ELECTRONICS AND INSTRUMENTATION ENGINEERS ASSOCIATION

MUTHAYAMMAL ENGINEERING COLLEGE
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INSTRONICS

The best INSTRUMENTATION magazine March, 2011 vol. 9

PIR SENSOR

SPEEDOMETER

YEAR: 2011 ISSUE:2 VOL:10 MAR

EDITORS:

The Editors and Publishers of this magazine do their best to verify the information published, but do not take responsibility for the absolute accuracy of the information.

Your commends are welcomed and you can send your and newsletters through email to the mail-ID **instronicsmagazine@gmail.com**

CONTENTS

“Our life is what our thought makes of it
Great thought comes from the heart”

We thank Our Beloved Principal ***Dr.M.Madheswaran***
For his valuable guidance and encouragement in bringing up this magazine ***“INSTRONICS”*** *successfully.*

- ***EIE ASSOCIATION***

TERMS & DEFINITIONS:

DISSOCIATION CONSTANT (K):

A value which quantitatively expresses the extent to which a substance dissociates in solution. The smaller the value of K, the less dissociation of the species in solution. This value varies with temperature, ionic strength, and the nature of the solvent.

DUPLEX WIRE:

A pair of wires insulated from each other and with an outer jacket of insulation around the inner insulated pair.

DROOP:

A common occurrence in time-proportional controllers. It refers to the difference in temperature between the set point and where the system temperature actually stabilizes due to the time-proportioning action of the controller.

DEAD BAND:

The temperature band where heat is turned off upon rising temperature and turned on upon falling temperature expressed in degrees. The area where no heating (or cooling) takes place.

DIN (DEUTSCHE INDUSTRIAL NORM):

A set of German standards recognized throughout the world. The 1/8 DIN standard for panel meters specifies an outer bezel dimension of 96 x 48 mm and a panel cutout of 92 x 45 mm.

DIN 43760:

The standard that defines the characteristics of a 100 ohm platinum RTD having a resistance vs. temperature curve specified by a = 0.00385 ohms per degree.

DYNAMIC (TWO-PLANE) BALANCING MACHINE:

A dynamic balancing machine is a centrifugal balancing machine that furnishes information for performing two-plane balancing.

DYNAMIC PRESSURE:

The difference in pressure levels from static pressure to stagnation pressure caused by an increase in velocity. Dynamic pressure increases by the square of the velocity.

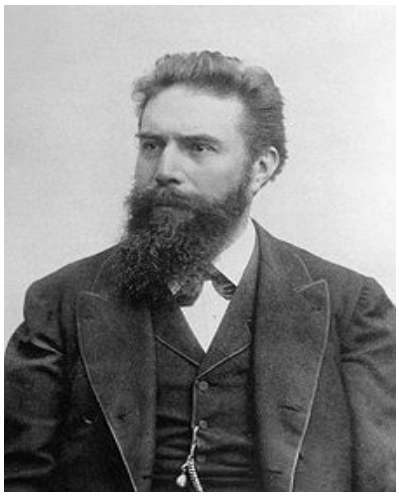
D'ARSONVAL MOVEMENT:

A meter movement based upon the permanent magnet DC motor principle: a small coil of wire supported on jewel bearings or taut band between the poles of a permanent magnet. The magnetic field of the DC current passing through the coil interacts with the magnet's field, causing rotation of the coil and an attached pointer against the restoring force of coil springs.

By:

Mr. R.RAMESH,
FINAL YEAR (MEIEA).

WILHELM CORNAD RONTGEN



Born : 27 march 1845
Lennep, Germany.

Died : 10 February 1923

Fields : Physics.

