PROJECT REPORT

INSTRUMENT LANDING SYSTEM

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By

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➢ TABLE OF CONTENT

1. **ABBREVATIONS**
2. ILS - Instrument Landing System
3. LOC or LLZ - Localizer
4. VHF - Very High Frequency
5. VOR - VHF Omni Directional Range
6. OM - Outer Marker
7. MM - Middle Marker
8. IM - Inner Marker
9. DME - Distance Measuring Equipment
10. RVR - Runway Visual Range
11. DH - Decision Height
12. MAP - Missed Approach Point
13. IMC - Instrument Meteorological Conditions
14. IFR - Instrument Flight Rules
15. CAST/ICAO - International Civil Aviation Organization
16. UHF - Ultra High Frequency
17. FAA - Federal Aviation Administration
18. APP - Appendix
19. LDA - Localizer Type Directional Aid
20. FAF - Final Approach Fix
21. AGL - Above Ground Level

22. GPS - Global Positioning System
23. ALS - Approach Lghting System
24. IAP - Instrument Approach Procedure
25. CAT - Clear Air Turbulence
26. MDA - Minimum Descent Altitude
27. NDB - Non Directional Beacon
28. IR - Infrared
29. VCC - Voltage Collector To Collector
30. LED - Light Emitting Diode
31. IC - Collector Current
32. GND - Ground

2. LIST OF TABLES

LIST OF ILLUSTRATIONS

3. ACKNOWLEDGEMENT

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Ms. Geetanjali Said.

4. Abstract

The Instrument Landing System is constructed as an educational study model for student of B.Sc Aeronautics. The theoretical working of ILS with highly efficient manner and understanding of complicity of such radio commutation in simple manner. The instrument landing system (ILS) is the most popular landing aid in the world. It is a distance-angled support system for landing in reduced visibility, while its task is the safe conduct of the aircraft from the prescribed course landing on the approach path. The aim of this study is to analyses the correctness of the ILS in simulated conditions.

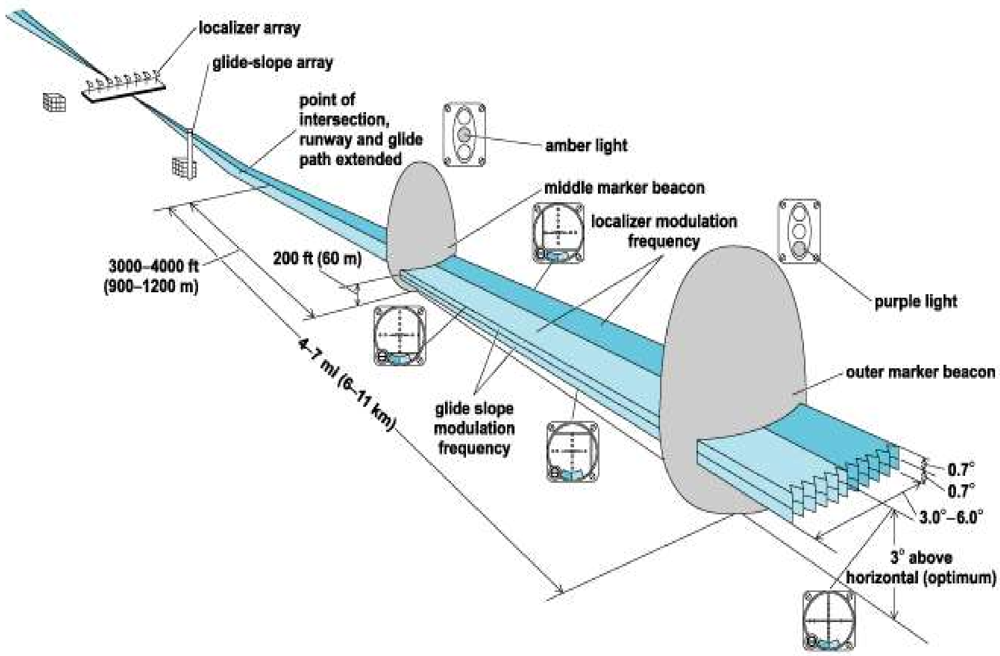
An ILS operates as ground-based instrument approach system, which provides precision lateral and vertical guidance to an aircraft approaching and landing on a runway, using combination of radio signals and, in many cases, high-intensity lighting arrays to enable safe landing during instrument meteorological conditions, such as low ceilings or reduced visibility due to fog, rain or blowing snow.

