MINI PROJECT REPORT
IV SEMESTER
DISTANCE COUNTER CIRCUIT (PEDOMETER)

SUBMITTED BY

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ABSTRACT

Increased physical activity is related to associate degree improvement in several health conditions, as well as cardiopathy, cardiovascular disease, internal secretion sensitivity, pathology and fatness. Self-monitoring and pursuit physical activity is a good strategy to initiate and maintain physical activity. a range of physical activity monitors, like pedometers, accelerometer-based activity monitors, radiocarpal joint devices and smartphone apps are obtainable to be used by people inquisitive about fitness, health and weight management. this text provides basic mechanisms and functions of pedometers and accelerometers. in addition, a listing of fashionable wearable devices and differing kinds of exercise and fitness smartphone apps for pursuit and promoting physical activity are enclosed.

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CHAPTER 01

INTRODUCTION

Distance activity of Associate in Nursing object ahead or by the facet of the moving entity is needed in sizable number of devices. These devices is also tiny or giant and may be quite easy or sophisticated. Distance activity has necessary applications in automotive and industrial applications. the space activity through sensors is helpful in detection obstacles. it's the space activity feature that allowed to imagine regarding self-driving cars and robots. the space activity application is additionally employed in industries to see fuel levels in aircrafts and industrial transport vehicles .These uses numerous forms of sensors and systems.

Pedometer could be a device, that is worn by an individual on his belt and it measures the quantity of steps and therefore the distance walked by the person. it's typically utilized by folks that do measured exercise on a daily basis. The device counts the quantity of steps taken by the person and multiplies it by the common step length fed to allow the space walked by the person. within the gift project, we tend to are mensuration the quantity of steps the person takes. This needs to be befittingly increased by the stride length of the person to calculate the particular distance traveled by the person.

The design drawback is to style and fabricate a little mechanical measuring device which may a minimum of live 2 kilometers on a dial or counter. the dimensions of the measuring device is to be regarding 50×50×25 millimeter.

Assuming the common stride of an individual is zero.33 m, the measuring device should live regarding 6000steps more or less.

This can be achieved by employing a three digit counter which may live until 999 and a gear reduction of 1:10. therefore the measuring device are able to live 9990 steps that is quite the desired specification. A additional elaborate calculation of the measuring instrument are given later

CHAPTER 02

LITERATURE SURVEY

A measuring device could be a device, sometimes moveable and electronic or mechanical device, that counts every step an individual takes by detection the motion of the person's hands or hips. as a result of the space of every person's step varies, an off-the-cuff activity, performed by the user, is needed if presentation of the space coated in a very unit of length (such as in kilometers or miles) is desired, though' there are currently pedometers that use physics and software system to mechanically confirm however a personality's step varies. Distance traveled (by walking or the other means) are often measured directly by a GPS receiver.

Used originally by sports and shape enthusiasts, pedometers are currently changing into widespread as Associate in Nursing everyday exercise counter and rational motive. typically worn on the belt and unbroken on all day, it will record what number steps the user has walked that day, and therefore the kilometers or miles (distance = variety of steps × step length). Some pedometers also will mistakenly record movements aside from walking, like bending to tie one's shoes, or road bumps incurred whereas riding a vehicle, though' the foremost advanced devices record fewer of those 'false steps'. Step counters will provide encouragement to contend with oneself in obtaining match and losing weight. a complete of ten,000 steps per day, like eight kilometers (5.0 mi), is usually recommended by some to be the benchmark for an energetic way, though now is debated among consultants. Thirty minutes of moderate walking are like three,000-4,000 steps as determined by a measuring device.[1] Step counters are being integrated into Associate in Nursing increasing variety of moveable shopper electronic devices like music

players, smartphones, mobile phones and watches (called activity trackers)

The technology for a measuring device includes mechanical detector and software system to count steps. Early forms used a mechanical switch to sight steps alongside a straightforward counter. If one shakes these devices, one hears a lead ball sloppy back and forth, or a setup placing stops because it swings. these days advanced step counters have faith in MEMS mechanical phenomenon sensors and complex software system to sight steps. These MEMS sensors have either 1-, 2- or 3-axis detection of acceleration. the utilization of MEMS mechanical phenomenon sensors permits additional correct detection of steps and fewer false positives.

The software system technology accustomed interpret the output of the mechanical phenomenon detector and "make sense of correct steps" varies wide. the matter is combined by the actual fact that in trendy day-after-day life, such step-counters are expected to count accurately on locations wherever users oftentimes carry their devices (attached to the belt, shirt/pants pocket, hand bag, backpack). In recent years additional advanced approaches to live steps are created with the utilization of pc vision.

CHAPTER 03

PROPOSED METHODOLOGY

In this mechanism a setup oscillates because the person walks. These oscillations area unit counted by a counter and area unit accustomed realize the number of steps taken by the person. The setup is connected to a ratchet and click mechanism that prevents movement of the counter within the other way. this can be the mechanism employed in this project.

In this methodology a mercury switch is employed to count the number of steps. Mercury switch includes a little tube containing mercury (half-filled), and 2 wires soldered thereto, that read the mercury. within the horizontal position, each the leads area unit lordotic in mercury and thus the wires area unit short. But, on tilting the tube, the mercury slides sideway and also the affiliation between the 2 wires break. The tilting motion whereas walking is employed to notice logic zero and one. associate degree instance of wires going open tells America that a step has been taken. this will be electronically counted.

Electronic systems rely on the amendment in input from zero to 1 to count the number of steps. the number of steps is mechanically counted and increased by the common step length of the person. The person will input his step length into the device and also the output is typically browsed on a digital show|LCD|digital display|alphanumeric display} display. the majority trendy pedometers area unit electronic as they're additional rugged and simple to use.