Residence : Germany

Signature : 

Wilhelm Conrad Röntgen was born on March 27, 1845, at Lennep in the Lower Rhine Province of Germany, as the only child of a merchant in, and manufacturer of, cloth. His mother was Charlotte Constanze Frowein of Amsterdam, a member of an old Lennep family which had settled in Amsterdam.When he was three years old, his family moved to Apeldoorn in The Netherlands, where he went to the Institute of Martinus Herman van Doorn, a boarding school. He did not show any special aptitude, but showed a love of nature and was fond of roaming in the open country and forests. He was especially apt at making mechanical contrivances, a characteristic which remained with him also in later life. In 1862 he entered a technical school at Utrecht, where he was however unfairly expelled, accused of having produced a caricature of one of the teachers, which was in fact done by someone else.

He then entered the University of Utrecht in 1865 to study physics. Not having attained the credentials required for a regular student, and hearing that he could enter the Polytechnic at Zurich by passing its examination, he passed this and began studies there as a student of mechanical engineering. He attended the lectures given by Clausius and also worked in the laboratory of Kundt. Both Kundt and Clausius exerted great influence on his development. In 1869 he graduated Ph.D. at the University of Zurich, was appointed assistant to Kundt and went with him to Würzburg in the same year, and three years later to Strasbourg.

In 1874 he qualified as Lecturer at Strasbourg University and in 1875 he was appointed Professor in the Academy of Agriculture at Hohenheim in Württemberg. In 1876 he returned to Strasbourg as Professor of Physics, but three years later he accepted the invitation to the Chair of Physics in the University of Giessen. After having declined invitations to similar positions in the Universities of Jena Würzburg (1888), where he succeeded Kohlrausch and found among his colleagues Helmholtz and Lorenz. In 1899 he declined an offer to the Chair of Physics (1886) and Utrecht (1888), he accepted it from the University of in the University of Leipzig, but in 1900 he accepted it in the University of Munich, by special request of the Bavarian government, as successor of E. Lommel. Here he remained for the rest of his life, although he was offered, but declined, the Presidency of the Physikalisch-Technische Reichsanstalt at Berlin and the Chair of Physics of the Berlin Academy.

Röntgen's first work was published in 1870, dealing with the specific heats of gases, followed a few years later by a paper on the thermal conductivity of crystals. Among other problems he studied were the electrical and other characteristics of quartz; the influence of pressure on the refractive indices of various fluids; the modification of the planes of polarised light by electromagnetic influences; the variations in the functions of the temperature and the compressibility of water and other fluids; the phenomena accompanying the spreading of oil drops on water.

Röntgen's name, however, is chiefly associated with his discovery of the rays that he called X-rays. In 1895 he was studying the phenomena accompanying the passage of an electric current through a gas of extremely low pressure.

On the evening of November 8, 1895, he found that, if the discharge tube is enclosed in a sealed, thick black carton to exclude all light, and if he worked in a dark room, a paper plate covered on one side with barium platinocyanide placed in the path of the rays became fluorescent even when it was as far as two metres from the discharge tube. During subsequent experiments he found that objects of different thicknesses interposed in the path of the rays showed variable transparency to them when recorded on a photographic plate.

When he immobilised for some moments the hand of his wife in the path of the rays over a photographic plate, he observed after development of the plate an image of his wife's hand which showed the shadows thrown by the bones of her hand and that of a ring she was wearing, surrounded by the penumbra of the flesh, which was more permeable to the rays and therefore threw a fainter shadow. This was the first "röntgenogram" ever taken. In further experiments, Röntgen showed that the new rays are produced by the impact of cathode rays on a material object. Because their nature was then unknown, he gave them the name X-rays. Later, Max von Laue and his pupils showed that they are of the same electromagnetic nature as light, but differ from it only in the higher frequency of their vibration.

Numerous honours were showered upon him. In several cities, streets were named after him, and a complete list of Prizes, Medals, honorary doctorates, honorary and corresponding memberships of learned societies in Germany as well as abroad, and other honours would fill a whole page of this book mountains

HONOURS & AWARDS

In 1901 Roentgen was awarded the very first Nobel Prize in Physics. The award was officially "in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him". Röntgen donated the monetary reward from his Nobel Prize to his university. Like Pierre Curie, Röntgen refused to take out patents related to his discovery, as he wanted mankind as a whole to benefit from practical applications of the same (personal statement). He did not even want the rays to be named after him

By:

Mr. V.VIJAYARAGAVAN,
FINAL YEAR(MEIEA).

