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3D Scanner

3D Scanner Using Arduino

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Abstract: This study has been undertaken to investigate the determinants of stock returns in Karachi Stock Exchange (KSE) using two assets pricing models the classical Capital Asset Pricing Model and Arbitrage Pricing Theory model. To test the CAPM market return is used, and macroeconomic variables are used to test the APT. The macroeconomic variables include inflation, oil prices, interest rate and exchange rate. For the very purpose monthly time series data has been arranged from Jan 2010 to Dec 2014. The analytical framework contains**.**

Index Terms - 3D scanning, LIDAR sensor, Arduino, servo motors, real-time, point cloud, high-resolution, MeshLab, 3D modelling, engineering, architecture, healthcare, affordable, efficient, customization.

I. INTRODUCTION

In recent years, 3D scanning has become increasingly popular in various fields such as architecture, engineering, and product design. The ability to accurately capture and reproduce 3D objects is essential for many applications, including reverse engineering, prototyping, and quality control. While there are many commercial 3D scanning solutions available, they can be expensive and often lack the flexibility to meet specific project requirements. In this paper, we propose a 3D scanner using an Arduino microcontroller, servo motors, and a LIDAR (Light Detection and Ranging) sensor. The system is designed to provide a low-cost and customizable 3D scanning solution that can be adapted for a variety of applications. The use of servo motors allows for precise control of the LIDAR sensor's orientation, enabling the system to capture high-quality 3D point clouds. We present the system's design, implementation, and evaluation, demonstrating its capabilities through several test scans. The results indicate that our proposed 3D scanner provides a low-cost and effective solution for 3D scanning applications.

1.1 PROBLEM STATEMENT

The issue that encouraged the development of this 3D scanner system is the need for an affordable and efficient solution for 3D scanning applications in various industries such as engineering, architecture, and healthcare. Traditional 3D scanning technologies can be expensive and require specialized expertise, limiting their accessibility to smaller businesses and individuals. This system offers an accessible and customizable solution that can be built and operated by individuals with basic technical skills. The system's real-time scanning capabilities and high-resolution 3D modelling make it a valuable tool for industries that require accurate and detailed scans of complex shapes and geometries.

2. LITERATURE SURVEY

A literature review is a survey of scholarly sources (such as books, journal articles, and theses) related to a specific topic or research question. It is often written as part of a thesis, dissertation, or research paper, in order to situate your work in relation to existing knowledge. It establishes the authors' in-depth understanding and knowledge of their field subject. It gives the background of the research. Portrays the scientific manuscript plan of examining the research result. Illuminates on how the knowledge has changed within the field.

Year of Publication	Author	Publication Paper/Conference	Project Title	Application
2021	Al-Dulaimi	IEEE Access	Low-Cost 3D Scanner Based on line Laser and Web Camera	Reverse Engineering
2021	Karimzadeh et al.	IEEE Sensors Journal	Design and Implementation of a Low-Cost 3D Scanner Based on a Structured Light System	Cultural Heritage Preservation
2021	Azar et al.	IEEE Sensors Journal	Design and Development of a Low-Cost 3D Scanner Using a Smartphone Camera and a Turntable	3D Printing

3. PROPOSED SYSTEM

The proposed system is a 3D scanner using an Arduino microcontroller, servo motors, and a LIDAR (Light Detection and Ranging) sensor. The system is designed to provide a low-cost and customizable 3D scanning solution that can be adapted for a variety of applications. The use of servo motors allows for precise control of the LIDAR sensor's orientation, enabling the system to capture high-quality 3D point clouds. The system consists of a LIDAR sensor, two servo motors, an Arduino microcontroller, and a power supply. The LIDAR sensor is mounted on a platform that is controlled by the two servo motors. The servo motors allow for precise control of the orientation of the LIDAR sensor, enabling the system to capture 3D data from different angles. The Arduino microcontroller is used to control the servo motors and to process the data captured by the LIDAR sensor. The system's software is written in Arduino's programming language and is responsible for controlling the servo motors, collecting, and processing the data captured by the LIDAR sensor, and generating a 3D point cloud of the scanned object. The system can be customized to scan objects of different sizes and shapes by adjusting the position and orientation of the LIDAR sensor.