CHAPTER 04

PROJECT DESCRIPTION

Circuit and working

Figure one shows a circuit diagram of the gap counter. The circuit is made around quad 2-input Schmitt trigger CD4093 (IC1), CMOS ripple carry binary counter/divider CD4024 (IC2), decade counter/divider CD4026 (IC3 and IC4), 2 transistors BC327 (T1, T2) and a few different elements.
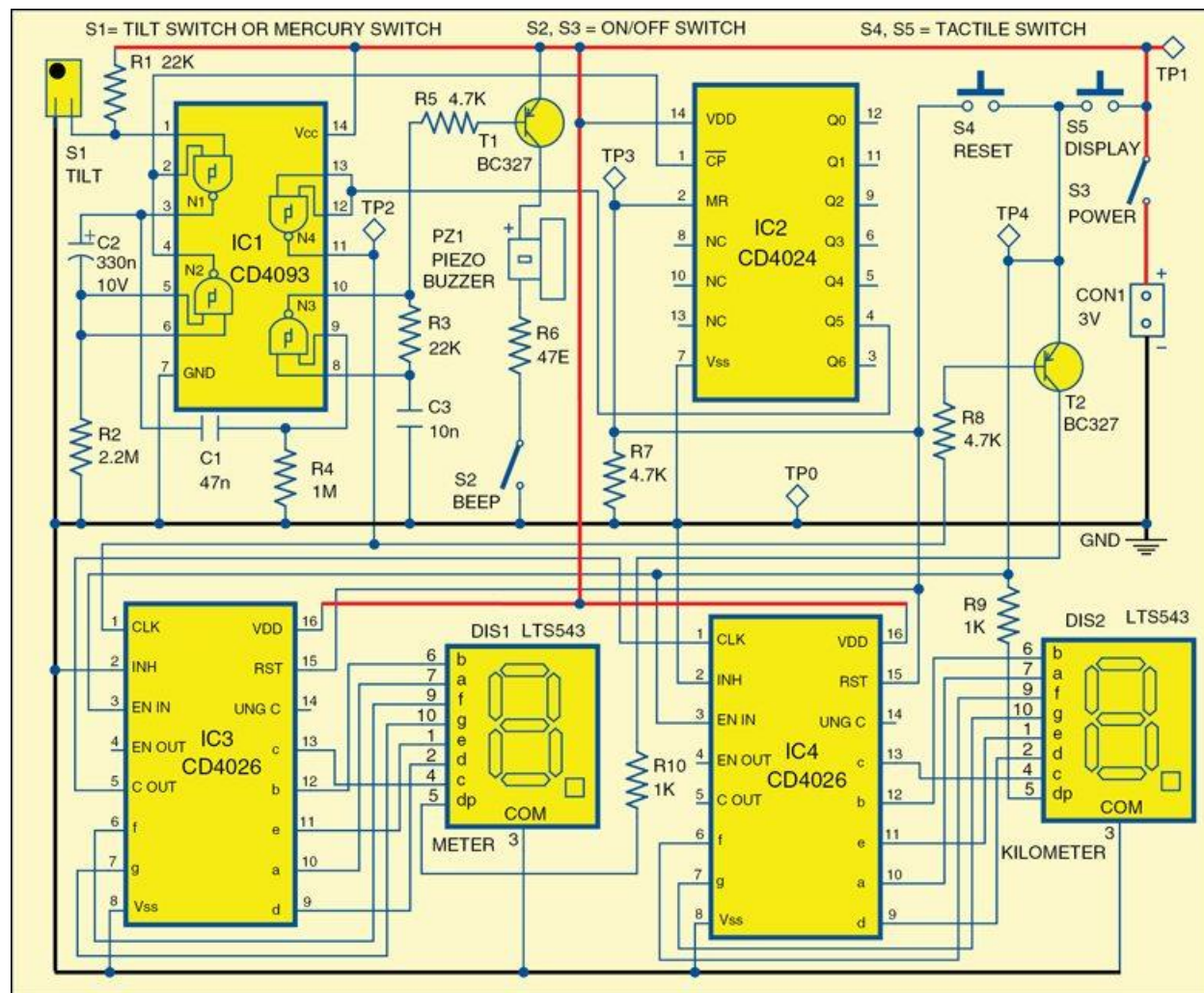
Fig. 4.1: Circuit diagram of the distance counter
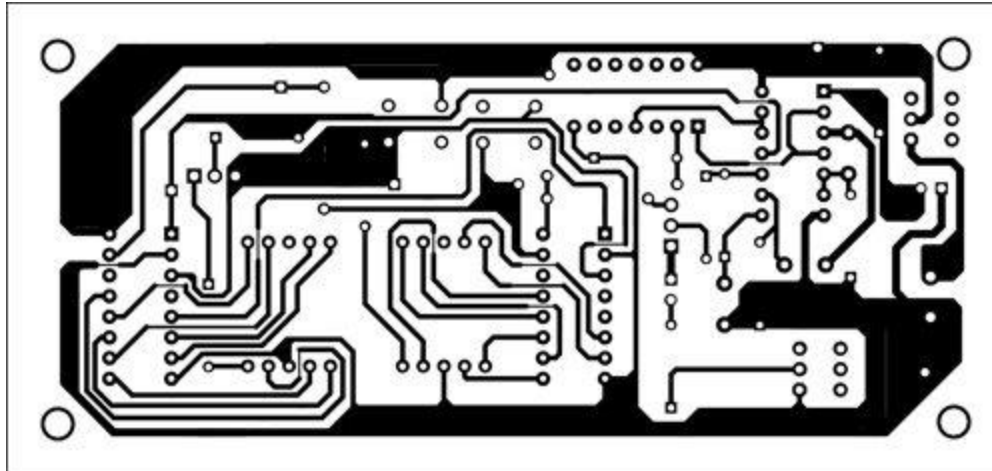
Fig. 4.2: A single- side PCB for the distance counter
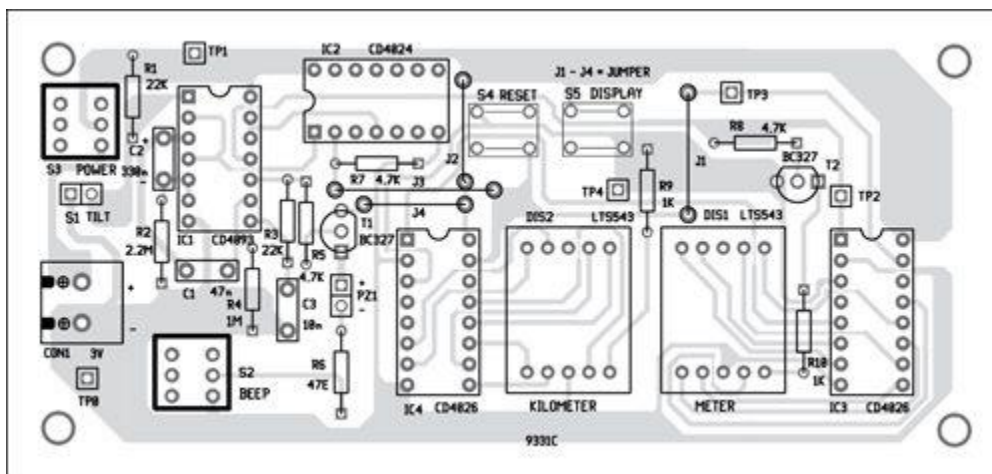
Fig. 4.3: Component layout for the PCB