BICYCLE SPEEDOMETER WITH HUB DYNAMO :

The idea for this circuit came when the author had problems with the wireless speedometer on his bicycle. Such a device consists of two parts: the cycle computer itself and a transmitter that is mounted on the front fork. A small magnet is attached to the spokes so that the transmitter sends out a pulse for every revolution of the wheel. Since the range of the transmitter is limited (about 75 cm), you'll be lucky if it works straight away. And when the voltage of the battery starts to drop you can forget it. The following circuit gets round these problems.

Fig. Front Panel of Bicycle Speedometer

A Shimano NX-30 hub dynamo has 28 poles. This results in 14 complete periods of a 6 V alternating voltage per revolution (when loaded by a lamp; under no load the voltage is much higher). C1, C2, D1 and D2 double the voltage of the AC output. Regulator IC2 keeps the voltage to the transmitter and the divider IC at a safe level (12 V, the same as the original battery). The divider chip (IC1) divides the frequency of the signal from the dynamo by 14, so that a single pulse goes to the transmitter for every revolution of the wheel.

Basic bike computer, cycle computer features and functions

These cycle computers usually range in price from $15.00 to $50.00 (for wired models) Standard bike computer,cycle computer features and functions are,

The Current Speed, Average speed, Maximum Speed,Odometer,Trip Distance, Total Time, Ride Time,12/24 Hour Clock, Wheel Size Settings (inches and CMs).

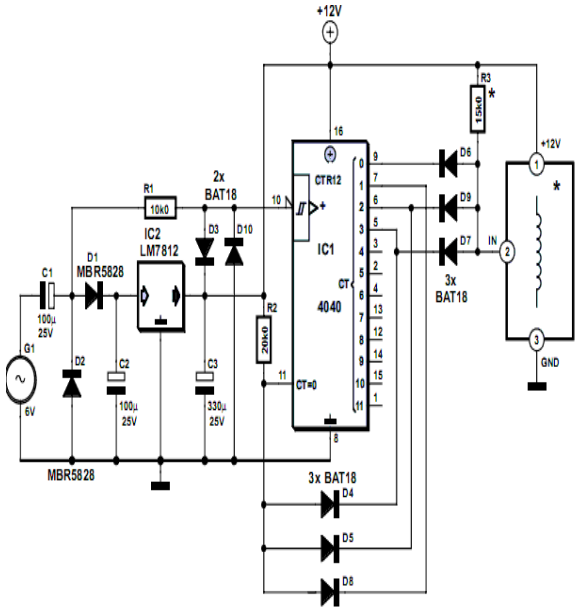


Fig. Circuit Diagram of Bicycle Speedometer With Hub Dynamo

This pulse enters the circuit at the point where the reed contact was originally. The circuit is built inside the front light, since it has enough room and a cable from the dynamo is already present. The distance to the cycle computer is smaller as well in that case. The following tip can be used if you want to save yourself a few components. In the author's prototype the counter divided by 16 and the setting for the size of the wheel was adjusted to 16/14th of the real size in the setup of the cycle computer. In that case you can leave out D4, D5 and D8.

By:

Mr.R.DILEEPAN,
FINAL YEAR(MEIEA).

LIGHTENING DETECTOR :

A Very Low Frequency(VLF) receiver tuned to 300 kHz designed to detect the crackle of approaching lightning. A bright lamp flashes in sychrony with the lightning bolts indicating the proximity and intensity of the storm. The figure shows the simple receiver which consists of a tuned amplifier driving a modified flasher circuit. The flasher is biased to not flash until a burst of RF energy, amplified by the 2N3904, is applied to the base of the 2N4403. The receiver standby current is about 350 microamps which is nothing at all to a couple of D cells, hardly denting the shelf life. Of course, the stormier it gets, the shorter the battery life.

