# Range Detector Using LIDAR

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**Abstract – A range detector is a device that measures the distance from the target to the observer, for the purposes of surveying, determining focus in photography, or accurately aiming a weapon. Existing system includes ultrasonic sensors can find distance up to 20m while this system works with the help of LIDAR-Lite Laser Rangefinder system. It features laser range finding for distances of upto 40m with accuracy of ±2.5% (~1 inch) and an acquisition time under 20 ms . All of this is offered in a module that weighs 16g and consumes less than 100 mA and 5V DC volts.**

**Index Terms – LIDAR, Servomotor, Arduino Board, IDE.**

## 1. INTRODUCTION

Radar is an object detection system that uses electromagnetic waves to identify range, altitude, direction, or speed of both moving and fixed objects such as aircraft, ships, vehicles, weather formations, and terrain. Basically the range detection help us in many ways like in military purposes, air traffic control for finding range of various things for general purpose also. In this system we are using LIDAR which uses laser pulses which travel at the speed of light and enables us to collect data fast and more accurately.

## 2. RELATED WORK

Existing range detection system uses SONAR and IR range sensors and ultrasonic sensors. Sonar has the ability to provide good ranging on most surfaces but they have wide detection beams that can easily be interfered with. On the other hand, IR range sensors can provide a confined beam that is very small but suffers from reflective differences on varying surfaces, thus changing the distance readings. While other system includes range detection using ultrasonic sensors whose biggest demerit is that it can detect range for shorter range. And also when the object is wrapped in soft fabric it absorbs more sound waves making it hard for sensor to see target.

## 3. PROPOSED MODELLING

LiDAR is the latest remote sensing technologies that have replaced the traditional data collection methods such as photogrammetry and surveying. It is relatively easy to use and offer fastzezr and more accurate services as compared to the traditional methods.In this proposed system we are using LIDAR- lite laser range finder system. This system features laser range finding for distances of up to 40m(~1 inch) and an acquisition time under 20 ms . All of this is offered in a module that weighs 16g and consumes less than 100 mA and 5V DC volts. In this system we are using Arduino board with Li-DAR and servo motor for full 180 degree. The two kinds of lidar detection method are incoherent or direct energy systems which measures amplitude changes of the reflected light. Coherent detection method is said to be best for measuring doppler shifts or changes in phase of the reflected light. Coherent system uses optical heterodyne detection. This is more sensitive that direct detection and allows them to operate at much lower power, but requires more complex transceivers.

Figure 1 LIDAR

## 4. SYSTEM ARCHITECTURE

The Architecture of the proposed system is the diagrammatic representation which depicts the scope of the project with the whole system design. In architecture diagram, it depicts the system with its various functions as a process. It aims to show the internal design of the proposed system. The following diagram shows the entire architecture of the proposed system.

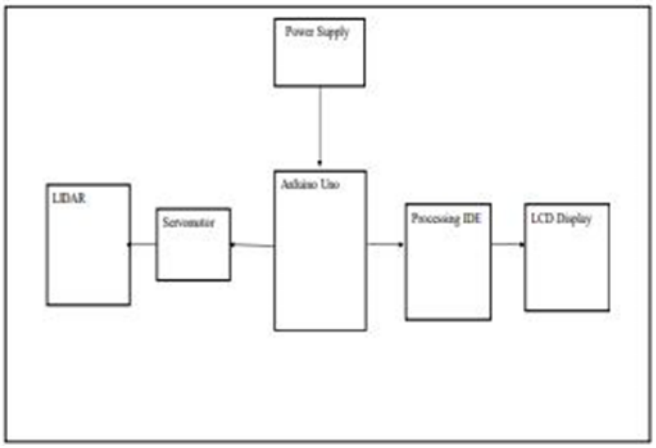


Figure 2 System Architecture

This system is first given the power supply to Arduino board and then the servo motor rotates 180 degree to observer all around the surrounding. Using this servo motor LIDAR is implemented to detect any aim or object which need to be detected. This system can detect distance up to 40 m. In this system the distance of the target and the angle of deflection are represented graphically.

## 5. SYSTEM IMPLEMENTATION

This system is being implemented using LIDAR, servo motor and Arduino board. The implementation includes first powering of the whole system. The power to the system is given AC power direct from plug. After the Arduino has been powered the control is given to servo motor. The servo motor checks the surrounding by rotating up to 180 degree. The LiDAR sensor is being mounted on the servo motor. So as with the rotation of the servo motor the LiDAR sensor also rotates having a wide field of inspection and detection. The LiDAR sensor produces a beam of laser pulse.

