MICROCONTROLLER BASED

DIGITAL TACHOMETER

BY

SHARVIL PANANDIKAR

DISHANT MEHTA

RICHARD NORONHA

AJINKYA PADWAD

In partial fulfillment for the award of the degree

Of

Bachelors of Engineering(B.E)

IN

ELECTRONICS ENGINEERING

UNDER THE GUIDANCE OF

MR. ABHIJIT SHETE

AFFILIATED TO

VIVEKANAND EDUCATION SOCIETY'S
INSTITUTE OF TECHNOLOGY
CHEMBUR, MUMBAI-400071

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VIVEKANAND EDUCATION SOCIETY'S
INSTITUTE OF TECHNOLOGY
CHEMBUR, MUMBAI-400071

CERTIFICATE OF APPROVAL

Project titled " *DIGITAL TACHOMETER* "

Submitted by Sharvil Panandikar, Dishant Mehta,

Richard Noronha and Ajinkya Padwad

is approved for the degree of Engineering.

_____ _____

Guide
Mr. Abhijit Shete

Examiner

_____ _____

Head of the Department

Principal
Mrs. J. M. Nair

CERTIFICATE

This is to certify that the project entitled **"*DIGITAL TACHOMETER*"**

is the bonafide work carried out by Sharvil Panandikar, Dishant Mehta, Richard Noronha and Ajinkya Padwad, students of degree in Electronics department ,Mumbai University (MU), during the year 2014-2015, in partial fulfillment of the requirements for the award of the degree in Electronics department and that the project has not formed the basis for the award previously of any degree, diploma, associate ship, fellowship or any other similar title.

_____

Signature of the Guide

Place:

Date:

Department of Electronics Engineering

V. E. S. I . T. , Mumbai-400071

PREAMBLE

This project report is being presented for the project work carried out on the topic ' Digital Tachometer '.

It will give a brief information about the project aim, various components used in the project, working principle along with the circuit diagram and desired output of the project.

Also mentioned in projects are the problems faced while preparing the project, different references used and future scope of the project.

CONTENTS

INTRODUCTION

Many domestic and industrial applications require frequency and RPM measurement. The most obvious method of measuring frequency is using CRO (or now- a-days using DSO). But this instrument is not handheld nor available with all the students or hobbyists at any time. It is actually laboratory instrument and not a portable one. Also it is costlier. A conventional CRO does not give the direct frequency value read out. One has to first set the waveform then find time/division and finely calculate time period and frequency. So it's a long process that takes time.

Another way is to use frequency counters that give us direct digital readout of frequency.

Revolutions Per Minute counter also finds its importance in so many industries as it measures current RPM of any motor. Measuring current RPM of the motor and based on that take decision like to increase RPM or decrease it, is the prime requirement. In certain application it is required to maintain the RPM of motor within desirable limits.

So the RPM and frequency can be continuously measured and taken as feedback.

LITERATURE REVIEW

With the conventional techniques employed for frequency and RPM measurements have several limitations and are tedious, developing a portable device for the measurement of the above parameters is of utmost importance.

The continuously measured frequency and RPM is conveniently observed on a digital display and feedback is obtained for further use.

This circuit can alternatively measures frequency or RPM using a switch. If switch is connected to

- direct signal input - it measures frequency
- Sensor (opto-interrupt) output – it measures RPM.

