KARNATAK LAW SOCIETY'S

GOGTE INSTITUTE OF TECHNOLOGY

UDYAMBAG, BELAGAVI-590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

Course Activity Report on

Projector Screen Controlling using LPC2148

Submitted in the partial fulfillment for the academic requirement of

4th Semester B.E. In

Microcontroller

Electronics and Communication Engineering

Submitted by

NAME	USN
Almas Kalal	2GI20EC019
Amey Kurade	2GI20EC020
Anusha Naik	2GI20EC024
Kartik Gadad	2GI20EC053

Guided By

Prof. Suresh Kuri

2021-2022

KARNATAK LAW SOCIETY'S

GOGTE INSTITUTE OF TECHNOLOGY

UDYAMBAG, BELAGAVI-590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

Department of Electronics and Communication Engineering

CERTIFICATE

This is to certify that, **Almas Kalal**, **Amey Kurade**, **Anusha Naik**, **Kartik Gadad** of 4th semester have satisfactorily completed the course activity (Seminar/Project) entitled Projector Screen Controlling using LPC2148 in Microcontroller (Course code: 18EC42). It can be considered as a bonafide work carried out in partial fulfillment for the academic requirement of 4th Semester B.E. (Electronics and Communication Engineering) prescribed by KLS Gogte Institute of Technology, Belagavi during the academic year 20212022.

The report has been approved as it satisfies the academic requirements in respect of Assignment (Course activity) prescribed for the said Degree.

Signature of the Faculty Member

Signature of the HOD

Date:

Abstract

In embedded system design managing connectivity among various bus interfaces and attaching multiple devices with different interfacing protocol to main processor is one of the challenging tasks. This report presents a platform which deals with implementation of certain of the above protocols presented by low power 32-bit ARM RISC processor- LPC2148. This platform is also useful for students to work with different system protocols which helps us in interfacing of sensors, speed controlling, memory ICs and so on. In this report we will see how the projector screen is controlled by use of LPC2148 using DC motors. Here we will deal with different protocols, interfaces of MCU board.

INDEX

CHAPTERS

Chapter Name	Page No.
1. Introduction	5
2. Problem Analysis and Block diagram	6
3. Implementation	7
4. Result analysis	11
5. Outcomes	12
6. Conclusion	13
References	14
Appendix: Program code	15

1. INTRODUCTION

LPC2148 is widely used microcontroller for different purposes like interfacing LCD, controlling speed of stepper motors, dc motors and so many due to which it has applications in mobile systems, wireless routers, automobiles embedded ARM7 cores, satellite radio receivers. Here we are working on up and down motion of the projector screen by controlling speed of motor using LPC2148. It will bring down the projector screen down as soon as projector is powered. Which will reduce manual work. Here we have explained the block diagram, implementation using Keil, program code for controlling speed of motors, schematic using Proteus.

2. PROBLEM ANALYSIS AND BLOCK DIAGRAM

Since we use the projector in our day today life widely we can reduce the manual work and saving time by controlling the motion of projector screen using LPC2148. Here we CAN control clockwise and anticlockwise motion of DC motor which will control up and down motion of screen. Using Keil software for writing the embedded C- program for speed control of DC motor and implemented using LPC2148 we can control the projector screen. It will help to understand the different interfaces of LPC2148 and connectivity, how to implement it on the board and we will learn more about embedded C-programming. It will reduce the manual work and screen will be controlled by DC motor. We are using LPC2148 MCU board, two DC motors, L293D motor driver. Using these components we will control projector screen.

2.1 Problem Statement - Controlling up and down motion of projector screen using LPC2148 by controlling speed of DC motor.