Gates N1 and N2 of IC1 kind a monostable multivibrator that receives trigger input from tilt or mercury switch S1. once you elevate your foot and bit the bottom back throughout walking, the mercury within the switch makes a contact with its 2 bimetallic leads as shown in Fig. 2. This makes the present to flow between the bimetallic leads and a pulse is generated at pin four of IC1.

Fig. 4.4: Open-close operation of mercury switch

This pulse is fed to pin one of IC2 that produces a divide-by-64 counter. Its output is given to inputs of gate N4 of IC1 and therefore the output of N4 is fed to the bottom of semiconductor T2   through resistance R8. semiconductor T2   drives the percentage point phase of common cathode 7-segment show (DIS1).

IC3 and IC4 square measure designed as decade counters to drive the 7-segment displays DIS1 and DIS2, severally. Switch S4 resets these 2 counters and switch S5 allows DIS1 and DIS2 displays.
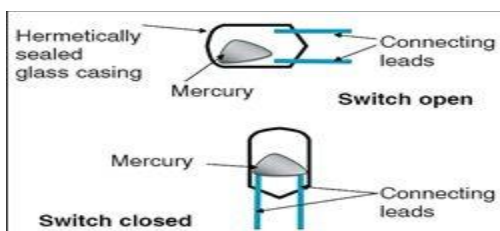
Transistor T1 drives the piezo buzzer (PZ1), that beeps once each 2 steps (one stride), provided switch S2 is closed. DIS1 and DIS2 displays indicate the gap coated in meters (m) and metric linear unit (km) units, severally.

Test Points

Test point	Details
TP0	GND, 0V
TP1	+3V when power switch S3 is closed
TP2	High when reset and remains high till 64 counts and low for the next 64 counts
TP3	Low to high when both S4 and S5 are pressed simultaneously
TP4	High when S5 is pressed to display the reading

Table 4.1 Test Points

Generally, walking step of every individual is slightly totally different. Here, we tend to assume that one step is 78cm long, that is that the average. in step with this, sixty-four strides equal 100m (that is, $2 \times 0.78 \times 64 = 99.84$m or 100m (approx.)) or 128 steps equal 100m.

DIS1 increments the digit once each 100m distance. That is, DIS1 displays one once distance coated is 100m and a pair of once distance coated is 200m, and so on. once digit nine in DIS1, DIS2 increments from zero to one digit.

The percentage point (dot) of DIS2 continuously glows to point separation of metric linear unit from the meter unit.

To save battery power consumption, DIS1 and DIS2 displays illuminate only if you push S5. If you would like to reset the counter circuit, each switches S4 and S5 should be ironed at the same time.

If you would like to endlessly illuminate DIS1 and DIS2 displays, take away switch S5 and connect the junction of S4 and electrode of semiconductor T2 to 3V.

Construction and testing

A single-side PCB for the gap counter is shown in Fig. three and its element layout in Fig. 4.

Mount DIS1 to the {proper the correct} of DIS2 as shown within the PCB so you get proper readings. as an example, if DIS2 shows five and DIS1 shows two, the reading are going to be 5km and 200m. It suggests that the gap traveled is 5200m. After collecting the circuit on PCB, enclose it in a very appropriate plastic case so you'll keep it in your trousers pocket or attach it to your belt. IC3 and IC4 square measure designed as decade counters to drive the 7-segment displays

DIS1 and DIS2, severally. Switch S4 resets these 2 counters and switch S5 allows DIS1 and DIS2 displays.

Transistor T1 drives the piezo buzzer (PZ1), that beeps once each 2 steps (one stride), provided switch S2 is closed. DIS1 and DIS2 displays indicate the gap coated in meter (m) and metric linear unit (km) units, severally.