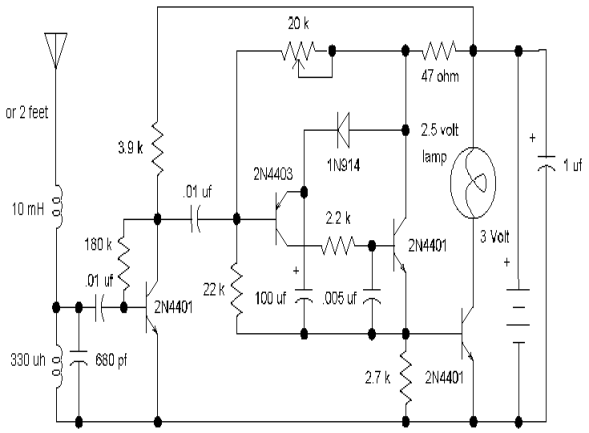


Fig. Circuit Diagram of Lightening Detector

For best effect, mount the lamp in an old-fashioned holder with an extra-large colored glass lense. Otherwise construct your own fixture with a plate of textured colored glass behind a panel painted with black-crackle paint. Watch a few old science fiction movies for other ideas. A totally different approach is to mount the circuit in an empty glass jar with the antenna and bulb protruding through the top. Use a pin jack for the antenna.

Boat owners may wish to replace the lamp with a 3-volt beeper to provide an early warning of approaching bad weather. Choose one of those unbreakable clear plastic jars like the large jars of coffee creamer. A little silicone rubber will seal the antenna hole in the lid of the jar. Use a longer antenna for increased sensitivity since there are few electrical noise sources on the lake.

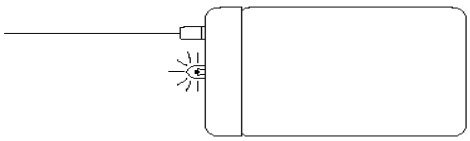


Fig. Lightening Detector

Adjust the potentiometer until the regular flashing just stops. (Use a multi-turn trimmer.) When properly adjusted, the lamp will occasionally flash when large motors or appliances switch on and off and an approaching storm will give quite a show. Obviously, tune-up is a bit more difficult during stormy weather. Adjust the pot with no antenna if lightning is nearby. Tune an AM radio to the bottom of the dial to monitor the pulses that the lightning detector is receiving.

This lightning detector is not so sensitive that it will flash with every crackle heard on the radio but will only flash when storms are nearby. Increased sensitivity may be achieved by increasing the antenna length. The experienced experimenter may wish to add another gain stage after the first by duplicating the 2N3904 circuitry including capacitor coupling with the addition of a 47 ohm emitter resistor to reduce the gain somewhat.

By:

Mr.K.M.MURALI,
FINAL YEAR (MEIEA).

HIGH TECH NUMBER PLATES TRACE AND TRAP AUTO THIEF:

Vehicle owners can heave a sigh of relief because dark and cloudy days are ahead for auto-lifters. As vehicle on the nation's roads will be equipped with a new high-tech number plate which is only issued by the Motor Vehicle Authority(MVA). It is the most hi-tech plate introduced till date and is a major step up towards fight against crime.

The new number plate will have a special micro chip which will help in the fight against risk of auto-theft that is spreading like plague. This would equip the police with ability to quickly access the vehicle and its owner's complete and correct information. The plates will come complete with Radio Frequency Identification (RFI) which will allow police to read them from 30 feet away. In front and rear registration plates, the letters 'IND' in blue hot-stamped will be embossed on the number plates

The unique feature is that they will be tamper-proof. They will have laser numbering containing the alphanumeric identification of the vehicle which can be decoded only by investigating agencies when required. The sticker, which will contain the engine and chassis number, also can't be tampered with.

