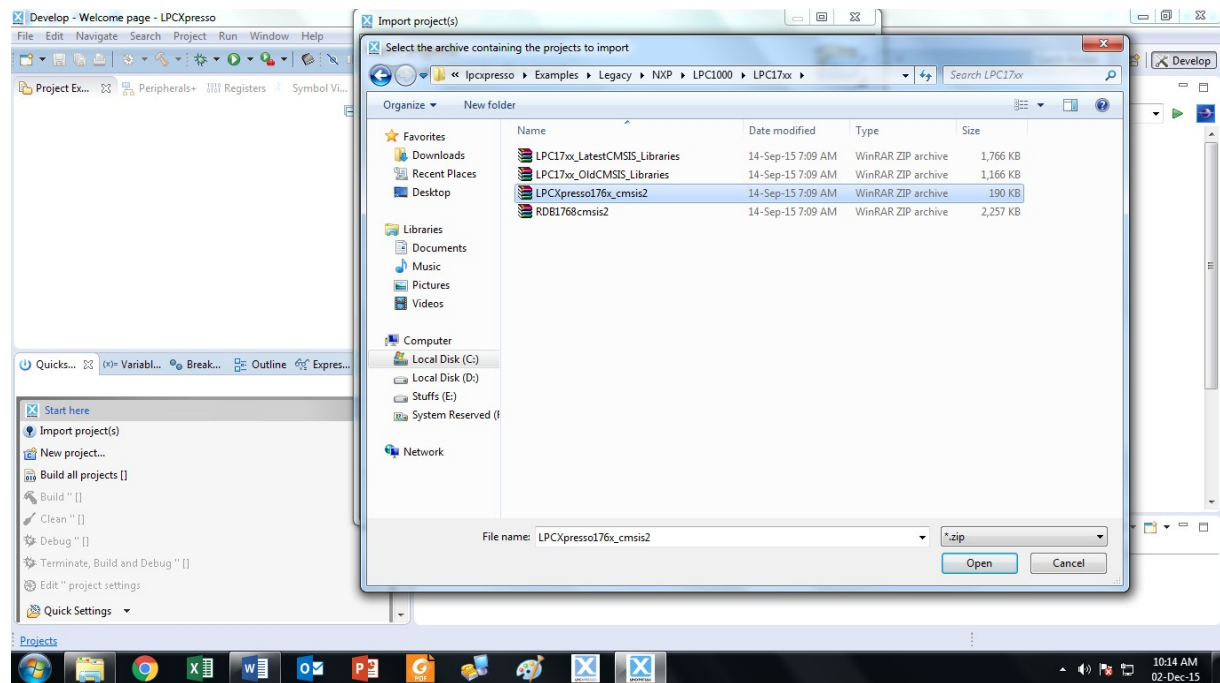


Figure 4

**Step 5:** After selecting you will be able to see the following libraries files. Let us select specific one.

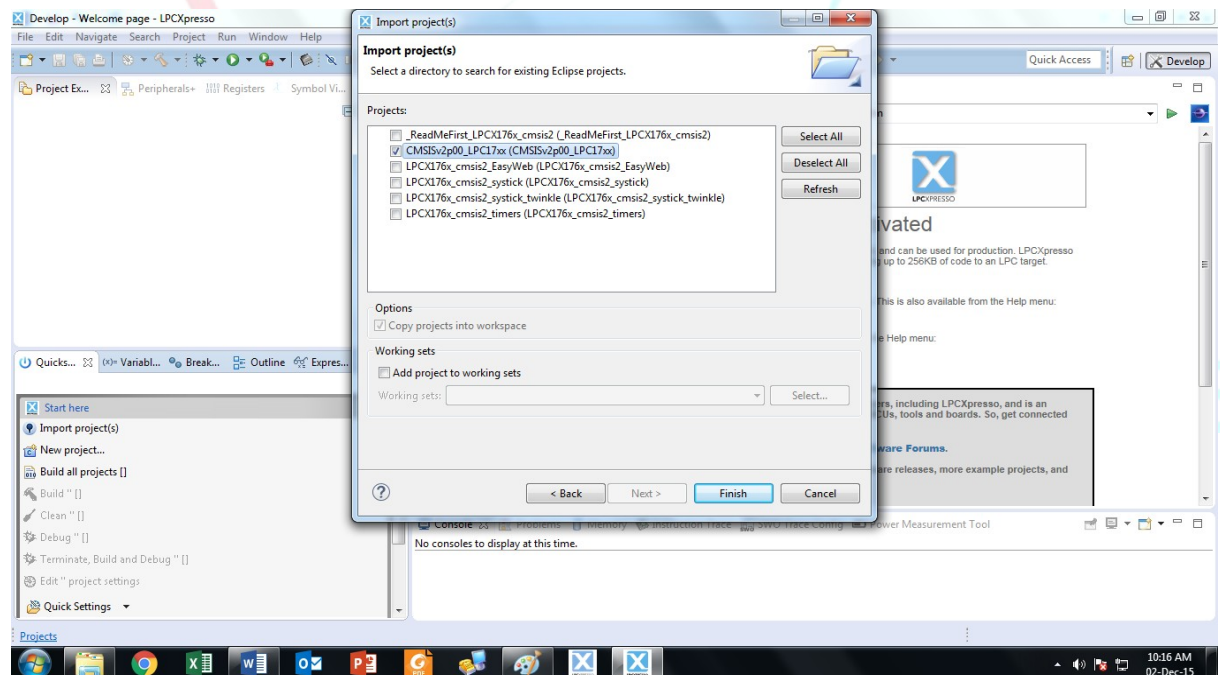


Figure 5



**Step 6:** Now we will be able to see those libraries in the workspace.

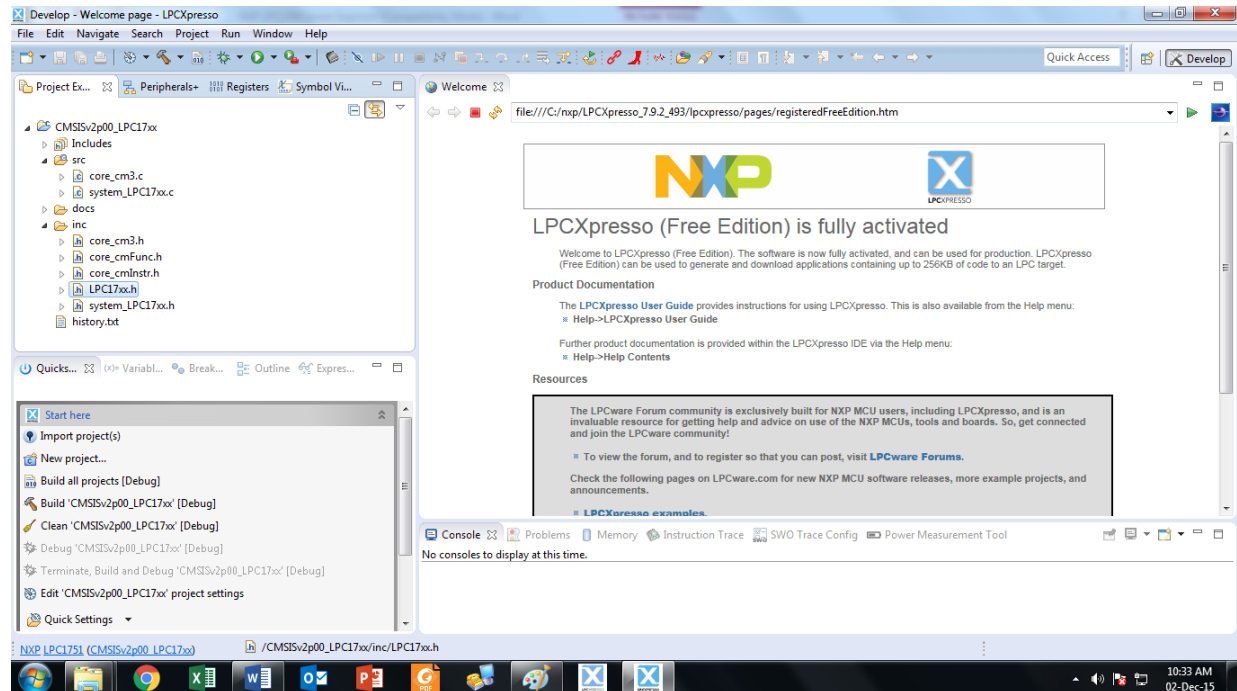