2.2 Block Diagram-

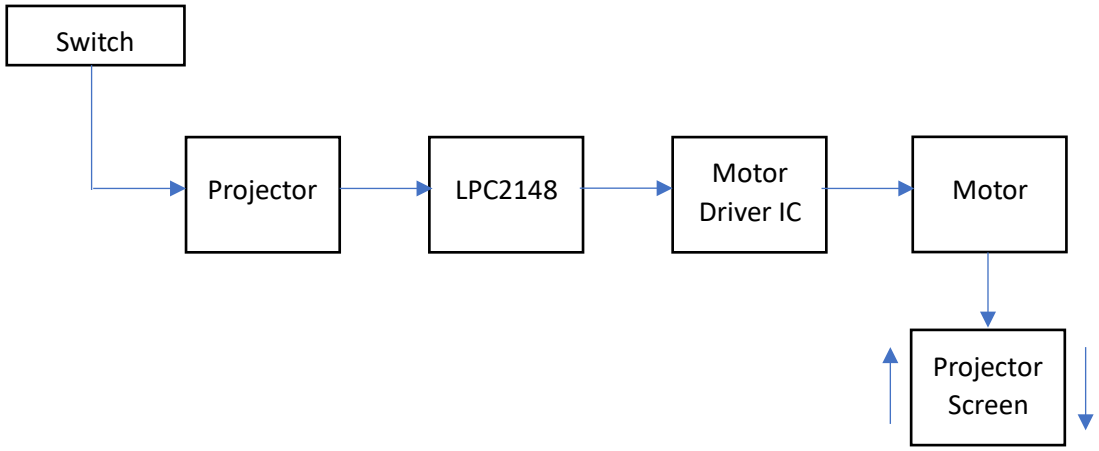

Fig 2.2.1 Block Diagram for Controlling up and down motion of Projector Screen

From the block diagram we can see that projector is connected to power supply and at other end is connected to LPC2148 via USB connector. As soon as the projector is power on the LPC2148 gets powered on which is then connected to motor driver IC i.e. L293D. Since output current of microcontroller pin is 15mA at 3.3V and power required is out of reach of microcontroller motor driver IC is used. Using this motor driver IC we can drive 2 DC motors at a time. These two DC motors then will control the motion of the projector screen.

3. IMPLEMENTATION

The aim of this project is to implement ARM7 based motor controller which then controls motion of projector screen. The overview of this project is described as. The complete overview of architecture is as below. Here we have to use LPC2148, driver motor IC.