An ILS comprises two segments: a ground segment and airborne segment. The ground segment includes a localizer (LOC or LLZ), an ILS glide slope, marking markers and DM radio beacons, while the airborne segment consists of three receivers: VOR/LOC, ILS – G receiver and the markers' receive

5. Introduction

An instrument landing system (ILS) is a system that works by sending radio waves downrange from the runway end, with aircraft that intercept it using the radio waves to guide them onto the runway. It is defined by the International Telecommunication Union as a service provided by a station as follows:

A radio navigation system which provides aircraft with horizontal and vertical guidance just before and during landing and, at certain fixed points, indicates the distance to the reference point of landing.



Localizer: - The primary component of the ILS is the localizer, which provides lateral guidance. The transmitter and antenna (Shown above) are on the centreline at the opposite end of the runway from the approach threshold.

Glide Path: - The glide path component of ILS provides vertical guidance to the pilot during the approach. Glide path is located 750 to 1,250 feet (ft) down the runway from the threshold (shown above), offset 400 to 600 ft from the runway centre line.

- **Markers**

(i) Outer Marker; (OM): The outer marker (if installed) is located 3 1/2 to 6 NM from the threshold within 250 ft of the extended runway centreline to provide the pilot with the ability to make a positive position fix on the localizer.
(ii) Middle Marker (MM): The middle marker (if installed) is located approximately 0.5 to 0.8 NM from the threshold on the extended runway centreline. The middle marker crosses the glide slope at approximately 200 to 250 ft above the runway elevation.

- **DME**

Distance Measuring Equipment (DME) is normally collocated with glide path and provides slant distance to the aircraft with respect to touch down point.

The approach lighting system:-Various runway lighting systems serve as integral parts of the ILS system to aid the pilot in landing. Any or all of the following lighting systems may be provided at a given facility: approach light system (ALS), sequenced flashing light (SFL), touchdown zone lights (TDZ) and centreline lights (CLL-required for Category II & III operations.)

- **RUNAWAY VISUAL RANGE (RVR)**

In order to land, the pilot must be able to see appropriate visual aids not later than the arrival at the decision height (DH) or the missed approach point (MAP).

6. Principle of Operation:-

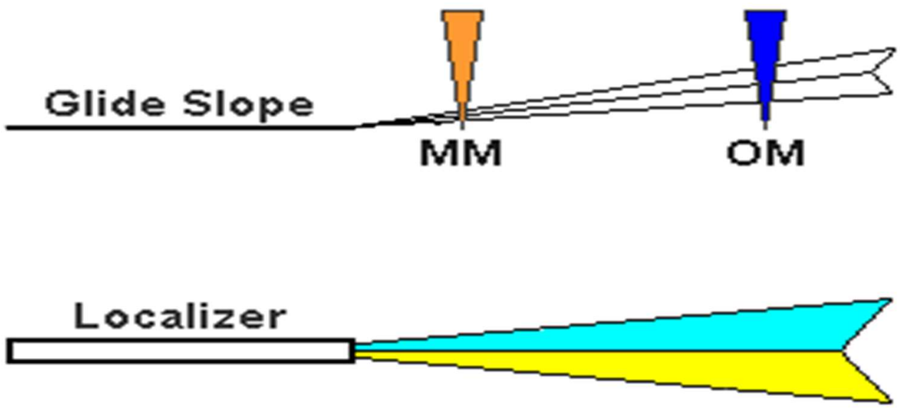
An instrument landing system operates as a ground-based instrument approach system that provides precision lateral and vertical guidance to an aircraft approaching and landing on a runway, using a combination of radio signals and, in many cases, high-intensity lighting arrays to enable a safe landing during instrument meteorological conditions (IMC), such as low ceilings or reduced visibility due to fog, rain, or blowing snow.

An instrument approach procedure chart (or 'approach plate') is published for each ILS approach to provide the information needed to fly an ILS approach during instrument flight rules (IFR) operations. A chart includes the radio frequencies used by the ILS components or navaids and the prescribed minimum visibility requirements.

Radio-navigation aids must provide a certain accuracy (set by international standards of CAST/ICAO); to ensure this is the case, flight inspection organizations periodically check critical parameters with properly equipped aircraft to calibrate and certify ILS precision.

An aircraft approaching a runway is guided by the ILS receivers in the aircraft by performing modulation depth comparisons. Many aircraft can route signals into the autopilot to fly the approach automatically. An ILS consists of two independent sub-systems. The localizer provides lateral guidance; the glide slope provides vertical guidance.