Figure 6

**Step 7:** Now we can start creating our new project. Goto **File >> New >> Project**. Select **LPCXpresso C project**.

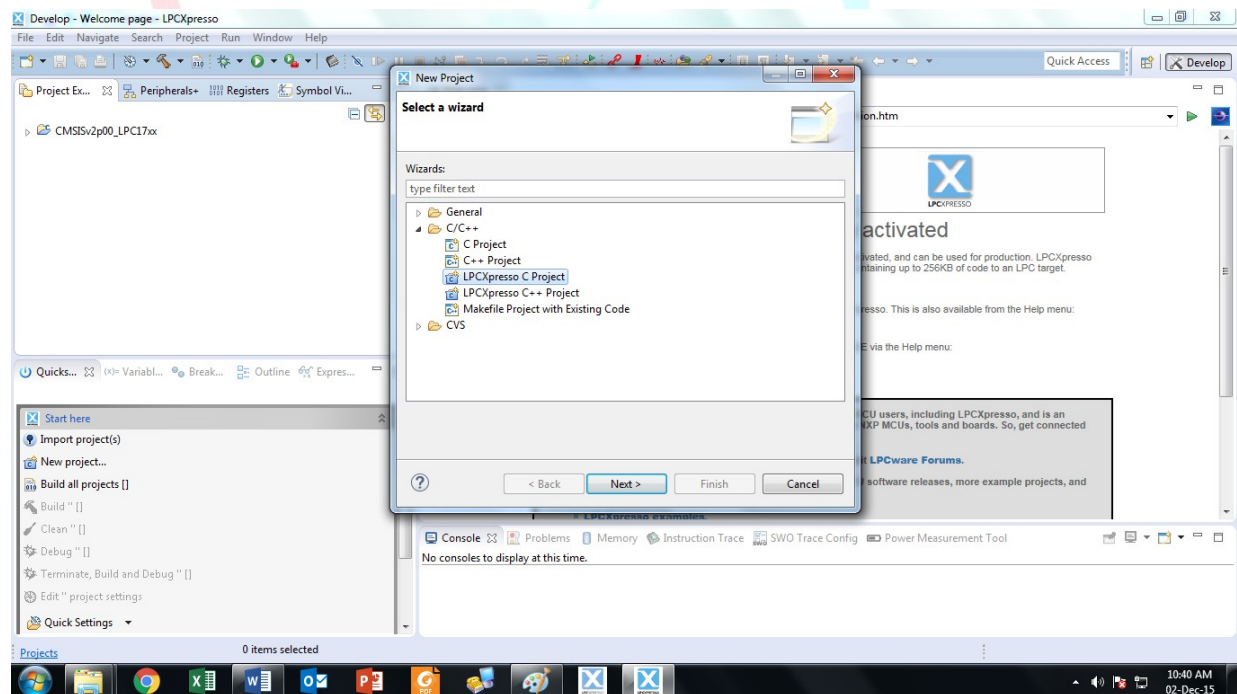


Figure 7

**Step 8:** Select LPC1769, **C Project** and give name to your project. Select target MCU as LPC1769.

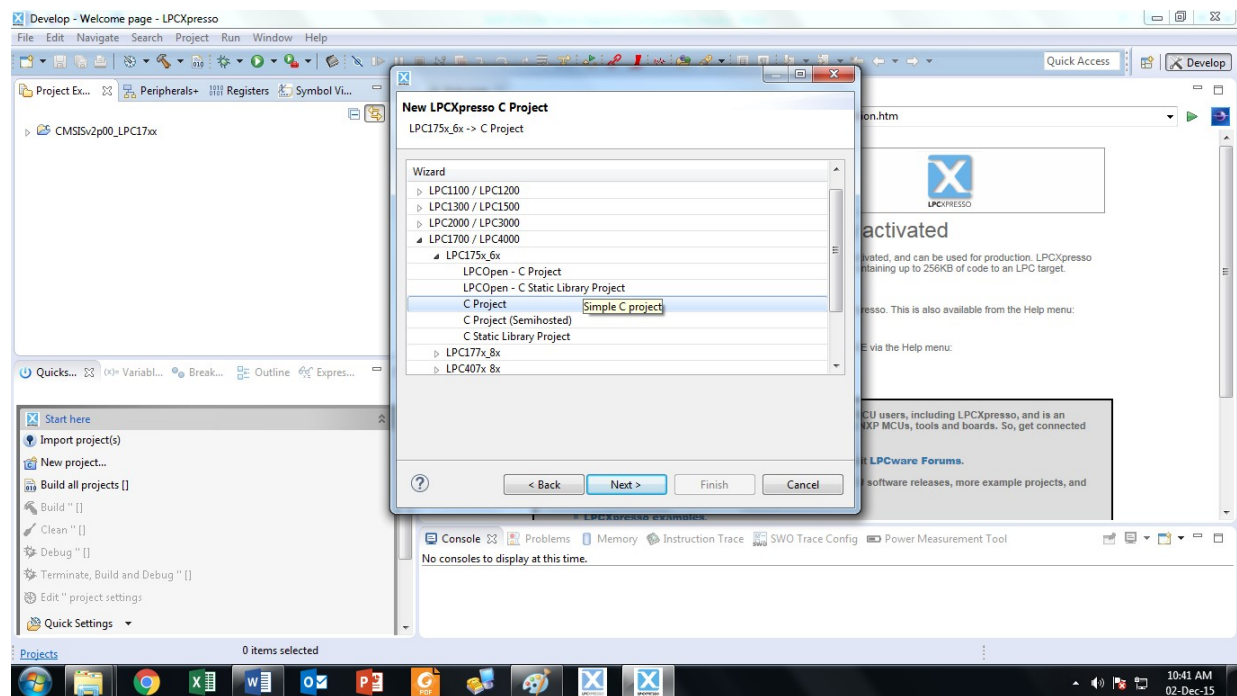