3.1 COMPONENTS REQUIRED-

1. LPC2148 ARM7 MCU Board

2. L293D – Motor Driver IC

3. DC Motor

4. Projector

3.2 ARCHITECTURE OF IMPLEMENTED SYSTEM-

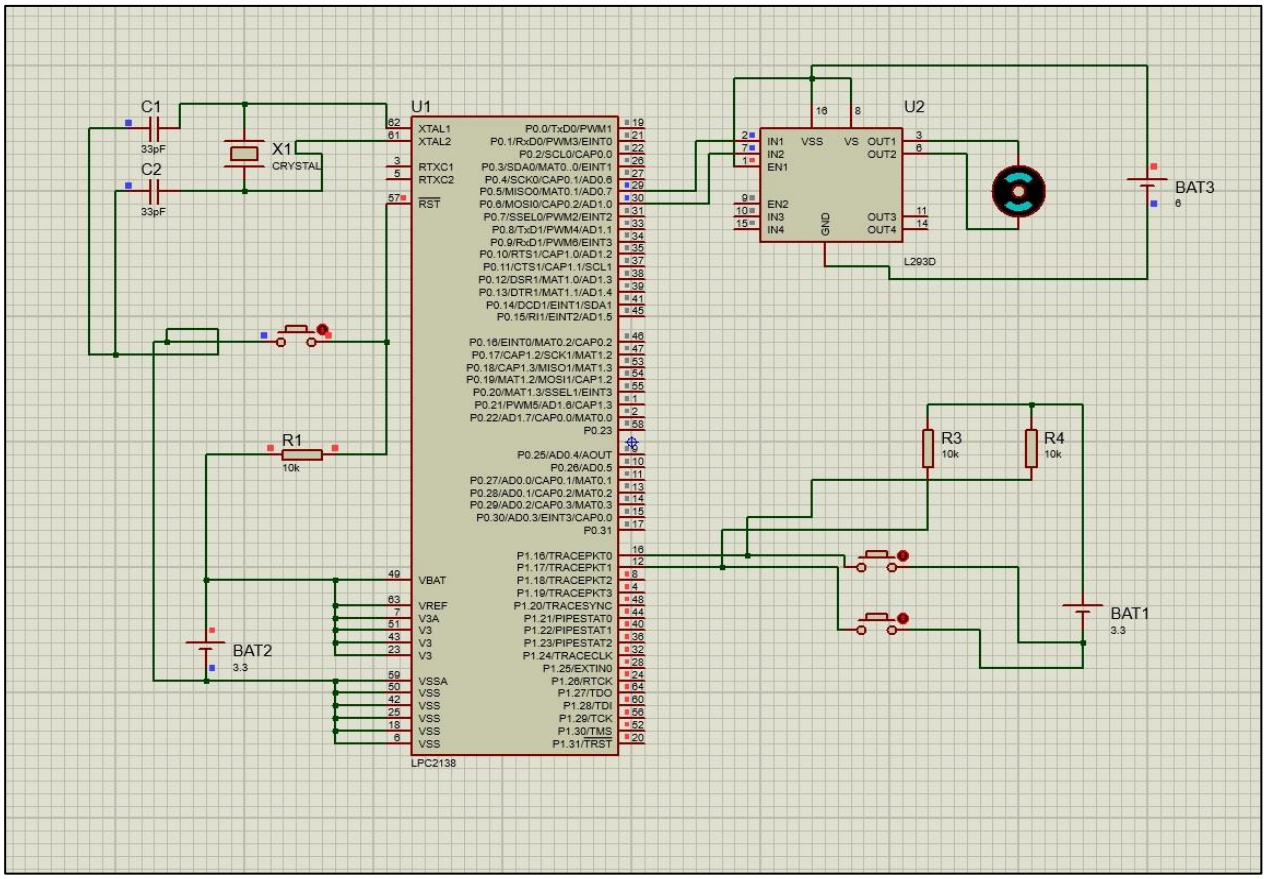

fig 3.2.1 Architecture of Implemented System

3.3 DESCRIPTION-

DC Motor Driver IC Pin Connection-

Motor Direction	LPC2148 Port No.
DCMO0-CLK	P0.5=1 and P0.6=0
DCM1-ACLK	P0.5=0 and P0.6=1

Table 3.1 DC Motor Driver IC Pin Connection

LPC2148 PINS-

P0.5➐ 29th Pin

P0.6➐ 30th Pin

Keypad Connection in LPC for Switch Interface-

User Defined Keys	S1(KY1)	S2(KY2)	S3(KY3)
LPC2148 Pin No.	16	12	8
LPC2148 Port No.	P1.16	P1.17	P1.18

Table 3.2 Keypad Connection in LPC for Switch Interface-

3.4 DESCRIPTION OF COMPONENT-

3.4.1 LPC 2148-

LPC2148 microcontroller board based on a 16-bit/32-bit ARM7 TDMI-S CPU with realtime emulation and embedded trace support, that combine microcontrollers with embedded highspeed flash memory ranging from 32 kB to 512 kB. A 128-bitwide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30% with minimal performance penalty. The meaning of LPC is Low Power Low Cost microcontroller. This is 32 bit microcontroller manufactured by Philips semiconductors (NXP). Due to their tiny size and low power consumption, LPC2148 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Individual enable/disable of peripheral functions as well as peripheral clock scaling for additional power optimization.