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4.1HARDWARE   DESCRIPTION

Components used

PARTS LIST

Semiconductors:
IC1   - CD4093 quad 2-input NAND Schmitt trigger
IC2   - CD4024 counter/divider
IC3, IC4   - CD4026 decade counter/ divider
T1, T2   - BC327 pnp transistor

Resistors (all 1/4-watt, ±5% carbon):
R1, R3   - 22-kilo-ohm
R2   - 2.2-mega-ohm
R4   - 1-mega-ohm
R5, R7, R8   - 4.7-kilo-ohm
R6   - 47-ohm
R9, R10   - 1-kilo-ohm

Capacitors:
C1   - 47nF ceramic disk
C2   - 330nF tantalum
C3   - 10nF ceramic disk

Miscellaneous:
DIS1, DIS2   - LTS543, 7-segment CC display
PZ1   - Piezo buzzer
S1   - Tilt/mercury switch
S2, S3   - On/off switch
S4, S5   - Tactile switch
CON1   - 2-pin terminal
                 - 3V battery

Table 4.1.1 Part list

CD4093B
CMOS Quad 2-Input NAND Schmitt Triggers

Fig4.1.1 CD4093 2 input NAND Schmitt Triggers

Description

CD4093B consists of 4 Schmitt-trigger circuits. every circuit function as a two-input logic gate with Schmitt-trigger action on each input. The gate switches at totally different points for positive- and negative-going signals.

The distinction between the positive voltage (VP) and also the negative voltage (VN) is outlined as physical phenomenon voltage (VH) (see Fig. 2).

The CD4093B sorts are equipped in 14-lead tight dual-in-line ceramic packages (F3A suffix), 14-lead dual-in-line plastic packages (E suffix), 14-lead small-outline packages (M, MT, M96, and NSR suffixes), and 14-lead skinny shrink small-outline packages (PW and PWR suffixes).

Features

• Schmitt-trigger action on every input with no external elements

• Hysteresis voltage usually zero.9 V at VDD = five V and a couple of.3 V at VDD = ten V

• Noise immunity bigger than five hundredth

• No limit on input rise and fall times

• Standardized, symmetrical output characteristics

• 100% tested for quiescent current at twenty V

• Maximum input current of one μA at eighteen V over full package-temperature vary, a hundred metal at eighteen V and 25°C

• 5-V, 10-V, and 15-V constant ratings

• Meets all necessities of JEDEC Tentative commonplace No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

· **Applications:**

o Wave and pulse shapers

o High-noise-environment systems

o Monostable multivibrators

o Astable multivibrators

o NAND logic

CD4024B
CMOS 7-Stage Ripple-Carry Binary Counter/Divider
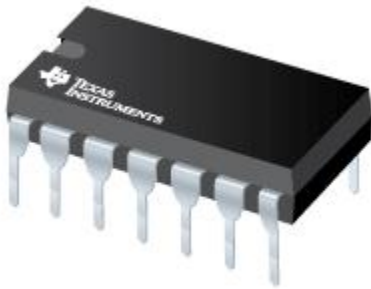
Fig4.1.2 CD4024 counter/divider

Description

CD4020B, CD4024B, and CD4040B are ripple-carry binary counters. All
counter stages are master-slave flip-flops. The state of a counter advances
one calculates the negative transition of every input pulse; a high level on the
RESET line resets the counter to its all zeros state. Schmitt trigger action on the
input-pulse line permits unlimited rise and fall times. All inputs and
outputs are buffered.

The CD4020B and CD4040B sorts are equipped in 16-lead tight dual-in-line

ceramic packages (F3A suffix), 16-lead dual-in-line plastic packages (E suffix), 16-lead small-outline packages (NSR suffix), and 16-lead skinny shrink small-outline packages (PW and PWR suffixes). The CD4040B kind is also equipped in 16-lead small-outline packages (M and M96 suffixes).

The CD4024B sorts are equipped in 14-lead tight dual-in-line ceramic packages (F3A suffix), 14-lead dual-in-line plastic packages (E suffix), 14-lead small-outline packages (M, MT, M96, and NSR suffixes), and 14-lead skinny shrink small-outline packages (PW and PWR suffixes).

Features

• Medium-speed operation

• Fully static operation

• Buffered inputs and outputs

• 100% tested for quiescent current at twenty V

• Standardized, symmetrical output characteristics

• Fully static operation

• Common reset

• 5-V, 10-V, and 15-V constant ratings

• Maximum input current of one µA at eighteen V over full package-temperature range; a hundred metal at eighteen V and 25°C

• Noise margin (over full package-temperature range):

one V at VDD = five V

a pair of V at VDD = ten V

2.5 V at VDD = fifteen V

• Meets all necessities of JEDEC Tentative commonplace No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

- **Applications**:

o Control counters

o Timers

o Frequency dividers

o Time-delay circuits

CD4026B

CMOS Decade Counter

Fig4.1.3   CD4026 decade counter/divider

Description

CD4026B associated CD4033B every comprises a 5-stage Johnson decade counter and an output decoder that converts the Johnson code to a 7-segment decoded output for driving one stage in a very numerical show.

These devices are significantly advantageous in show applications wherever low power dissipation and /or low package count are vital.

Inputs common to each sorts are CLOCK, RESET, & CLOCK INHIBIT; common outputs are do and also the seven decoded outputs (a, b, c, d, e, f, g). further inputs and outputs for the CD4026B embrace show modify input and show modify and

UNGATED "C-SEGMENT" outputs. Signals peculiar to the CD4033B are RIPPLE-BLANKING INPUT AND LAMP check INPUT and a RIPPLE-BLANKING OUTPUT.