Figure 5

**Step 9:** Now select CMSIS Core library. Click on Next and keep all the other configurations as default and Finish.

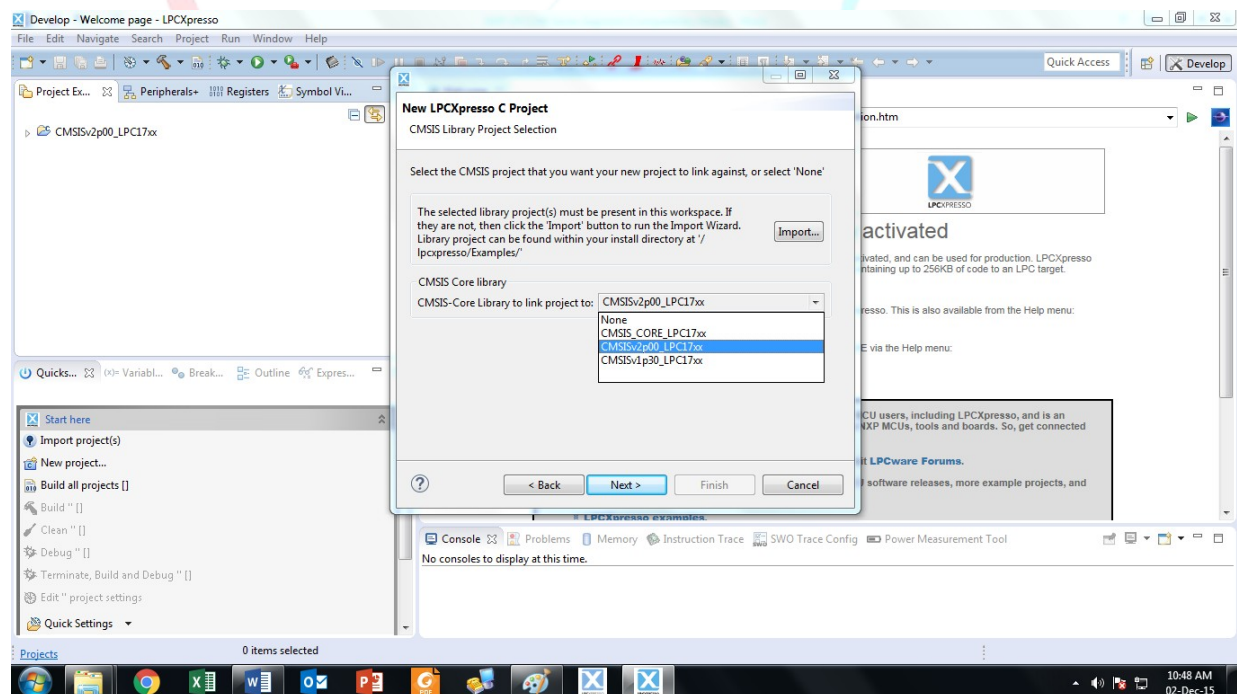


Figure 9

**Step 10:** Now we can see our project onto the workspace. Now by double clicking on Stepper\_Motor.c file, we can start writing code.