It holds many effective ways of setting baits for thieves who are roaming freely, because these plates will be linked with the Global Positioning System (GPS) through which the auto can be traced or located on being misplaced or stolen. They can neither be removed nor replaced and if tampered with, they self-destruct. All these high tech features make it a worth and promising product which helps in keeping an eye over the thief.

This makes it more useful in identifying the suspects or tracing the people of the crime area who might have seen the vehicle. High tech number plates are part of a larger initiative aimed at combating fraudulent. This new system being introduced will equip the traffic cops in getting information about the illegal happenings of auto-theft. Tamper-proof, high security number plates will definitely work in scanning and uncovering auto thief.

By:

Mr.VIGNESH KUMAR,
PRE-FINAL YEAR (MEIEA).

NEXI - ROBOT WITH FACIAL EXPRESSIONS:

A latest invention by **MIT Media Lab** is a new robot that is able to show various facial expressions such as 'slanting its eyebrows in anger', or 'raise them in surprise', and show a wide assortment of facial expressions while communicating with people.

This latest achievement in the field of Robotics is named **NEXI** as it is framed as the next generation robots which are aimed for a range of applications for personal robots and human-robot teamwork.

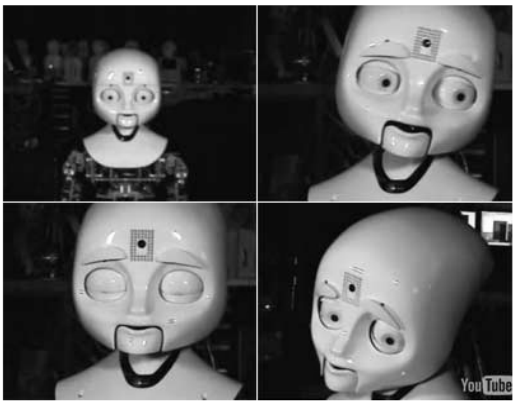


Fig. Different facial expressions of Robot

DESIGN :

The head and face of **NEXI** were designed by **Xitome Design** which is a innovative designing and development company that specializes in robotic design and development. The expressive robotics started with a neck mechanism sporting 4 Degrees Of Freedom (DOF) at the base, plus pan-tilt-yaw of the head itself. The mechanism has been constructed to time the movements so they mimic human speed. The face of **NEXI** has been specially designed to use gaze, eyebrows, eyelids and an articulate mandible which helps in expressing a wide range of different emotions.

The chassis of **NEXI** is also advanced. It has been developed by the **Laboratory for Perceptual Robotics UMASS (University of Massachusetts), Amherst**. This chassis is based on the **uBot5 mobile manipulator**. The mobile base can balance dynamically on two wheels. The arms of **NEXI** can pick up a weight of up to 10 pounds and the plastic covering of the chassis can detect any kind of human touch.

CYNTHIA BREAZEAL: HEAD OF THE PROJECT

This project was headed by Media Lab's Cynthia Breazeal, a well known robotics expert famous for earlier expressive robots such as **Kismet**. She is an Associate Professor of Media Arts and Sciences at the MIT. She named her new product as an MDS (mobile, dextrous, social) robot.

FEATURES OF NEXI

Except a wide range of facial expressions, **NEXI** has many other features. It has self-balancing wheels like the Segway transporter, to ultimately ride on. Currently it uses an additional set of supportive wheels to operate as a statically stable platform in its early stage of development. It has hands which can be used to manipulate objects, eyes (video cameras), ears (an array of microphones), and a 3-D infrared camera and laser rangefinder which support real-time tracking of objects, people and voices as well as indoor navigation.

By:

Mr. P.GOPALAKRISHNAN ,
FINAL YEAR(MEIEA).

PIR(Passive Infra-Red) Sensor:

The Passive Infra-Red (PIR) sensor switch can detect the Infrared Rays released by human body. The light or any other electrical appliance can be activated automatically by the active presence of a human body within the detection range / coverage area & when there is no presence the light will be deactivated automatically.