A high RESET signal clears the last decade counter to its zero count. The counter is advanced one count at the positive clock signal transition if the CLOCK INHIBIT signal is low. Counter advancement via the clock line is suppressed once the CLOCK INHIBIT signal is high. The CLOCK INHIBIT signal will be used as a negative-edge clock if the clock line is control high. Antilock gating is provided on the JOHNSON counter, therefore reassuring correct tally sequence. The CARRY-OUT (Cout) signal completes one cycle each 10 CLOCK INPUT cycles and is employed to clock the succeeding decade directly in a very multi-decade tally chain. The seven decoded outputs (a, b, c, d, e, f, g) illuminate the correct sections in a very seven segment show devices used for representing the decimal numbers zero to nine. The 7-segment outputs go high on choice within the CD4033B; within the CD4026B these outputs go high only if the show modify IN is high.

The CD4026B- and CD4033B-series sorts are equipped in 16-lead dual-in-line plastic packages (E suffix), 16-lead small-outline packages (NSR suffix), and 16-lead skinny shrink small-outline packages (PW and PWR suffixes).

Features

• Counter and 7-segment coding in one package

• Easily interfaced with 7-segment show sorts

• Fully static counter operation: DC to six megacycle (typ.) at VDD = ten V

• Ideal for low-power displays

• Display modify output (CD4026B)

• "Ripple blanking" and lamp check (CD4033B)

• 100% tested for quiescent current at twenty V

• Standardized, symmetrical output characteristics

• 5-V, 10-V, and 15-V constant ratings

• Schmitt-triggered clock inputs

• Meets all necessities of JEDEC Tentative commonplace No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

Applications

o Decade tally 7-segment decimal show

o Frequency division 7-segment decimal displays

o Clocks, watches, timers (e.g. ÷60, ÷60, ÷ twelve counter/display)

o Counter/display driver for meter applications

BC327 PNP TRANSISTOR

Fig4.1.4 BC327 Transistor Pin out

Features / Technical Specifications

♣ Package Type: TO-92

♣ Transistor Type: PNP

♣ Max Collector Current(IC): -800mA

♣ Max Collector-Emitter Voltage (VCE): -45V

♣ Max Collector-Base Voltage (VCB): -50V

♣ Max Emitter-Base Voltage (VBE): -5V

♣ Max Collector Dissipation (Pc): 625 power unit

♣ Max Transition Frequency (fT): a hundred Mc

♣ Minimum & most DC Current Gain (hFE): a hundred to 630

♣ Max Storage & operational temperature ought to be: -55 to +150Centigrade

PNP Complementary
PNP Complementary of BC327 is BC337

Replacement and Equivalent
Alternative transistors for BC327 square measure 2N4403, BC488, BC638,
2N4402, 2N3702, 2N3703, BC486, Bc490 and BC328 (The pinout configuration
of the choice or substitute transistors shown here several differ from the
BC327. thus, it's urged to perpetually check pinout configuration of a junction
transistor you're exchange within the circuit.)

BC327 junction transistor Explained / Description
BC327 could be a general purpose PNP BJP junction transistor that may be used
for shift and amplification functions in electronic circuits. The junction

transistor options 800mA collector current therefore it is accustomed drive kind

of hundreds in AN electronic application. The liquid ecstasy collector-emitter

voltage is -45V thus it will simply handle load

voltage underneath 45V. excluding that junction

transistor conjointly options 625mW collector dissipation and DC current gain

of most 630 thus it may also be used as an amplifier or for any form of signal

amplification.

BC327 factory-made in numerous hFE classification that may be differentiate with

the code variety written once the junction transistor variety. If you discover code -

16 once the junction transistor variety then the hFE are 100~250, if the code is -25

then the hFE are 160~400 and if the code is -40 then the hFE are 250~630.

Where we are able to Use BC327 junction transistor & the way to Use:

Like alternative essential general purpose junction transistors the BC327 is

additionally a requirement of have transistor in your workplace as a result

of it is employed in wide selection of applications. It is used as a switch to

drive hundreds up to 800mA which incorporates high power relays, high power

transistors, high power LEDs, ICs and alternative components of a circuit. With -

5V emitter-base voltage this junction transistor may also be used because

the output of microcontrollers to drive load of up to 800mA which

may simply drive motors, modules, sensors etc.

Applications

Output of Microcontrollers to Drive hundreds

Any form of Signal Amplification

Audio electronic equipment

Audio Amp Stages

Drive hundreds underneath 800mA

Resistor

Fig 4.1.5 Resistors

We have used several resistors they are

R1, R3-22kilo ohm   R2-2.2mega ohm   R4-1mega ohm R5, R7, R8 -4.7kilo ohm

R6- 47-ohm R9, R10- 1kilo ohm

Resistor may be a passive part wont to management current in an exceedingly circuit. Its resistance is given by the quantitative relation of voltage applied across its terminals to this passing through it. therefore, a specific price of electrical device, for fastened voltage, limits this through it. they're ubiquitous in electronic circuits.

the various price of resistances square measure wants to limit the currents or get the specified fall in step with the current-voltage rating of the device to be connected within the circuit. for instance, if an LED of rating two.3V and 6mA is to be connected with a provider of 5V, a fall of two.7V (5V-2.3V) and limiting current of 6mA is needed. this could be achieved by providing a electrical device of 450 connected serial with the light-emitting diode.

Resistors are often either fastened or variable. The low power resistors square measure relatively smaller in size than high power resistors. The resistance of a electrical device are often calculable by their color codes or are often measured by a multimeter. There square measure some nonlinear resistors additionally whose

resistance changes with temperature or lightweight. Negative temperature constant (NTC), positive temperature constant (PTC) and lightweight dependent electrical device (LDR) square measure some such resistors. These special resistors square measure normally used as sensors. browse and find out about internal structure and dealing of a resistor.