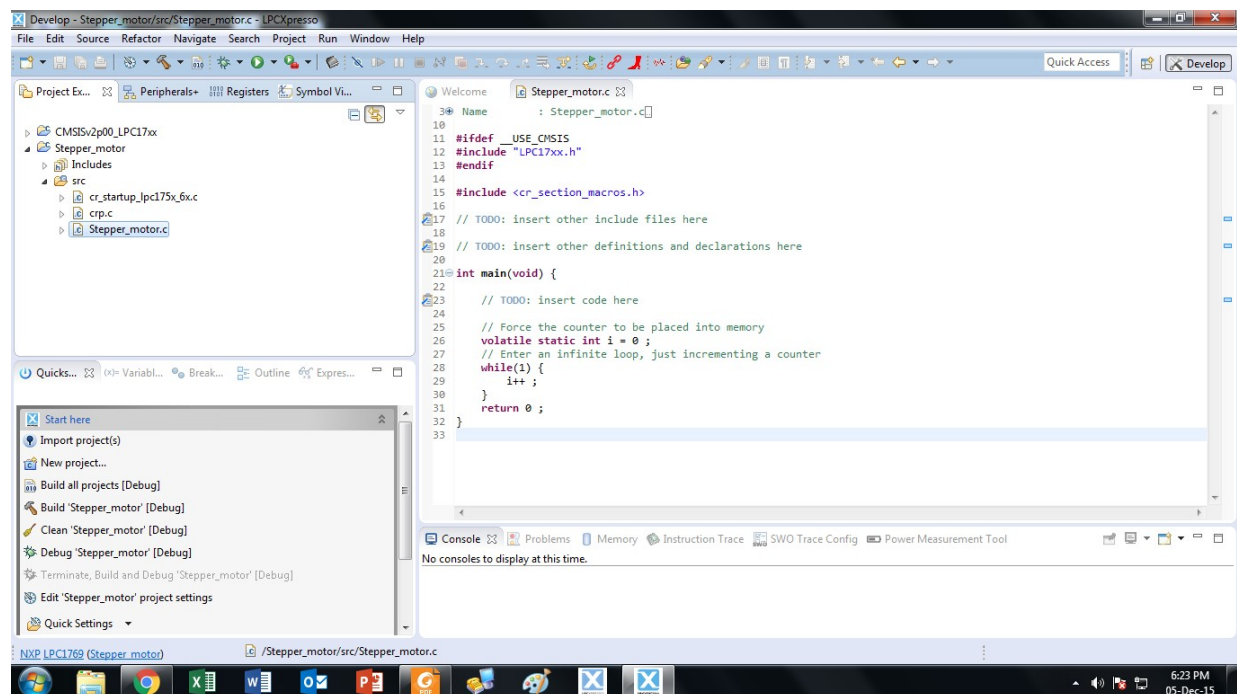


Figure 10

**Step 11:** Write a code as shown below.

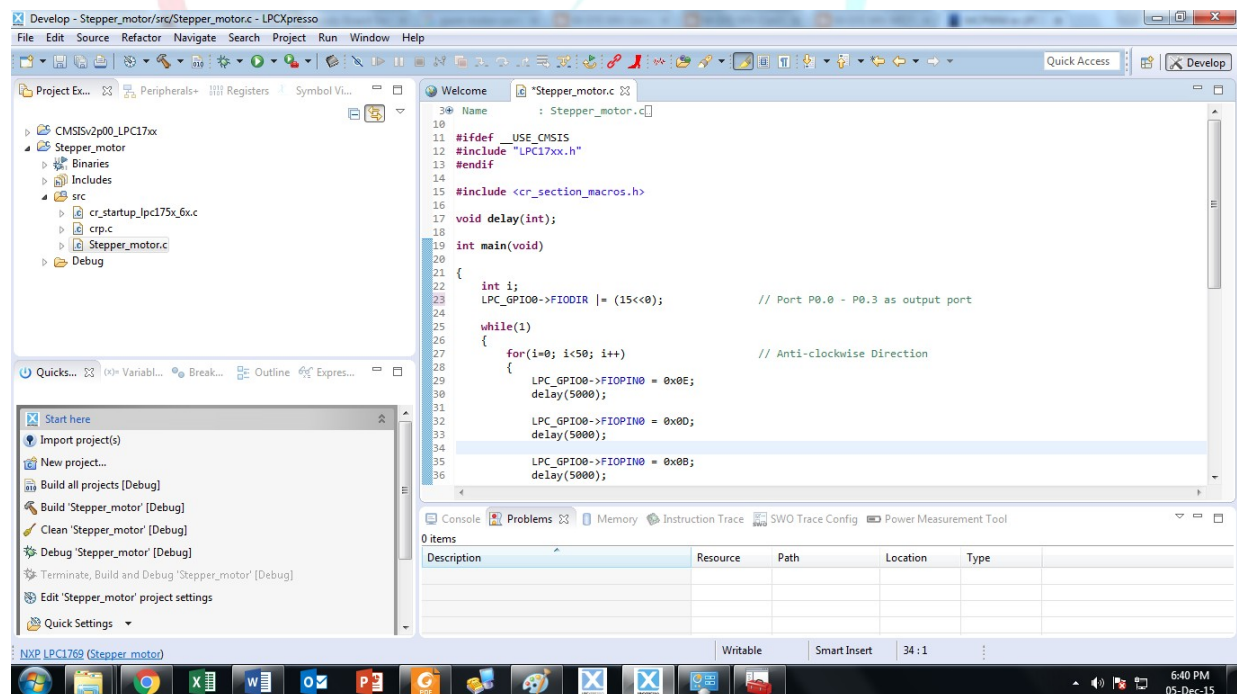


Figure 11

## CODE:

```
#ifndef __USE_CMSIS
#include "LPC17xx.h"
#endif

void delay(int);
int main(void)
{
    int i;
    LPC_GPIO0->FIODIR0 = 0x0F;    // Port P0.0 - P0.3 as output port
    while(1)
    {
        for(i=0; i<50; i++)        // Anti-clockwise Direction
        {
            LPC_GPIO0->FIOPIN0 = 0x0E;
            delay(5000);

            LPC_GPIO0->FIOPIN0 = 0x0D;
            delay(5000);

            LPC_GPIO0->FIOPIN0 = 0x0B;
            delay(5000);

            LPC_GPIO0->FIOPIN0 = 0x07;
            delay(5000);
        }
        for(i=0; i<50; i++)        // Clockwise Direction