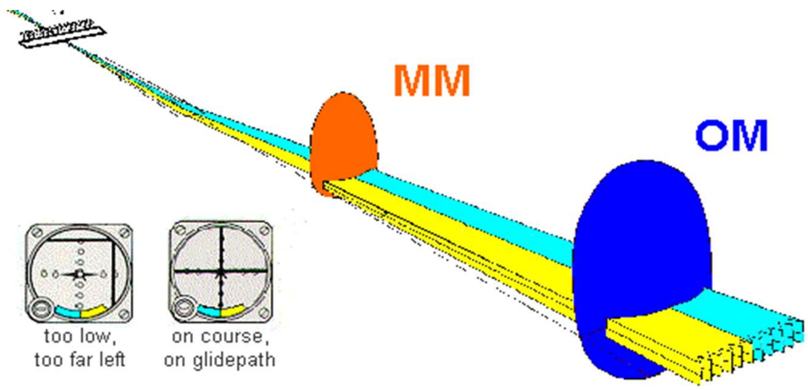
➢ **The ILS Components**



When you fly the ILS, you're really following two signals: a localizer for lateral guidance (VHF); and a glide slope for vertical guidance (UHF). When you tune your Nav. receiver to a localizer frequency a second receiver, the glide-slope receiver, is automatically tuned to its proper frequency. The pairing is automatic.There's more to an ILS than the localizer and glide slope signals. The FAA categorizes the components this way:

- **Guidance information:** the localizer and glide slope.
- **Range information:** the outer marker (OM) and the middle marker (MM) beacons.
- **Visual information:** approach lights, touchdown and canter line lights, runway lights.

7. **Descriptions of the ILS components**



Three-dimensional depiction of the Instrument Landing System. Early VOR indicators had the yellow and blue-coloured arc as shown here, but it was later phased out because it provided no useful information. Localizer antennas shown at far end of runway.

I. The Localizer (In Cockpit):-

The localizer signal provides azimuth, or lateral, information to guide the aircraft to the centerline of the runway. It is similar to a VOR signal except that it provides radial information for only a single course; the runway heading. Localizer information is displayed on the same indicator as your VOR information.

When tracking the localizer the pilot turns towards the needle in the same manner as with VOR navigation The glideslope scale is located to the right of the attitude sphere. On aircraft which have a mechanical gyro compass are both the localizer and glideslope indicated as a vertical and a horizontal arrow in the compass as well. But they are essentially read in the same way. On some aircraft is only the glideslope indicated on two main instruments, and the oldest version of ILS-instruments was an instrument of its own used instead. This used two dangling bars, fixed in the middle of the top (localizer indicator) and in the middle of the left side (glideslope indicator), and if the aircraft was located on the intended glide path, the dangling bars formed a cross. This is, in theory, however, more difficult to learn—but even for pilots experienced with using such indicators, it added another instrument they needed to focus on. With the indicators added to the artificial horizon (and to the compass), the pilot can theoretically watch the attitude simultaneously with the localizer and glideslope.

In modern cockpits, the localizer is seen as a colored dot (usually in the shape of a diamond) at the bottom of the artificial horizon gauge. It does not appear during cruise, but comes up during the descent and approach to the selected runway, provided that the navigation radio is set to the ILS frequency of that specific runway. If the transmitted localizer beam, which usually, but not always, is directed in the heading of the runway extension. If the aircraft is located on this line, the localizer dot will appear in the middle of the scale. But if the aircraft is located a little left of the beam, the marker will appear to the right on the localizer gauge scale in cockpit. The pilot then knows he or she must adjust the heading towards the dot.

In older cockpits, the localizer scale below the artificial horizon is rather short. But in older style cockpit instrumentation, the localizer also appears as an arrow in the gyro compass below the artificial horizon. The top and bottom of this arrow "is one unit", which shows current heading. But the middle part of this arrow is moving independently of the aircraft's heading. The middle of that arrow could be described as being "stand alone", and moves to the left if the aircraft is located to the right of localizer beam and to the right if the aircraft is located to the left of the localizer beam. When the arrow is "united" to a straight line, then the aircraft is following the localizer beam. (This second "arrow-indicator" is omitted in modern cockpits, but the main compass is still located below the artificial horizon)

- **The Localizer (At Runways)**

A localizer (LOC, or LLZ until ICAO standardisation) is an antenna array normally located beyond the departure end of the runway and generally consists of several pairs of directional antennas.

The localizer will allow the aircraft to turn and match the aircraft with the runway. After that, the pilots will activate approach phase (APP).

In some cases, a course projected by localizer is at an angle to the runway (usually due to obstructions near the airport). It is then referred to as a localizer type directional aid (LDA). The localizer system is placed about 1,000 feet from the far end of the approached runway. Usable volume extends to 18 NM for a path up to 10° either side of runway centreline. At an angle of 35° either side of runway centreline, the useful volume extends up to 10 NM. Horizontal accuracy increases as distance between the aircraft and localizer decreases. Localizer approach specific weather minimums are found on approach plates.