3.4.2 MOTOR DRIVER CIRCUIT

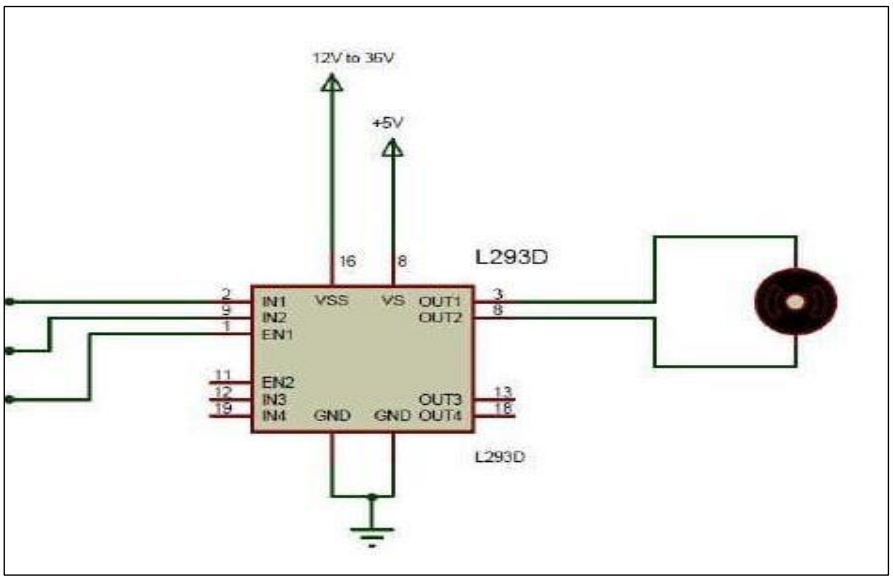

fig 3.2 L293D Motor Driver IC

Dc motor driver uses L293D push-pull four channel driver with diodes to control high rating dc motor using TTL-compatible logic input. L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

Above fig 3.2 represents pin diagram of L293D.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

Features of L293D-

1. Wide supply voltage range – 4.5 to 36V.
2. Separate input logic supply.
3. Thermal Shutdown.
4. Output current 1A per channel (600mA for L293).
5. Peak output current 2A per channel.

4. RESULT ANALYSIS

Signals from LPC2148 is given to DC motor driver IC L293D which controls 5v to 12v dc from LPC2148. It will control forward and reverse motion of the motor according to the input from LPC2148 and then it will control projector screen's up and down motion.

Firstly when projector is powered on the motor will move in clockwise direction, where the signal is given from LPC to Motor Driver IC i.e L293D. It will bring the projector screen downwards as soon as the projector is powered on.

After that motor will remain in off condition until projector is on. Then when the projector is turned off there will signal from the LPC2148 which will make motor to run in reverse direction which then takes projector screen upward.

5. OUTCOMES

Sl. No.	Project Outcomes	Bloom's Level
1	Understanding the problem statement and learning about the board.	L2
2	Apply the knowledge of computer organization to identify the features for development of ARM microprocessor.	L3
3	Build a small application using LPC2148 to understand the functioning and programming of GPIO's.	L3
4	Use of different interfaces of LPC2148 and writing embedded C program to demonstrate functionality.	L4
5	Develop the C program for given problem statement and comparing the code optimization through study.	L4
6	Result analysis and Conclusion.	L4
7	Designing of embedded c implemented projects with available resources.	L6

6. CONCLUSION

This project deals with the design and analysis of speed control of DC motor or induction motor which in turn controls motion of projector screen. An analysis of the speed of controlling of the speed of DC motor is established by equivalent model circuit. The project has been successfully completed with the main aim of controlling motion of projector screen by means of speed of induction motor using ARM microcontroller i.e. LPC2148. The project has been designed using Proteus, Keil software for ARM microcontroller. The implementation of project is easy and understandable. This is user friendly project.

REFERENCES

[1] UM10139 LPC214x User manual

[2] https://www-edaboard-com.cdn.ampproject.org/v/s/www.edaboard.com/threads/dc-motorinterfacing-to-arm-lpc2148-for-speed-control

[3] https://www.electronicshub.org/dc-motor-control-using-arm7-lpc2148/#Circuit_Design

PROGRAM CODE

Embedded C Program for DC Motor Interfacing using LPC21487.

```
#include<lpc214x.h
> unsigned int i=0;
int main() {
        IO1DIR &=(0<<16)&(0<<17)&(0<<18);  //Declaring Port Pins P1.16,P1.18,P1.17 as
                                                input
        IO0DIR|=(1<<5)|(1<<6); //Declaring Port Pins P0.5 and P0.6 as Output

        while(1)
        {
                //Clockwise Rotation of DC Motor
                if(!(IO1PIN & (1<<16)))
                {
                        IO0SET=0x00000040;
for(i=0;i<5760000;i++);
                        IO0CLR=0x00000040;
                }
                //if(!(IO1PIN & (1<<18)))
                //{
                //      IO0PIN=0x00000060;
                //}
                //Anticlockwise Rotation of DC Motor
if(!(IO1PIN & (1<<17)))
                {
                        IO0SET=0x00000020;
for(i=0;i<5760000;i++);
                        IO0CLR=0x00000020;
                }
        }
}
```