        {
            LPC_GPIO0->FIOPIN0 = 0x07;
            delay(5000);

            LPC_GPIO0->FIOPIN0 = 0x0B;
            delay(5000);

            LPC_GPIO0->FIOPIN0 = 0x0D;
            delay(5000);

            LPC_GPIO0->FIOPIN0 = 0x0E;
            delay(5000);
        }
    }
}

void delay(int a)
{
    int i,j;
    for(i=0; i<100; i++)
        for(j=0; j<a; j++);
}
```



**Step 12:** After writing code, Build the project by clicking on Build Stepper\_motor on the Quickstart Panel on the bottom left of the window.

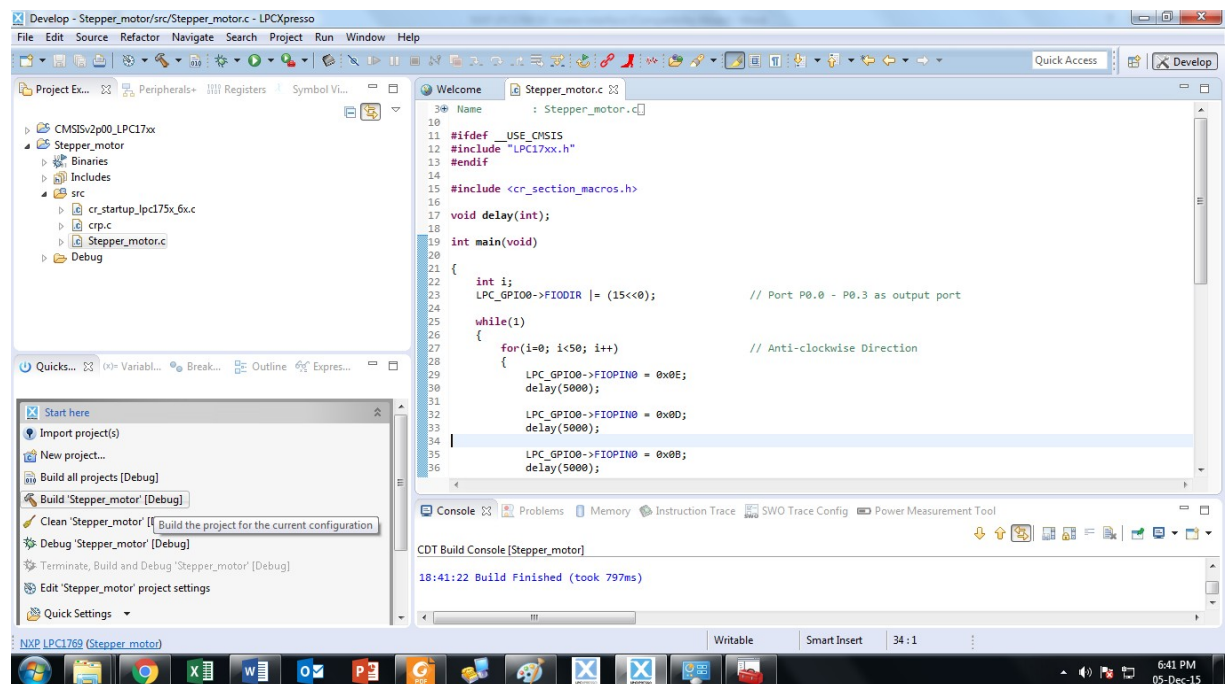


Figure 12

**Step 13:** Now, if all goes well connect the Micro B cable to LPC1769 and connect it to your computer. To upload the project file, click on the Program flash.