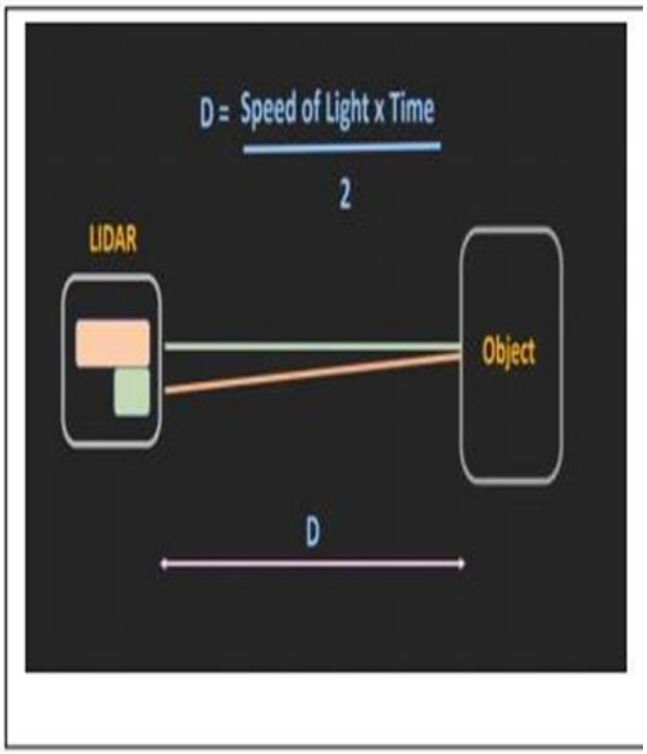


Figure 3 Lidar Working

which travels with the speed of light. The beam after getting reflected back by the object is being measured by the detector and in the detector side the timing between the transmitted pulse and the received pulse is measured. Let the distance between the LIDAR and object is D, then,

D=Speed of light * Time /2 (1)

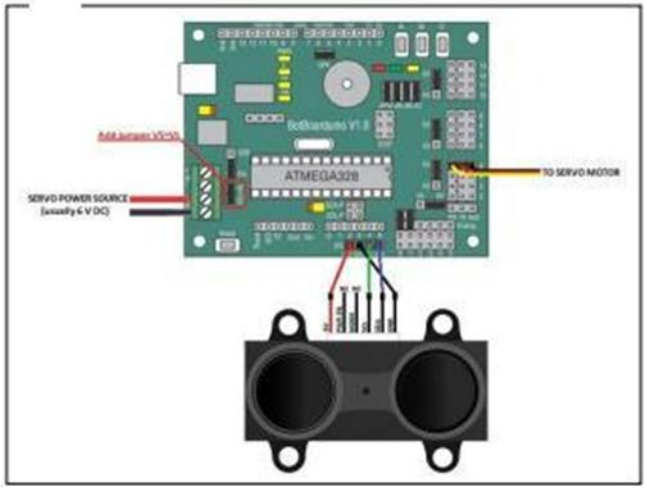


Figure 4 Circuit Diagram

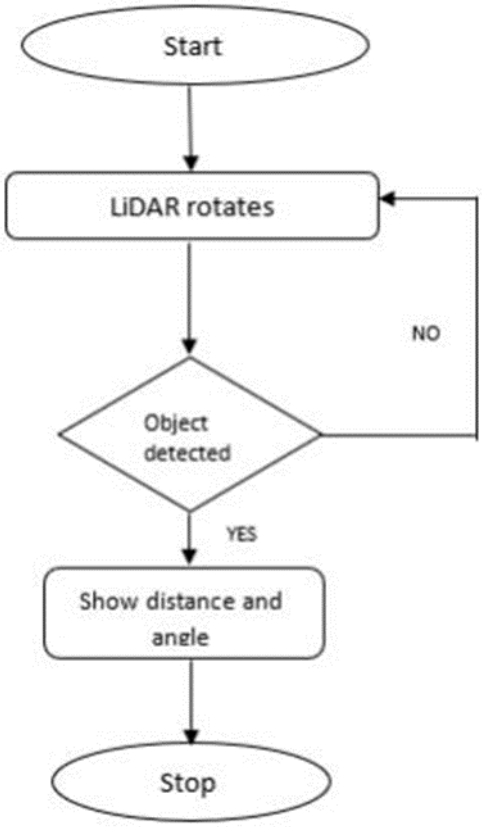


Figure 5 Flow Chart

## 6. CONCLUSION

The proposed system is more accurate and has high degree of precision and because of this precision these LIDAR system is useful in 3D mapping of the object and even for the surface scanning of object and also by using this system we can scan building and as well as different terrain for military purposes

as well as for ATC (Air traffic control).This system uses short wavelength i.e high frequency waves which travels with very fast speed and gives very accurate outputs.

## REFERENCES

[1] Dr.Kadam and Patil Yuvr, "Arduino Based Moving Radar System" International Journal of Innovative Studies in Sciences and Engineering Technology, April 2017.
[2] Hesham Ismail and Balakumar Balachandran , "Algorithm Fusion for Feature Extraction and Map Construction from Sonar data," IEEE Sensors Journal, Nov 2015
[3] Imed Haddda and Vaclav Krivanek, "Low cost 3D mapping for Indoor Navigation" , IJISSET.
[4] D.G. Lown , " Object recognition from local scale-invariant features", IEEE 7th conf. Computer Vision (ICCV), september 1997
[5] Snehal Boob and Priyanka Jadhav, " Wireless Instrusion Detection System", International Journal of Computer Application,August 2010
[6] P.M. Lange and K.L.G. Nielsen, "Phase recognition in an opeerating room using sensor technology", IT University of Copenhagen, Feb 2010
[7] The Smart Detect Project Team, "Wireless Sensor network for Human Intruder Detection", Indian Institute of Science Banglore, May2010
[8] Lili Wan and Tiejun Chen, "Automobile Antitheft System Design based on GSM", International Conference of Advanced Computer Control, Jan 2009
[9] The Smart Detect Project Team, "Wireless Sensor network for Human Intruder Detection", Indian Institute of Science Banglore, May2010
[10] Lili Wan and Tiejun Chen, "Automobile Antitheft System Design based on GSM", International Conference of Advanced Computer Control, Jan 2009.