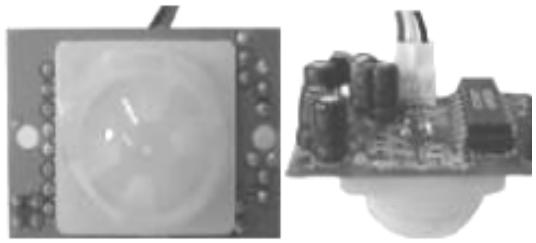


Fig. PIR SENSOR

A PIR sensor is an electronic device commonly used in security lighting, and burglar alarm systems. A PIR sensor is a motion detector which detects the heat (infrared) emitted naturally by humans and animals. When a person in the field of vision of the sensor moves, the sensor detects a sudden change in infrared energy and the sensor is triggered (activated).

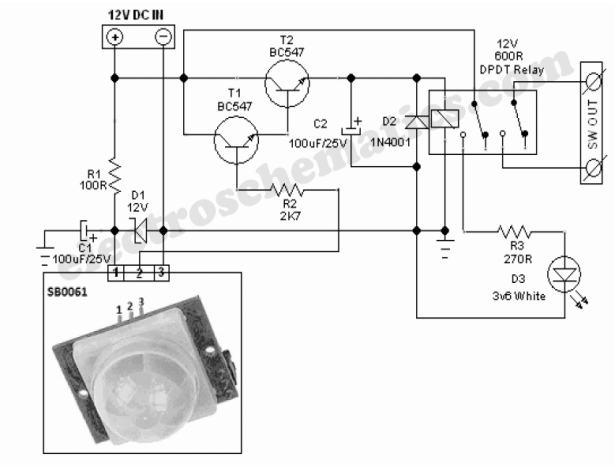


Fig. Circuit Diagram of PIR Sensor

Working Principle:

- The PIR Sensor senses the motion of a human body by the change in surrounding ambient temperature when a human body passes across.
- Then it turns on the lighting load to which it is connected.
- The lighting load will remain **ON** until it senses motion.
- Once the motion is seized it switches **OFF** the lighting load.
- During the night, the FLUX adjustment knob allows you to adjust the luminosity based on which the lighting load will either switch on / off automatically.

PIR Motion Sensor for Automatic Light Control:

PIR Motion Sensor is a fully automatic indoor and outdoor security / courtesy light controller capable of controlling up to 2000W incandescent or 30W x 20 fluorescent of lighting in day as well as at night. The built–in Passive Infrared (PIR) Motion Sensor turns on the connected lighting system when it detects motion in its coverage area. During the day, the built in Photocell Sensor saves electricity by deactivating the lights. You can reduce your electricity bills by using PIR Motion Sensors & Occupancy Sensors.

Energy Saving Sensor:

By the use of PIR Sensor, considerable energy can be saved by switching off the lights when the space is not in use. Savings are huge in larger facilities.

It has been estimated that a single unit of energy saved at the end use point is equal to 2.3 units of energy produced.

If energy efficient methods are implemented properly about 25000 MW equivalent capacity of power can be saved through promotion of energy efficient measures

PIR Motion Sensor for Security of Houses:

If PIR Motion Sensor is installed in front yard or back yard of your house, it works as Security Sensor in nights. As if any body jumps or sneaks within its detection range, the connected lights / Sirens or beeps can be activated automatically to create Panic to the Intruder.