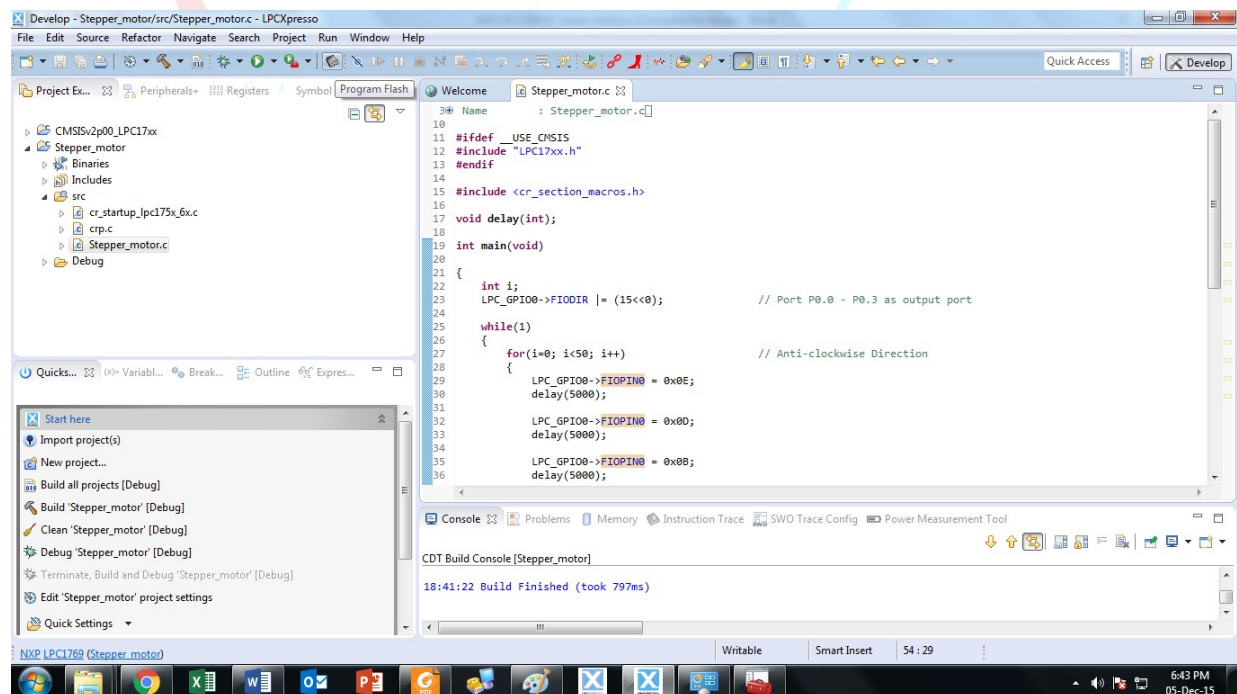


Figure 13

**Step 14:** Now select the Project file Stepper\_motor.axf. We can find it in our project folder.

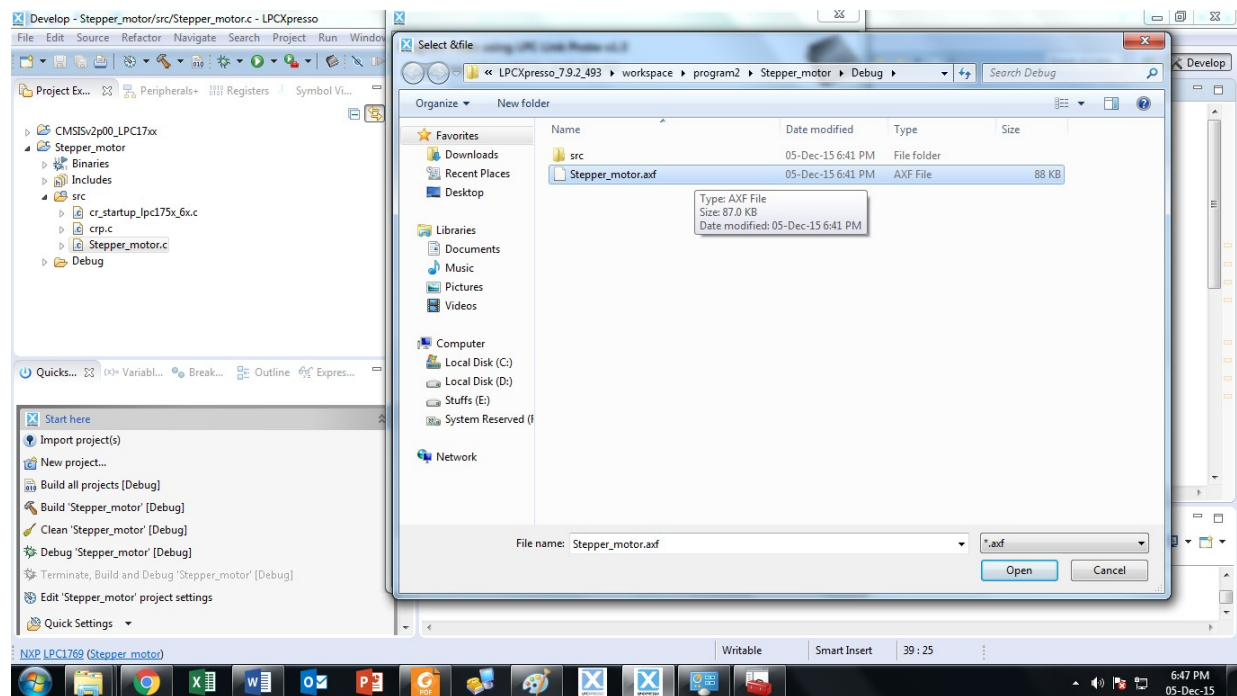


Figure 14

**Step 15:** Now this window shows we have finally dumped our project onto LPC1769.

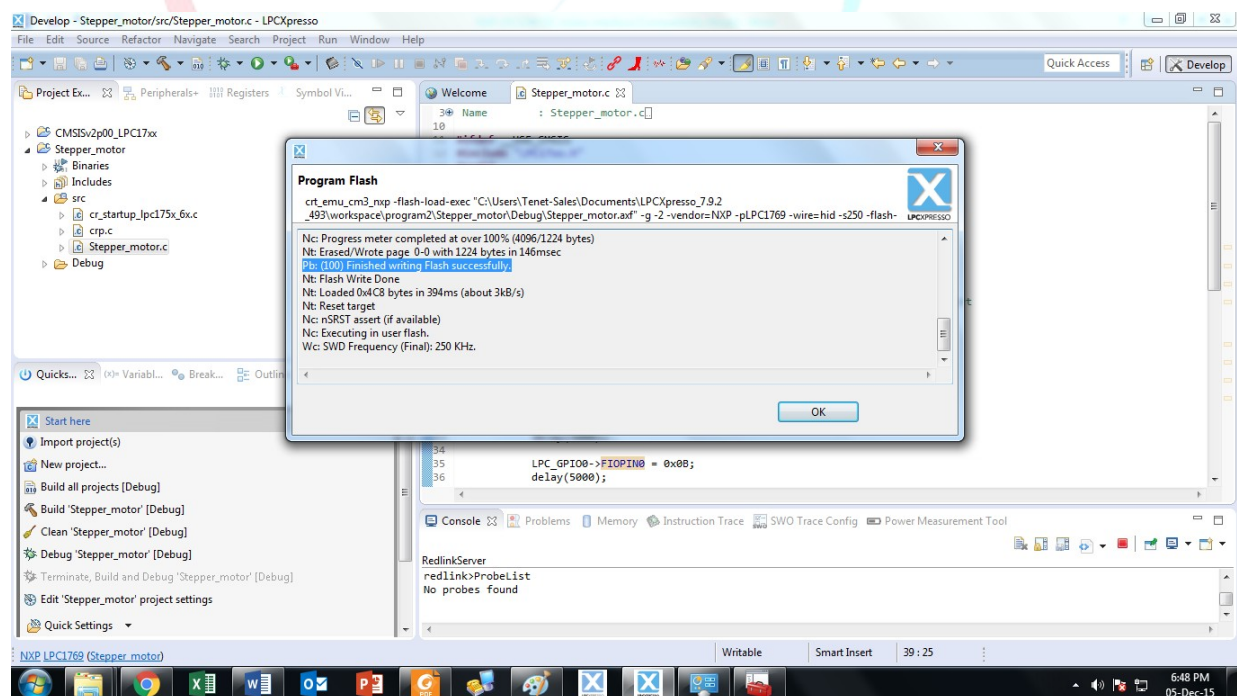


Figure 15

## CIRCUIT EXPLANATION:

### Interface Stepper motor using ULN2803 motor driver

#### Hardware:

- LPC1769 Board
- Stepper motor
- ULN2803 motor driver
- breadboard
- hook-up wire

#### ULN2803 motor driver IC:

The ULN2803 motor driver is a high-voltage, high-current darlington drivers comprised of eight NPN darlington pairs. All units feature integral clamp diodes for switching inductive loads.

As you can see, ULN2803 motor driver has eight input pins and eight output pins. As we are using stepper motor which has four pins, we need only four input and output pins of ULN2803.