- **Specifics of the Localizer**

1. The localizer antenna is located at the far end of the runway.
2. The approach course of the localizer is called the front course.
3. The course line in the opposite direction to the front course is called the back course.
4. The localizer signal is normally usable 18 NM from the field.
5. The Morse code Identification of the localizer consists of a three-letter identifier preceded by the letter I. Here is the localizer identifier for Providence's Runway 5.

I. The Glide Slope

The Glide Slope is the signal that provides vertical guidance to the aircraft during the ILS approach. The standard glide-slope path is 3° downhill to the approach-end of the runway. Follow it faithfully and your altitude will be precisely correct when you reach the touchdown zone of the runway.

Tracking the glide slope is identical to tracking a localizer. If the glide-slope needle swings away from center—up or down—maneuver the aircraft towards the needle by adjusting the engine's power. Don't point the aircraft's nose up or down.

- **Glide Slope in Cockpit**

The glide path projection angle is normally adjusted to 3 degrees above horizontal so that it intersects the MM at about 200 feet and the OM at about 1,400 feet above the runway elevation. The glide slope is normally usable to a distance of 10 NM.

At the Outer Marker, each dot of glide slope deviation equals about a 50-foot excursion from the prescribed glide path. At the Middle Marker, the sensitivity is an astounding eight feet per dot.

Glide Slope at Ground

III. Marker Beacons

Marker beacons are used to alert the pilot that an action (e.g., altitude check) is needed. This information is presented to the pilot by audio and visual cues. The ILS may contain three marker beacons: inner, middle and outer. The inner marker is used only for Category II operations. The marker beacons are located at specified intervals along the ILS approach and are identified by discrete audio and visual characteristics (see the table below). All marker beacons operate on a frequency of 75 MHz.

Indications a pilot receives when passing over a marker beacon.			
MARKER	**CODE**	**LIGHT**	**SOUND**
OM	_ _ _	BLUE	400 Hz two dashes/second
MM	._._._	AMBER	1300 Hz Alternate dot and dash
IM	. . . .	WHITE	3000 Hz only dots

The OM, 4 to 7 NM from the runway threshold, normally indicates where an aircraft intercepts the glide path when at the published altitude. The outer marker, which normally identifies the final approach fix (FAF), is situated on the same course/track as the localizer and the runway center-line, four to seven nautical miles before the runway threshold. It is typically located about 1 NM (1.85 km) inside the point where the glideslope intercepts the intermediate altitude and transmits a 400 Hz tone signal on a low-powered (3 watts), 75 MHz carrier signal. Its antenna is highly directional, and is pointed straight up. The valid signal area is a 2,400 ft (730 m) × 4,200 ft (1,280 m) ellipse (as measured 1,000 ft (300 m) above the antenna.) When the aircraft passes over the outer marker antenna, its marker beacon receiver detects the signal. The system gives the pilot a visual (blinking blue outer marker light) and aural (continuous series of audio tone morse code-like 'dashes') indication.

The MM, 3500 feet from the runway threshold, is the Decision Height point for a normal ILS approach. On glide path at the MM an aircraft will be approximately 200 feet above the runway.A middle marker works on the same principle as an outer marker. When the aircraft is above the middle marker, the receiver's amber middle marker light starts blinking, and a repeating pattern of audible morse code-like dot-dashes at a frequency of 1,300 Hz in the headset. This alerts the pilot that the CAT I missed approach point (typically 200 feet (60 m) above the ground level on the glideslope) has been passed and should have already initiated the missed approach if one of several visual cues has not been spotted.

The IM. 1000 feet from the runway threshold, is the Decision Height point for a Category II approach. Similar to the outer and middle markers, a inner marker located at the beginning (threshold) of the runway on some ILS approach systems (usually Category II and III) having decision heights of less than 200 feet (60 m) AGL. Triggers a flashing white light on the same marker beacon receiver used for the outer and middle markers; also a series of audio tone 'dots' at a frequency of 3,000 Hz in the headset.