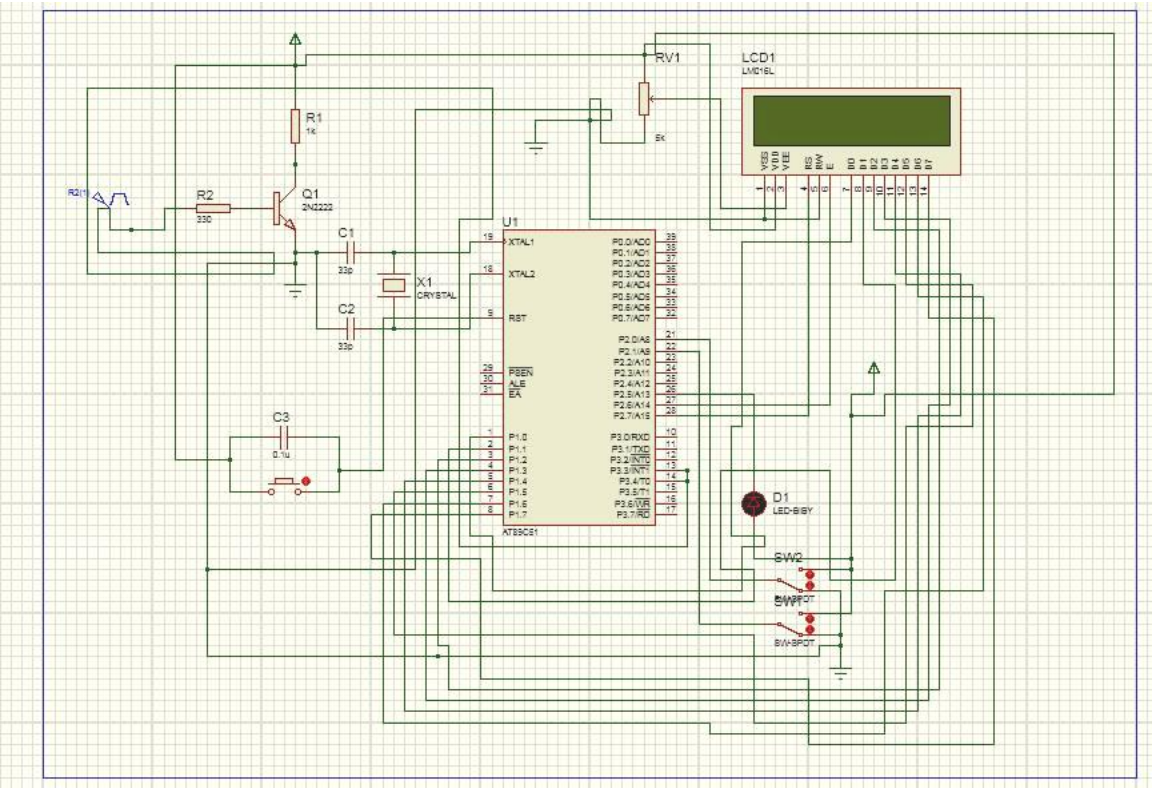
Also it measures either frequency or RPM only once or in continuous loop after every 5 second.