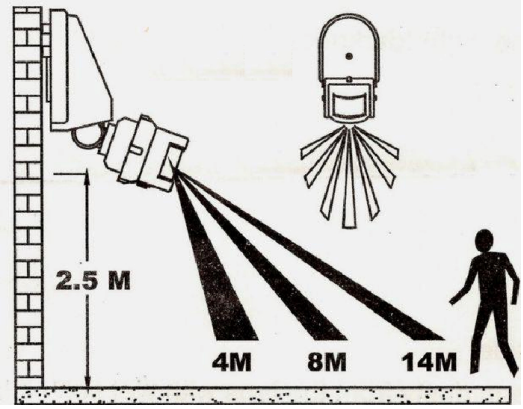


Fig.PIR sensing range at different levels

Advantages :

- PIR Motion Sensors will itself recover its cost by reducing your electricity bills and will further save your electricity cost for the future.
- Very easy installation and can be installed by in – house technician itself.
- No separate wiring is required hence no additional installation cost.
- No modification is required and complies with current aesthetics.
- Pay back within ten months according to residential meter and six months according to construction meter.

Applications:

- Common toilets, for lights & exhaust fans
- Common staircase / Entrance / Basements
- Parking areas / garden lights
- Living room, Malls, ATMS
- Changing rooms in shops
- Offices / Conference Room
- Corridors & many more.

Weaknesses of PIR Sensors:

In order for a PIR sensor to work well most of the time, they are designed with certain limitations. A PIR sensor cannot detect a stationary or very slowly moving body - if the sensor was set to the required sensitivity, it would be activated by the cooling of a nearby wall in the evening, or by very small animals. Similarly, if someone walks straight towards a PIR sensor, it will not detect them until they are very close.

PIR sensors are temperature sensitive - they work optimally at ambient air temperatures of around 15-20 degrees Celsius. If the temperature is over 30 degrees, the field of view narrows and the sensor will be less sensitive. Alternatively, if the temperature is below 15 degrees, the field of view widens and smaller or more distant objects will activate the sensor.

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Mr. M.MOHAMMED AARIF,
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By:

Mr.D.NARESH,
FINAL YEAR(MEIEA).

TECHS & APPS:

1) A person has certain number of cows and birds. They have 172 eyes and 344 legs. How many cows and birds does he have?

a) 84, 2 b) 81, 5
c) 86, 0 d) 80, 6

2) A pool has four taps. The first tap takes two days to fill the pool, the second tap three days, the third four days and the last one only 6 hours. How long will it take to fill the pool using all 4 taps at once?

a) 4h, 43m, 17s b) 4h, 33m, 13s
c) 4h, 39m, 20s d) 4h, 40m, 34s

3) Find the sum of the first 14 terms for a sequence starting with 2,
ending with 120 and common difference2

a)845
b)854
c)800
d)834

4) A man ate 100 bananas in five days, each day eating 6 more than the previous day. How many bananas did he eat on the first day?

a) 11 b) 08 c) 09 d) 07

5) Can you find out what day of the week was January 12, 1979?

a) Tuesday b) Wednesday
c) Monday d) Friday

6) A man said to a lady, "Your mother's husband's sister is my aunt." How is the lady related to the man?

a) Daughter b) Granddaughter
c) Mother d) Sister

7) Thirty men take 20 days to complete a job working 9 hours a day. How many hour a day should 40 men work to complete the job?

(a) 8 hrs (b) 7 1/2 hrs
(c) 7 hrs (d) 9 hrs

8) A goat is tied to one corner of a square plot of side 12 meter by a rope 7 meter long. Find the area it can graze?

(a) 38.5 sq.m (b) 155 sq.m
(c) 144 sq.m (d) 19.25 sq.m

9) Mr. Sharma decided to walk down the escalator of a tube station. He found that if he walks down 26 steps, he requires 30 seconds to reach the bottom. However, if he steps down 34 stairs he would only require 18 seconds to get to the bottom. If the time is measured from the moment the top step begins to descend to the time he steps off the last step at the bottom, find out the height of the stair way in steps?