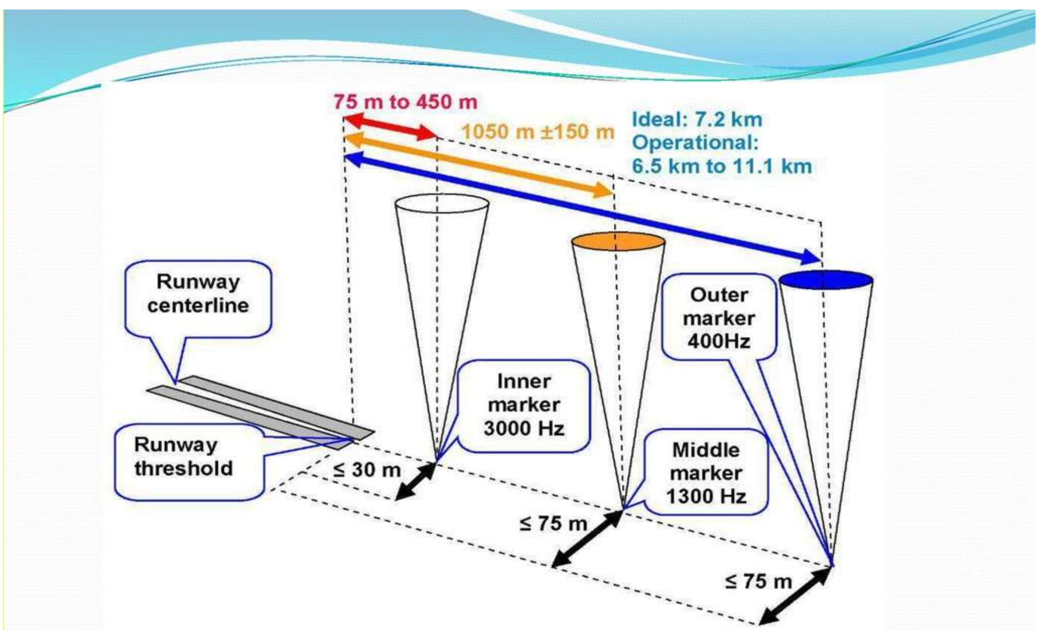
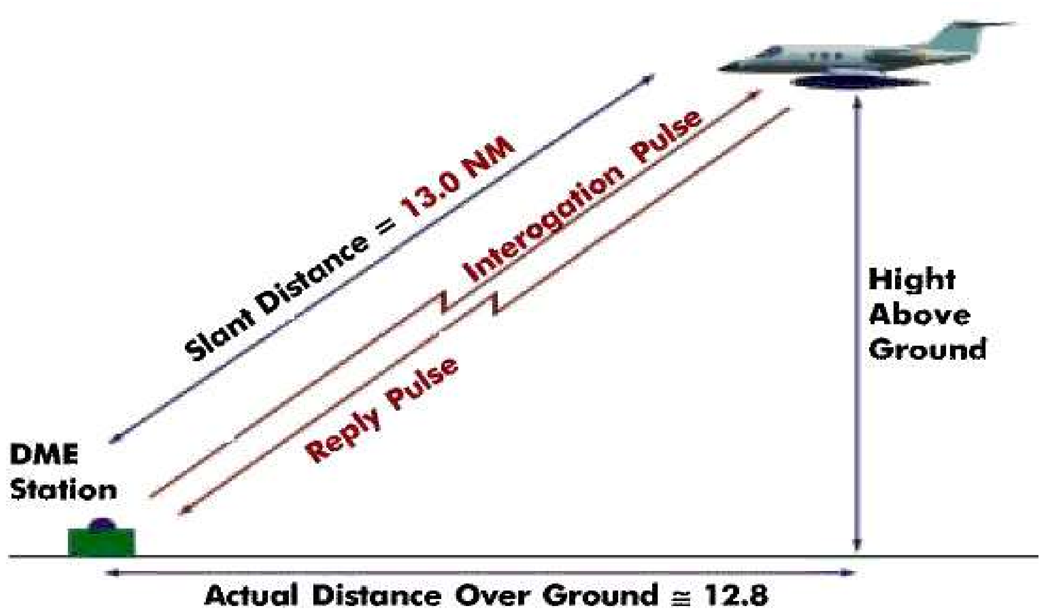


Figure 14: Marker beacon placement with respect to runway

IV. DME Substitution

Distance measuring equipment (DME) is a radio navigation technology that measures the slant range (distance) between an aircraft and a ground station by timing the propagation delay of radio signals in the frequency band between 960 and 1215 megahertz (MHz). Line-of-visibility between the aircraft and ground station is required.

Distance measuring equipment (DME) provides pilots with a slant range measurement of distance to the runway in nautical miles. DMEs are augmenting or replacing markers in many installations. The DME provides more accurate and continuous monitoring of correct progress on the ILS glide slope to the pilot, and does not require an installation outside the airport boundary. When used in conjunction with an ILS, the DME is often sited midway between the reciprocal runways thresholds with the internal delay modified so that one unit can provide distance information to either runway threshold. For approaches where a DME is specified in lieu of marker beacons, DME required is noted on the Instrument Approach Procedure and the aircraft must have at least one operating DME unit, or an IFR approved GPS system to begin the approach.