Capacitors

It is AN electronic device whose operation is to accumulate charges so unleash it.
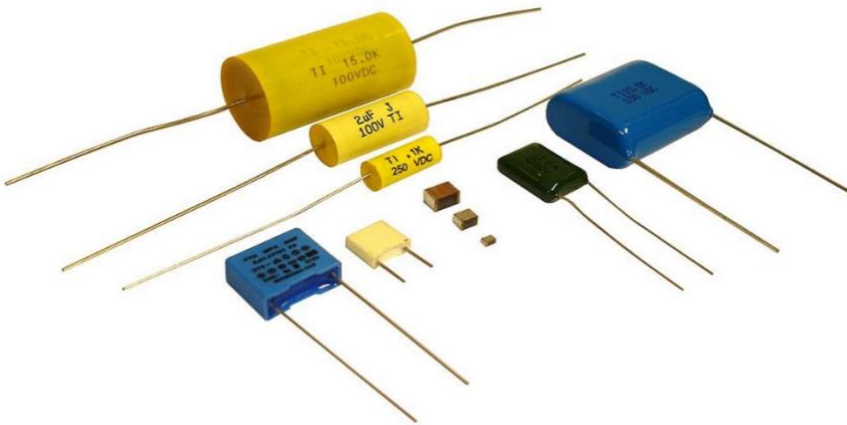

Fig 4.1.6 Capacitors

To understand the conception of capacitance, think about a combine of metal plates that all square measure placed around one another while not touching. If A battery is connected to those plates the positive pole to at least one and therefore the negative pole to the opposite, electrons from the battery are going to be attracted from the plate connected to the positive terminal of the battery. Capacitors square measure of 2 sorts: - (1) fastened type like ceramic, polyester, electrolytic capacitors-these names discuss with the fabric they're fabricated from tin foil. (2) Variable sort like gang condenser in radio or trimmer. In fastened sort capacitors, it's 2 leads and its price are written over its body and variable sort has 3 leads. Unit of activity of an electrical condenser is capacitance unit denoted by the image .It is a unit of capacitance. Small unit electrical condenser square measure pico-farad denoted by pf (1pf=1/1000,000,000,000 f) in particular, just in case of electrolytic capacitors, it's 2 terminal square measure marked as (-) and ( ) thus check it whereas

mistreatment capacitors within the circuit in right direction. Mistake will destroy the electrical condenser or entire circuit in operational.
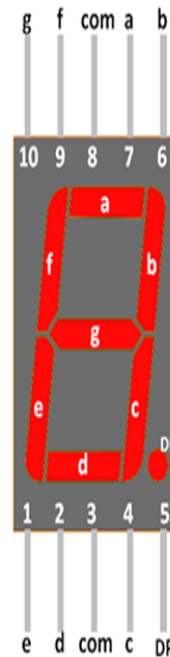
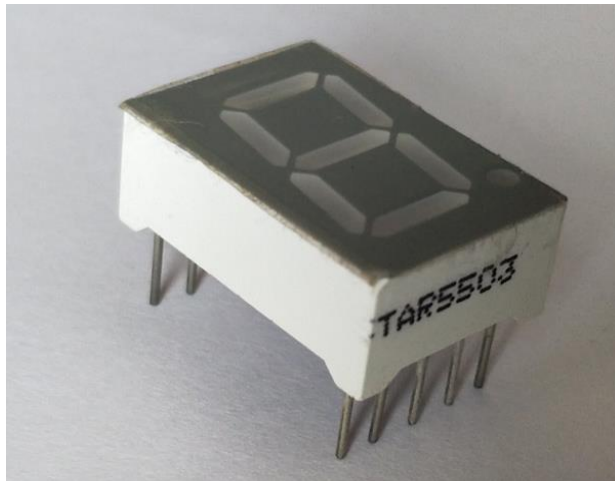## 7 Segment Display

Fig 4.1.7 7 Segment display

7-Segment display features

• Available in 2 modes Common Cathode (CC) and customary Anode (CA)

• Available in many various sizes

like nine.14mm,14.20mm,20.40mm,38.10mm,57.0mm and 100mm (Commonly

used/available size is fourteen.20mm)

• Available colors: White, Blue, Red, Yellow and inexperienced (Res is often used)

• Low current operation

• Better, brighter and bigger show than typical LCD displays.

• Current consumption : 30mA / section

• Peak current : 70mA

7-segment display short Intro

 These eight LEDs are separated into every segment which might be named as a, b, c, d, e, f,g, as shown within the image higher than. These entire eight section LEDs have one finish of their pins force out of the module as shown higher than and therefore the different ends are connected along and force out because the Common pin. therefore, to form AN diode of a specific section glow we tend to simply need to power common pin beside the section pin. this fashion we are able to power quite one section at a time to represent the numeric range 0-9 and conjointly few Alphabets as shown on the graphic image below. we tend to even have AN choice to show a mathematical notation victimization the displaced person pin.

Common Cathode (CC) seven segment display

The common cathode show is often referred to as CC show. during this kind the common pin on the 7-segment show is connected to all or any the eight Cathode pins of the LEDs. therefore, so as to form this sort of seven section show to figure we must always connect he Com pin to the bottom pin and power the opposite pins with Vcc (+5V typically).
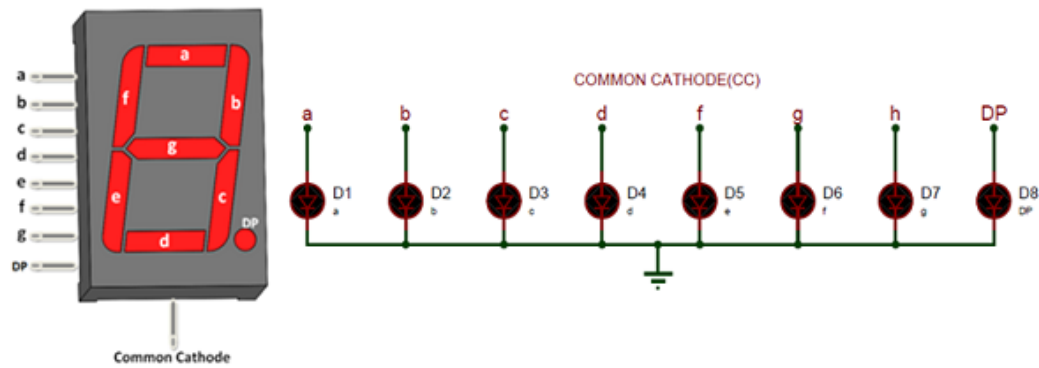
Fig 4.1.8 Common Cathode (CC) seven segment display