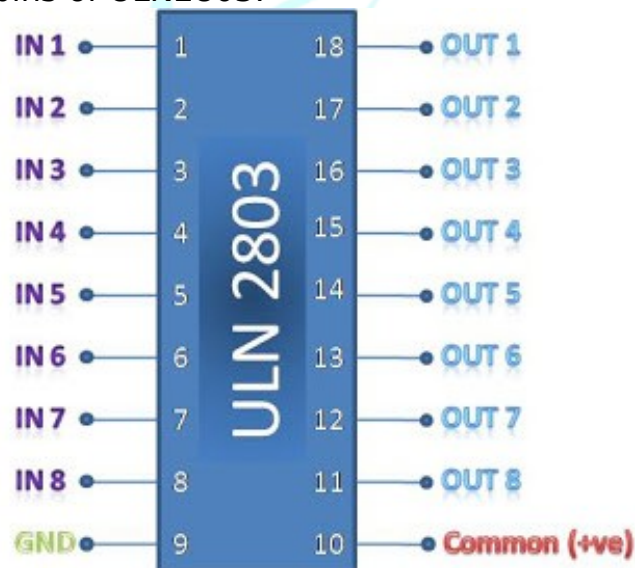


Figure 16

#### Stepper motor:

Stepper motors consist of a permanent magnetic rotating shaft, called the rotor, and electromagnets on the stationary portion that surrounds the motor, called the stator. Figure 17 illustrates one complete rotation of a stepper motor. At position 17, we can see that the rotor is beginning at the upper electromagnet, which is currently active (has voltage applied to it). To move the rotor clockwise (CW), the upper electromagnet is deactivated and the right electromagnet is activated, causing the rotor to move 90 degrees CW, aligning itself with the active magnet. This process is repeated in the

same manner at the south and west electromagnets until we once again reach the starting position.