8. Approach Light:-

An approach lighting system, or ALS, is a lighting system installed on the approach end of an airport runway and consisting of a series of light bars, strobe lights, or a combination of the two that extends outward from the runway end. ALS usually serves a runway that has an instrument approach procedure (IAP) associated with it and allows the pilot to visually identify the runway environment and align the aircraft with the runway upon arriving at a prescribed point on an approach.

Modern approach lighting systems are highly complex in their design and significantly enhance the safety of aircraft operations, particularly in conditions of reduced visibility.

Some installations include medium- or high-intensity approach light systems (abbreviated ALS). Most often, these are at larger airports but many small general aviation airports have approach lights to support their ILS installations and obtain low-visibility minimums. The ALS assists the pilot in transitioning from instrument to visual flight, and to align the aircraft visually with the runway center line. Pilot observation of the approach lighting system at the Decision Altitude allows the pilot to continue descending towards the runway, even if the runway or runway lights cannot be seen, since the ALS counts as runway end environment. In ILS without approach lights may have CAT I ILS visibility minimums as low as 3/4 mile (runway visual range of 4,000 feet) if the required obstacle clearance surfaces are clear of obstructions. Visibility minimums of 1/2 mile (runway visual range of 2,400 feet) are possible with a CAT I ILS approach supported by a 1,400-to-3,000-foot-long (430 to 910 m) ALS, and 3/8 mile visibility 1,800-foot (550 m) visual range is possible if the runway has high-intensity edge lights, touchdown zone and center line lights, and an ALS that is at least 2,400 feet (730 m) long. In effect, ALS extends the runway environment out towards the landing aircraft and allows low-visibility operations. CAT II and III ILS approaches generally require complex high-intensity approach light systems, while medium-intensity systems are usually paired with CAT I ILS approaches. At many non-towered airports, the pilot controls the lighting system; for example, the pilot can key the microphone seven times to turn on the lights on the high intensity, five times to medium intensity or three times for low intensity.

9. Decision Height:-

Once established on an approach, the pilot follows the ILS approach path indicated by the localizer and descends along the glide path to the decision height. This is the height at which the pilot must have adequate visual reference to the landing environment (e.g. approach or runway lighting) to decide whether to continue the descent to a landing; otherwise, the pilot must execute a missed approach procedure, then try the same approach again, try a different approach, or divert to another airport.

The ILS brings in a brand new term, Decision Height, or DH as you will always hear it from here on. Thus far, the altitude published in the minimums section of the approach plates that you have used has been the MDA, or Minimum Descent Altitude. When flying a non-precision approach, you are not authorized to descend below the MDA unless you can see the runway or the approach lights and make a normal landing.

DH has a similar meaning. The DH for an ILS approach is a point on the glide slope *determined by the altimeter* where a decision must be made to either continue the landing or execute a missed approach.

- The minimums for a straight-in ILS approach to Runway 5 are 253 ft. DH and 1800 ft. RVR. As you descend down the glide slope, when your altimeter reads 253 ft., you must make a decision whether to continue the descent and approach, or to execute a missed approach.
- If the Glide Slope is unavailable for whatever reason, one could fly a Localizer approach straight in to Runway 5. In that case, with no glide slope, the approach is no longer a precision approach because no vertical guidance information is being provided. The 460 ft. on the chart is now the MDA, not the DH, and the minimum RVR has increased to 2400 ft. Here, like the VOR and NDB approaches that you have already flown, you may descend to the MDA as soon as you pass the FAF.

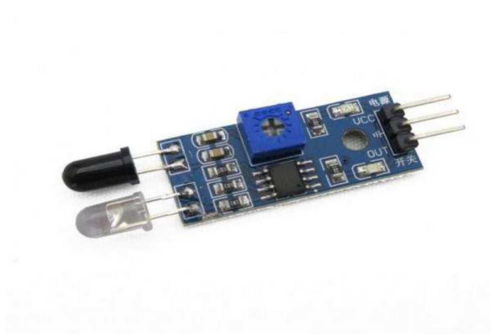
10. Component Used For Project

1. IR (Infrared) Sensor :-

IR Sensor module has great adaptive capability of the ambient light, having a pair of infrared transmitter and the receiver tube, the infrared emitting tube to emit a certain frequency, encounters an obstacle detection direction (reflecting surface), infrared reflected back to the receiver tube receiving, after a comparator circuit processing, the green LED lights up, while the signal output will output digital signal (a low-level signal), through the potentiometer knob to adjust the detection distance, the effective distance range 2 ~ 10cm working voltage of 3.3V-5V. The detection range of the sensor can be adjusted by the potentiometer, with little interference, easy to assemble, easy to use features, can be widely used robot obstacle avoidance, obstacle avoidance car assembly line count and black-and-white line tracking and many other occasions.