Piezo Buzzers

Fig 4.1.9. Buzzers

Buzzer Pin Configuration

Pin Number	Pin Name	Description
1	Positive	Identified by (+) symbol or longer terminal lead. Can be powered by 6V DC
2	Negative	Identified by short terminal lead. Typically connected to the ground of the circuit

Table 4.1.2 Buzzer pin configuration

Buzzer options and Specifications

• Rated Voltage: 6V DC

• Operating Voltage: 4-8V DC

• Rated current: <30mA

• Sound Type: Continuous Beep

• Resonant Frequency: ~2300 cycle per second

• Small and neat sealed package

• Breadboard and Perf board friendly

Equivalents for Passive Buzzer

Piezo electrical buzzer, Speaker, Active Passive Buzzer with Module

How to use a Buzzer

A buzzer may be a tiny nevertheless economical element to

feature sound options to our project/system. it's terribly tiny and compact 2-pin

structure thus will be simply used on bread board, Perf Board and even on

PCBs that makes this a wide used element in most electronic applications.

There are 2 sorts are buzzers that are usually offered. The one shown here may be a straightforward buzzer that once hopped-up can build endless Beeeeeeppp....

sound, the opposite kind is named a readymade buzzer which can look bulkier than this and can manufacture a Beep. Beep. Beep. Sound because of the inner oscillatory circuit gift within it.

But, the one shown here is most generally used as a result of it will be bespoken with facilitate of different circuits to suit simply in our application.

This buzzer will be employed by merely powering it employing a DC power provide starting from 4V to 9V. an easy 9V battery can even be used, however it's suggested to use a regulated +5V or +6V DC provide. The buzzer is often related to a switch circuit to show ON or put off the buzzer at needed time and need interval.

Applications of Buzzer
• Alarming Circuits, wherever the user must be afraid concerning one thing
• Communication equipment
• Automobile physical science

Mercury switch

Fig 4.1.10 Mercury switch

A mercury switch is Associate in Nursing controller that opens and closes a circuit once a little quantity of the liquid metal mercury connects metal electrodes to shut the circuit. There are many totally different basic styles (tilt, displacement, radial, etc.) however all of them share the common style strength of non-eroding switch contacts.

The most common is that the mercury tilt switch. it's in one state (open or closed) once atilt one direction with relation to horizontal, and therefore the different state once atilt the opposite direction. this can be what older vogue thermostats accustomed flip a heater or cooling on or off.

The mercury displacement switch uses a 'plunger' that dips into a pool of mercury, raising the extent within the instrumentality to contact a minimum of one conductor. This style is employed in relays in industrial applications that require to modify high current masses often. These relays use magnetic attraction coils to tug steel sleeves within hermetically sealed containers.

Mercury switches have one or additional sets of electrical contacts in a very sealed glass envelope that contains a little amount of mercury. The envelope may additionally contain gas at pressure, Associate in Nursing chemical element, or a vacuum. Gravity perpetually pulls the drop of mercury to rock bottom purpose within the envelope. once the switch is atilt within the acceptable direction, the mercury touches a collection of contacts, therefore finishing Associate in Nursing electric circuit. Tilting the switch within the other way moves the mercury aloof from that set of contacts, breaking that circuit.[1] The switch might contain multiple sets of contacts, closing {different totally totally different completely different} sets at different angles, allowing, as an example, single-pole, double-throw (SPDT) operation.

Mercury switches provide many benefits over different switch types:

• The contacts are penned, thus reaction of the contact points is unlikely.

• In risky locations, interrupting the circuit doesn't emit a spark that might ignite burnable gases.

• Contacts keep clean, and though an indoor arc happens, the contact surfaces renew on each operation, in order that they do not wear out.

• Even a little drop of mercury has low resistance, thus switches will carry helpful amounts of current in a very little size.[2]

• Sensitivity of the drop to gravity provides a singular sensing perform, and lends itself to straightforward, low-force mechanisms for manual or automatic operation.

• The switches are quiet, as no contacts dead snap along.

• The mass of the moving mercury drop provides Associate in Nursing over center impact to avoid chattering because the switch tilts.

• The envelope will embrace contacts for 2 or additional circuits.
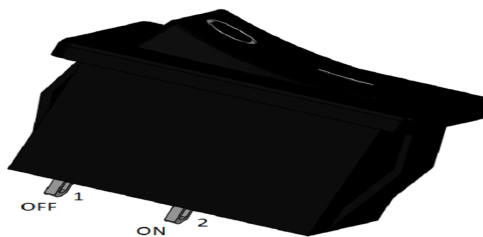
ON-OFF Rocker Switch

Fig 4.1.11 ON/OFF Switch

Pin Configuration

Pin No	Pin Name	Pin Function
1	I (Input)	ON, Connects the input supply to the output when pressed
2	O (Output)	OFF, Disconnects the input supply to the output when down

Table 4.1.3 Switch pin configuration

Features and Electrical Specifications

• Power switches

• Snap-in kind

• SDDJE series comes in SPST (Single Pole Single Throw) and DPST (Double Throw Single Pole) configuration

• SDDJE11200 is SPST ON-OFF Rocker Switch with IO marking.