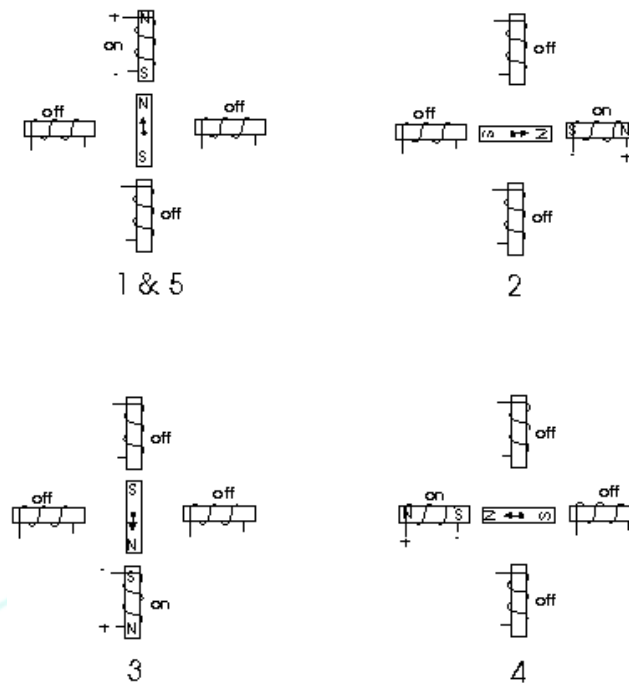


Figure 16

## CONNECTION DIAGRAM:

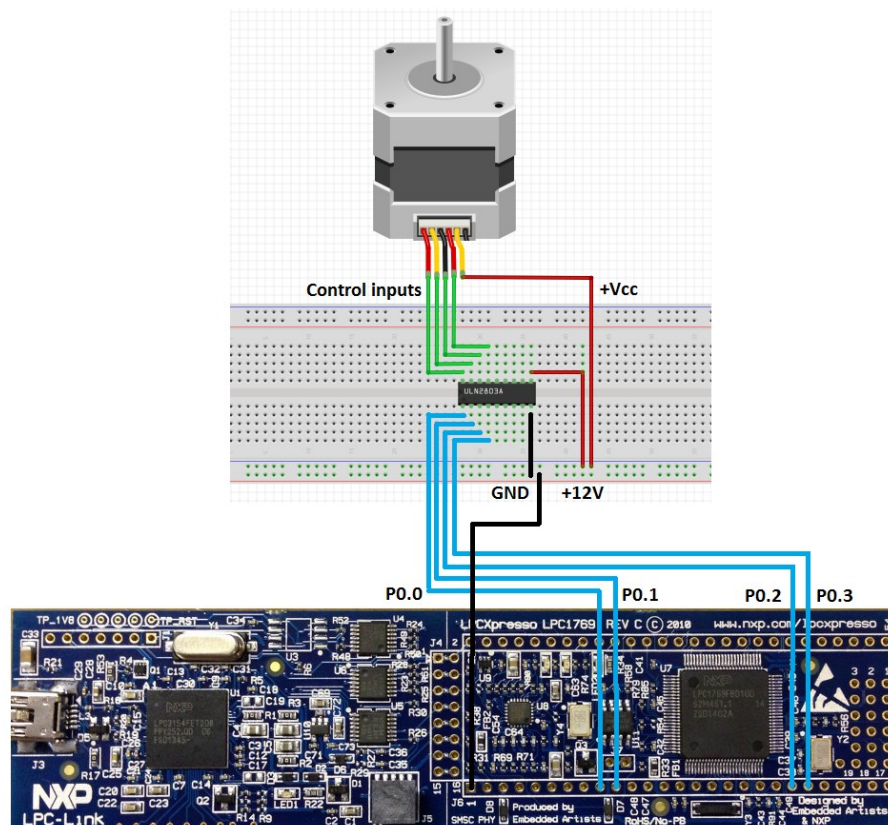


Figure 17



### TRUTH TABLE:

Steps	P0.3	P0.2	P0.1	P0.0	Hex value
1	1	1	1	0	0x0E
2	1	1	0	1	0x0D
3	1	0	1	1	0x0B
4	0	1	1	1	0x07

### OUTPUT:

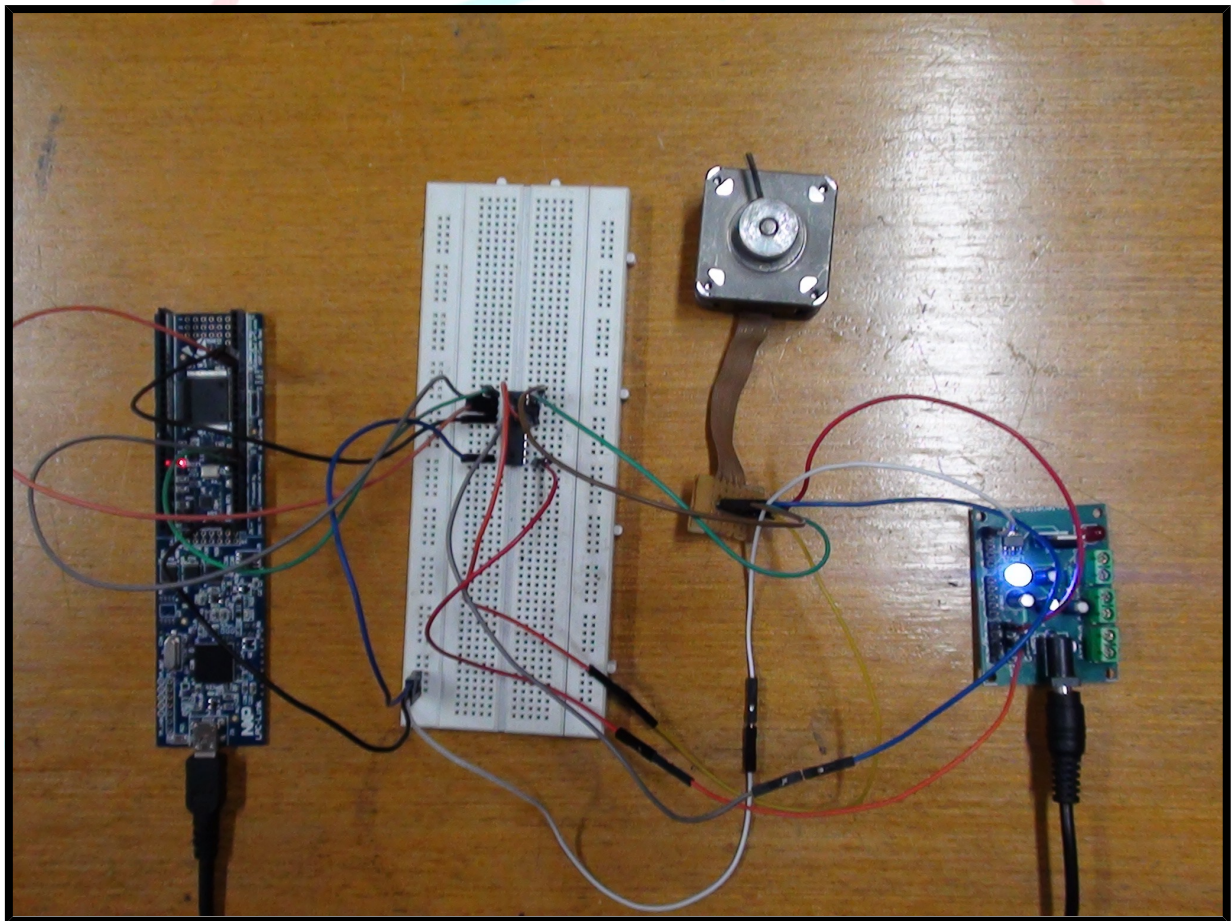


Figure 18

**For product link:**

1. <http://www.tenettech.com/product/1548/lpc1769-lpcxpresso-board>
2. <http://tenettech.com/product/6655/universal-gpio-board>
3. <http://www.tenettech.com/product/2846/power-supply-breakout>

**For more information please visit: [www.tenettech.com](http://www.tenettech.com)**

**For technical query please send an e-mail: [info@tenettech.com](mailto:info@tenettech.com)**