Some other features of this circuit-

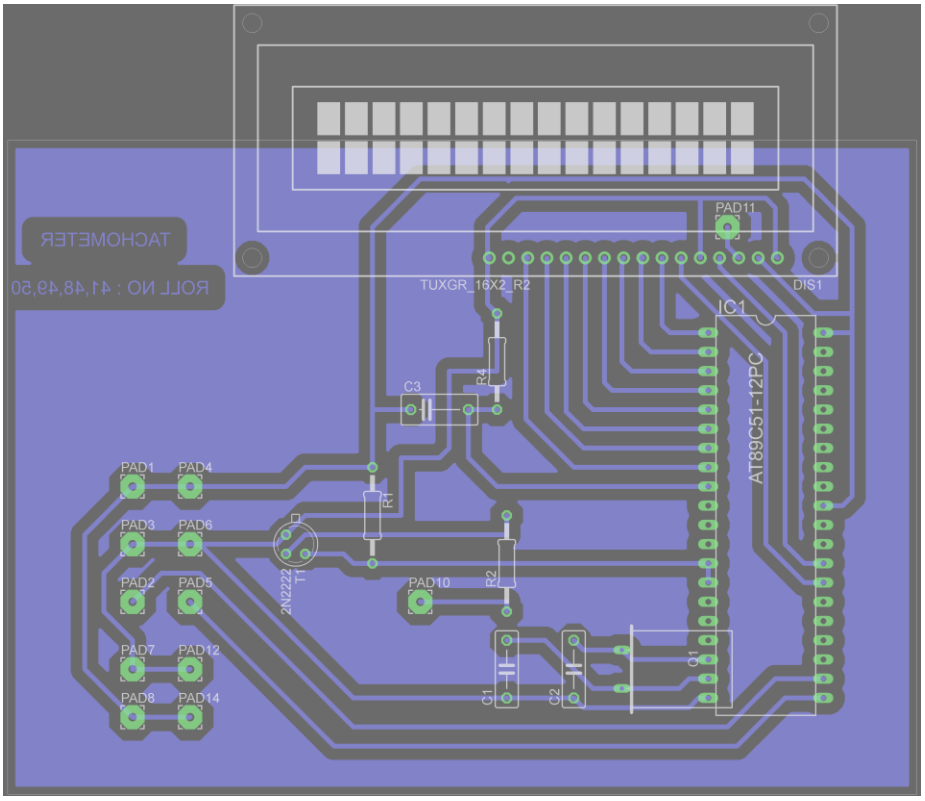
- measures frequency from 50 Hz to 65 KHz
- measures RPM from 5 to 9999
- uses non contact type RPM sensor
- digital output with text on 16x2 LCD
- option for continuous measurement