• Operating temperature vary –10 °C to +55 °C

• Contact resistance 100mΩ goop.

• Insulation resistance 500MΩ min. 500V DC

• Voltage proof two,000V AC for 1minute

• Operating life ten,000cycles

• Actuator strength - operative direction 25N

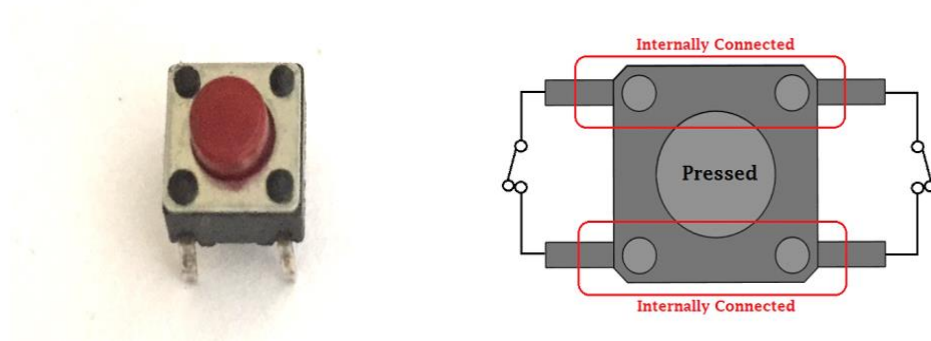• Actuator strength - Perpendicular direction 25N

Tactile Switch

Fig 4.1.12 Tactile Switch

Features
• Prevent flux rise by the insert-molded terminal
• Snap-in mount terminal
• Contact Bounce: easy lay 5mS
• Crisp clicking by tactile feedback
• Dielectric Withstanding Voltage 250V AC for one minute

Technical Specifications
• Mode of Operation: Tactile feedback
• Power Rating: easy lay 50mA 24V DC
• Insulation Resistance: 100Mohm at 100v
• Operating Force: two.55±0.69 N
• Contact Resistance: easy lay 100mOhm
• Operating Temperature Range: -20 to +70 ℃
• Storage Temperature Range: -20 to +70 ℃

2- pin terminal

www.pololu.com

Fig 4.1.13 2 pin terminals

These side-entry screw terminal blocks have a pitch of five millimeter (0.197″). every block has 2 terminals for the stripped ends of twenty-two – fourteen AWG wires, and units will slide along to create longer strips. they're rated for 250 V, sixteen A (UL) and ship in packs of 4

These terminal blocks have terminals that hold and unleash wires through the straightforward adjustment of a screw, permitting you to simply build temporary connections to a PCB. The 2-pin and 3-pin units every feature a ridge on one aspect and a slot on the opposite, that lets them slide and lock along to create every which way long strip with a pitch of three.5 millimeter or five millimeters.

3V Battery

Fig .4.1.14 3V Battery

SPECIFICATION:

- Nominal Voltage: three.0 Volts
- Maximum Current: zero.14A
- Non - reversible Disposal battery
- Typical Capacity: 163 mAh @ 20°C 15kΩ Load
- Service Life: ~680 Hrs @20°C 15kΩ Load
- Typical Weight: two.6 grams (0.08 oz.)
- Operating Temp: -30C to 60C
- Self-Discharge: ~1% / year

CHAPTER 05

RESULT AND DISCUSSION

The mechanical pedometer was successfully designed. It approximately met the design specifications for size.

Pedometer could be a device, that is worn by an individual on his belt and it measures the quantity of steps and therefore the distance walked by the person. it's typically utilized by folks that do measured exercise on a daily basis. The device counts the quantity of steps taken by the person and multiplies it by the common step length fed to allow the space walked by the person. within the gift project, we tend to are mensuration the quantity of steps the person takes. This needs to be befittingly increased by the stride length of the person to calculate the particular distance traveled by the person.

Benefits or advantages of Pedometers

Following are the benefits or **advantages of Pedometers**:

➡They are easy to use by wearing on wrist or hip.

➡They are inexpensive and non-invasive.

➡They are used to measure common activity e.g. walking at schools and workplace as well as regular walkers.

➡Usually pedometers provide measurement of distance travelled on foot. Modern pedometers also provide measurement of energy expended and time. They also provide heart rate monitoring.

➡10,000 steps per day is recommended by most of the pedometers.

➡It can capture qualitative and quantitative information both

CHAPTER 06

CONCLUSION AND FUTURE SCOPE

It is recommended that adults should perform 150 minutes of moderate intensity aerobic activity per week to remain healthy and physically fit. However when walk is considered as the performed activity, then activity duration is not enough for categorizing user into any activeness level. Step count is another factor that should be taken into account. Users can perform activity for same duration but they can differ depending on their step count. This project presents an approach for converting users step into the duration for which activity has been performed. We have developed a prototype, Distance counter(Pedometer) that uses user step count and converts these steps to activity duration. The objective of Pedometer is to promote physical activities and enable users to achieve their activeness goal by dividing the goal into level and sublevels. Using gamification techniques, users are awarded with points if their performance is up to mark while points are deducted if a user lags behind in completing his/her goal. Unlike existing systems, which focus on the goal itself, our focus is on facilitating the user to achieve the goal. To ensure that our approach is applicable to wide variety of users, we intend to conduct experiments on larger scale consisting users from different population, age groups, gender etc. After that we will be confident about the impact of Pedometer on user lifestyle. Moreover, we plan to incorporate user preferences as well as exercise recommendation in Pedometer. User will enter his/her preferences e.g. weight, age, health condition etc. The exercise will be recommended by considering the user's preferences and points are deducted accordingly.