Interface (3-wire):-

- VCC external 3.3V-5V voltage (can be directly connected with the a 5v microcontroller and 3.3v microcontroller).
- GND external GND.
- OUT board digital output interface (0 and 1).

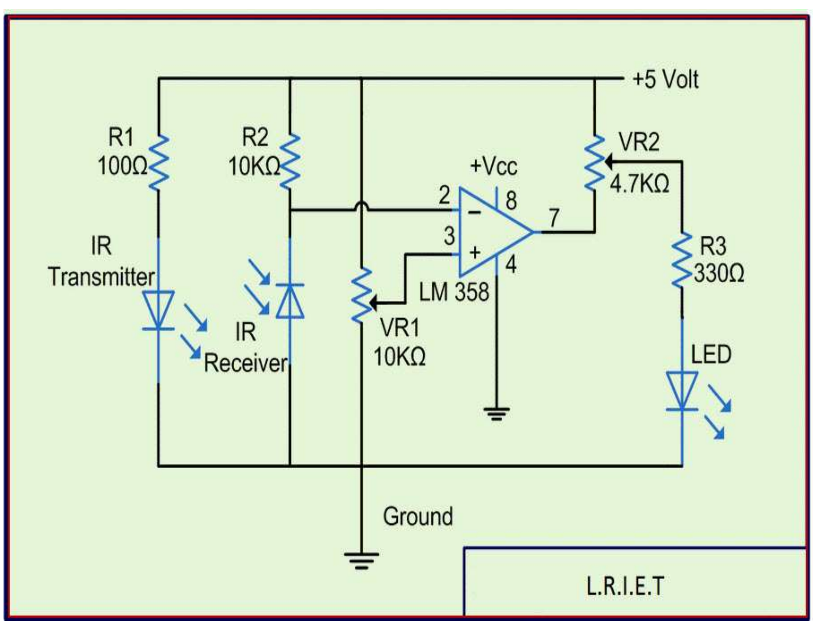


➢ **Circuit Diagram and Working Principle of IR Sensor:-**

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (light emitting diode) and the detector is simply an IR photodiode that is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real-time. This circuit comprises of the following components

- LM358 IC 2 IR transmitter and receiver pair
- Resistors of the range of kilo-ohms.
- Variable resistors.
- LED (Light Emitting Diode).



In this the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analysed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.

When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram.

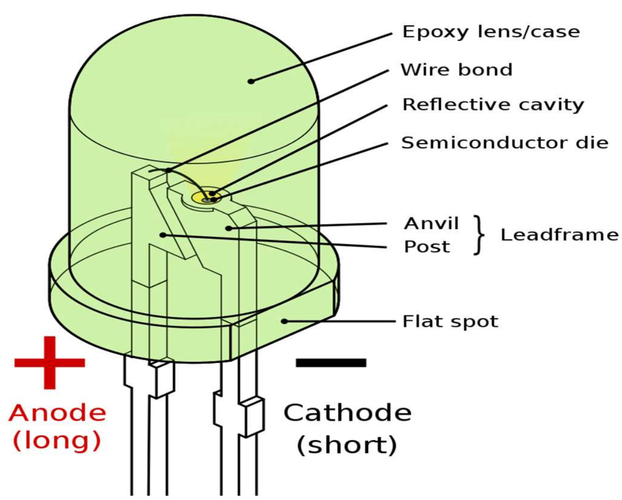
➢ **Features of IR Sensor Module:-**

- When the module detects obstacles in front of the signal, the circuit board green indicator light level, while the OUT port continuous output low-level signals, the module detects a distance of 2 ~ 10cm, detection angle 35 °, the detection distance can be potential adjustment with adjustment potentiometer clockwise, the increase in detection distance; counter clockwise adjustment potentiometer, the detection distance decreased.
- The sensor active infrared reflection detection, target reflectivity and shape of the detection distance of the key. The black minimum detection range, white maximum; small area object distance is small, a large area from the large.
- The sensor module output port OUT can be directly connected with the microcontroller IO port can also be driven directly to a 5V relay; Connection: VCC-VCC; GND-GND; OUT-IO.
- The comparator using LM358, stable.
- 3-5V DC power supply module can be used. When the power is turned on, the red power LED is lit.
- With the screw holes of 3mm, easy to install.