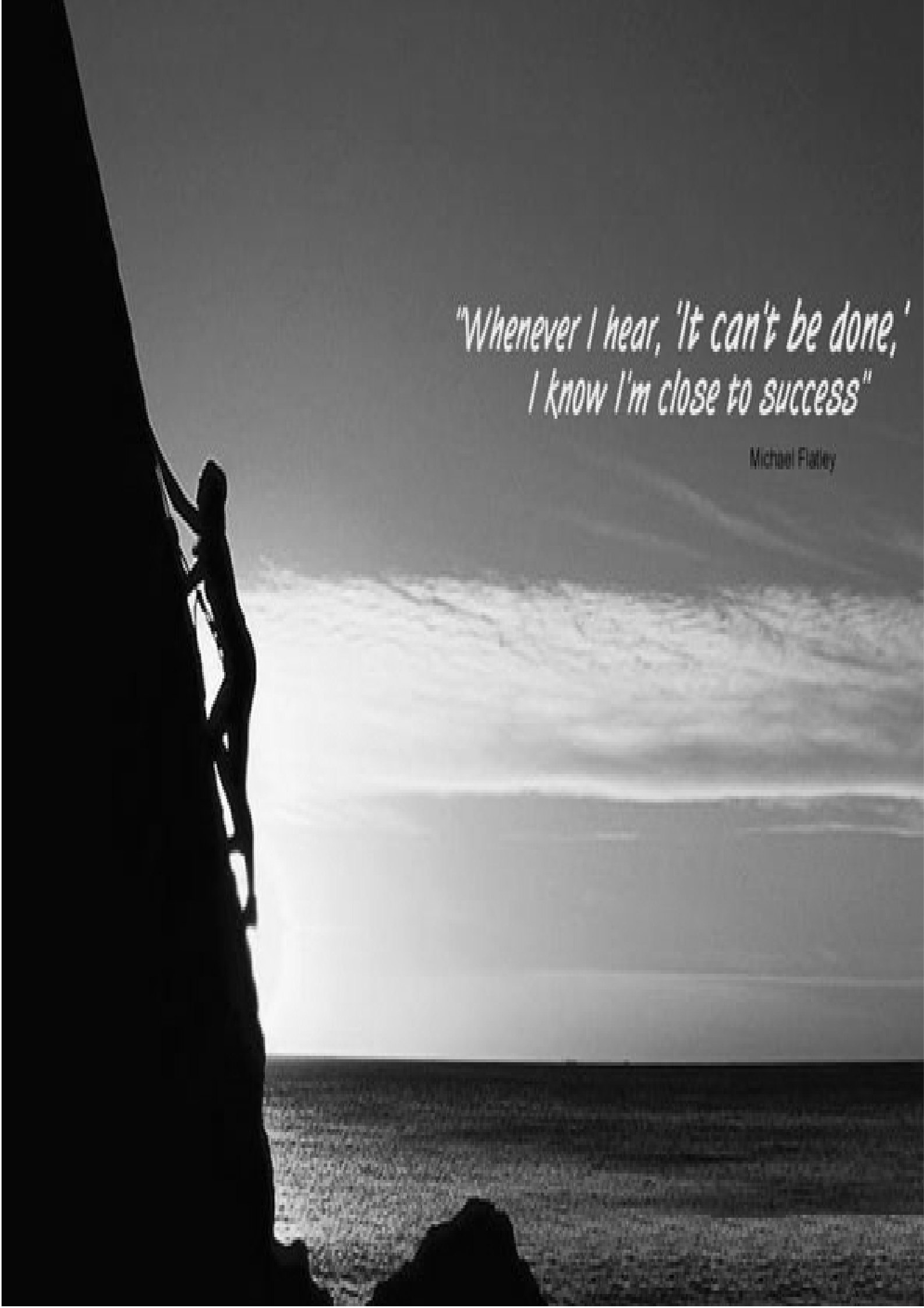
a) 46 b) 39
c) 41 d) 43

10) The average age of 10 members of a committee is the same as it was 4 years ago, because an old member has been replaced by a young member. Find how much younger is the new member?

a) 35 b) 50
c) 40 d) none of the above

By:

Mr. B.VINOTH KUMAR,
FINAL YEAR(MEIEA).


"Whenever I hear, 'It can't be done,'
I know I'm close to success"
Michael Flatley