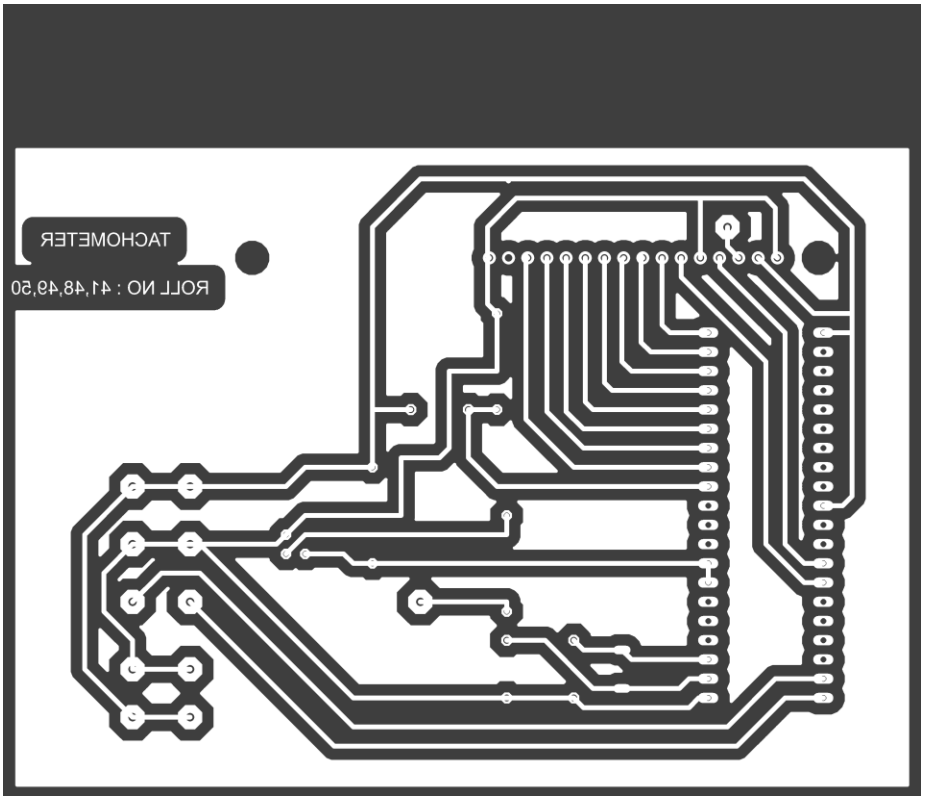
CIRCUIT DIAGRAMS

SCHEMATIC

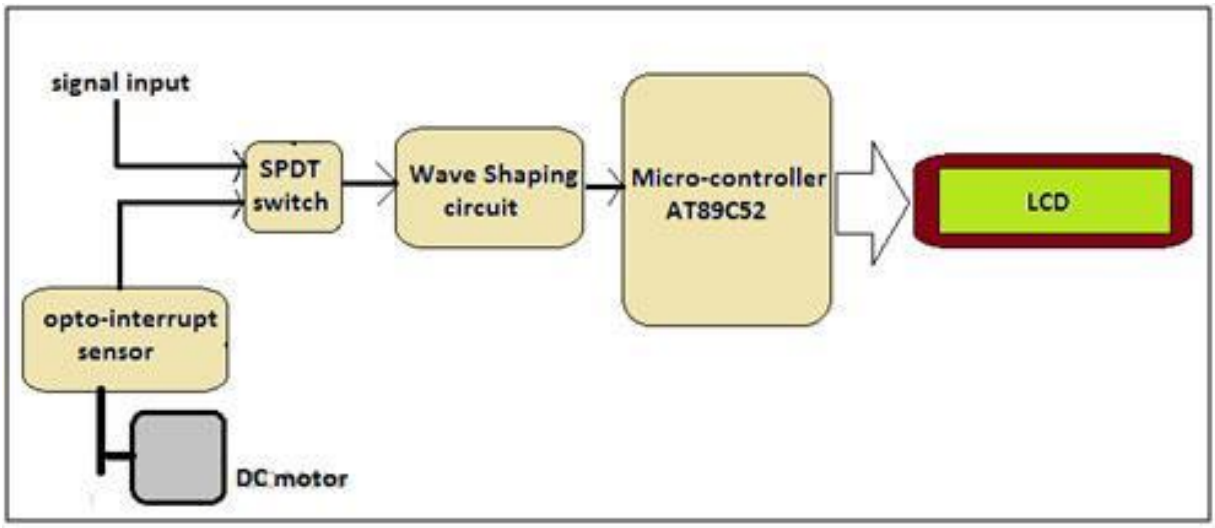


PCB LAYOUTS


TACHOMETER
ROLL NO : 41,48,49,50
PAD11
TUXGR_16X2_R2
DIS1
IC1
AT89C51-12PC
C3
R4
PAD1
PAD4
PAD3
PAD6
PAD2
PAD5
R1
2N2222
T1
PAD10
R2
PAD7
PAD12
PAD8
PAD14
C1
C2
C4


TACHOMETER
ROLL NO : 41,48,49,50

WORKING



The major building blocks are wave shaping circuit, sensor, micro controller and LCD

Wave shaping circuit: - It converts any input signal to pulses (unipolar square or rectangular) wave. Its output is between 0 to 5 V. So actually it converts the input signal shape into the type of shape that can be recognized by micro controller.

Opto-interrupt sensor: - it converts each revolution of motor into a pulse. So we shall directly get the results as number of revolutions = number of pulses.

Micro controller: - it counts number of pulses (either from sensor or a direct signal) per fixed time (1 sec or 10 sec) and calculates frequency or RPM and displays them on LCD

LCD: - it is used to display text messages as well as the read outs of either frequency or RPM

Along with all these there are two SPDT switch inputs that selects frequency or RPM counter and decides to take single measurement or continuous in loop.

CONCLUSION

For the frequency and RPM measurements, a conventional CRO does not give the direct frequency value read out. One has to first set the waveform then find time/division and finally calculate time period and frequency. So it's a long process that takes time. This project is a great alternate for the conventional devices.
With the facility to switch between frequency or RPM measurement and whether to carry out the measurement in single take or continuous readings, this project is an easy to implement form of Tachometer.

Further, the compact size of the circuit enables convenient portability.

The output is displayed on an LCD display unit that shows informative text as well; the observations can be noted with ease and used further use.