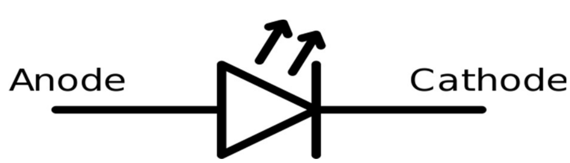
- Board size: 3.1CM 1.5CM.
- Each module in the delivery has threshold comparator voltage adjustable via potentiometer, special circumstances, please do not adjust the potential

2. Light Emitting Diode:-

A light emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.



Electronic Symbol:-



Applications:-

LED uses fall into four major categories:

- Visual signals where light goes more or less directly from the source to the human eye, to convey a message or meaning.
- Illumination where light is reflected from objects to give visual response of these objects.
- Measuring and interacting with processes involving no human vision.
- Narrow band light sensors where LEDs operate in a reverse-bias mode and respond to incident light, instead of emitting light.

3. Jumper Wires:-

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.

Meaning of the Colour:-

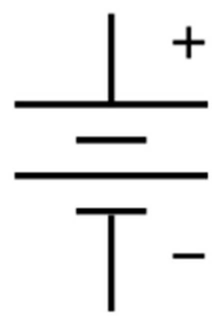
Though jumper wires come in a variety of colors, the colors don’t actually mean anything. This means that a red jumper wire is technically the same as a black one. But the colors can be used to your advantage in order to differentiate between types of connections, such as ground or power.

4. Battery:-

This is General purpose 9V Original HW marked Non-Rechargeable Battery. A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices.Batteries convert chemical energy directly to electrical energy. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

Primary (single-use or "disposable") batteries are used once and discarded, as the electrode materials are irreversibly changed during discharge; a common example is the alkaline battery used for flashlights and a multitude of portable electronic devices. Secondary (rechargeable) batteries can be discharged and recharged multiple times using an applied electric current; the original composition of the electrodes can be restored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium-ion batteries used for portable electronics such as laptops and mobile phones.

- **Electronic Symbol:-**



- **Safety Precautions:-**

1. Avoid short-Circuit the battery terminals.
2. Do n0t put it beside the high-temperature condition?
3. Don’t throw it into the fire or Water after use

11. CONCLUSION:-

The aim of this study was to examine the accuracy of instrument landing system (ILS). The study was conducted by using books based on instrument, Wikipedia and the model of ILS .As the aircraft in cooperation with the ILS made correct approaches and landings in any weather conditions.

At a controlled airport, air traffic control will direct aircraft to the localizer course via assigned headings, making sure aircraft do not get too close to each other (maintain separation), but also avoiding delay as much as possible. Several aircraft can be on the ILS at the same time, several miles apart. An aircraft that has turned onto the inbound heading and is within two and a half degrees of the localizer course (half scale deflection or less shown by the course deviation indicator) is said to be established on the approach. Typically, an aircraft is established by at least 2 nautical miles (3.7 km) prior to the final approach fix (glide slope intercept at the specified altitude).

Aircraft deviation from the optimal path is indicated to the flight crew by means of a display dial (a carryover from when an analog meter movement indicated deviation from the course line via voltages sent from the ILS receiver).An aircraft landing procedure can be e output from the ILS receiver goes to the display system (head-down display and either coupled where the autopilot or Flight Control Computer directly flies the aircraft and the flight crew monitor the operation, or uncoupled where the flight crew flies the aircraft manually to keep the localizer and glide slope indicators centered.

The work carried out in this study was dictated by the fact that the ILS is the most widely used system in aviation; indeed, every airport is currently equipped with this system. The correct operation of the system affects safety when flying or landing aircraft. As this study is far from exhaustive, however, we recommend that a complete analysis should be carried out on the impact of other factors on the operation of the ILS.

12. REFERENCES

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Aeronautical Information Manual, FAA – February 11, 2010

Digital Terminal Procedures, FAA – May 2010

Aircraft Instrument, Second Edition ,EHJ Pallett

Mr. Kasote Rajaram (M.Tech Electrical)

BONAFIDE CERTIFICATE

This is to certify that the project report titled Instrument"Landing System is a bonafide record of work carried out by Ms. Geetanjali Ashok Said during the final semester from"November 2020" to "April 2020 and under my guidance, in partial fulfilment of 2020

the requirements for the award of BACHELOR OF SCIENCE – in AERONAUTICS (AVOINICS)

Prof.Dr.M Suresh Kumar
Principal

DECLARATION

I, Ms. Geetanjali Ashok Said hereby declared that this porject report titled Instrument Landing System submitted in partial fulfilment of the requirement For the award of "BACHELOR OF SCIENCE - in AERONAUTICS (Avionics) is my original work and it has not formed the basis for the award of any other degree.

(signature of student)

Geetanjali Said.

Place :- PUNE

Date :- 30/09/2020