3.1 BLOCK DIAGRAM

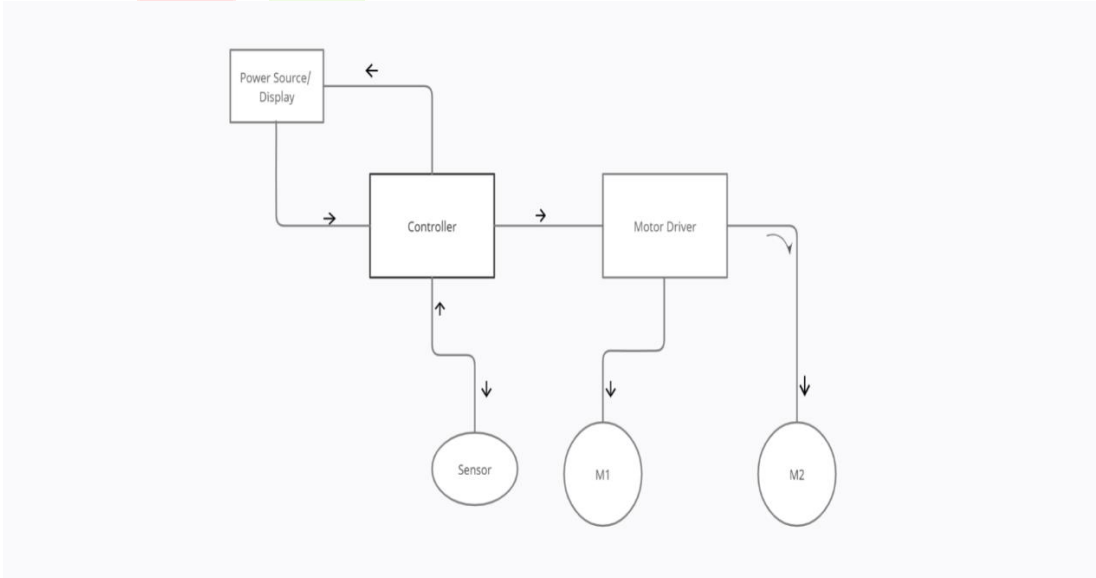

Fig -1: Block Diagram

3.2 CIRCUIT DIAGRAM

A circuit diagram is a graphical representation of an electrical circuit. A pictorial circuit diagram Muses simple images of components, while a schematic diagram shows the interconnections of the circuit using standardized symbolic representations. The circuit diagram of the proposed system is shown in fig 2.

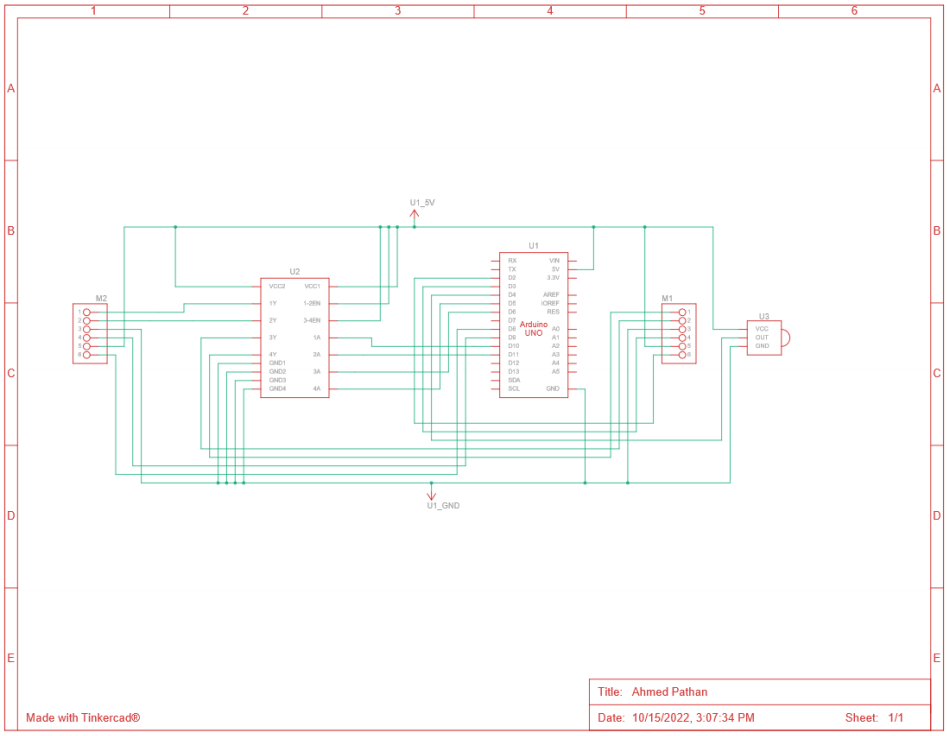

Fig -2: Circuit Diagram

3.3 METHODOLOGY

The methodology for the proposed 3D scanner using Arduino and servo motors with a LIDAR sensor can be broken down into the following steps:

1. Hardware Setup: The LIDAR sensor, servo motors, and Arduino microcontroller are assembled into a functional system. The LIDAR sensor is mounted on a platform that is controlled by the servo motors. The servo motors are connected to the Arduino microcontroller and are programmed to move the LIDAR sensor in a controlled manner.

2. Software Development: The software for the system is developed in Arduino's programming language. The software is responsible for controlling the servo motors, collecting, and processing the data captured by the LIDAR sensor, and generating a 3D point cloud of the scanned object. The software is designed to be user-friendly and customizable.

3. Scanning Process: The object to be scanned is placed in front of the LIDAR sensor, and the system is turned on. The servo motors are programmed to move the LIDAR sensor in a controlled manner, capturing data from different angles. The LIDAR sensor emits laser beams, which bounce off the object and are detected by the sensor. The data collected by the LIDAR sensor is sent to the Arduino microcontroller for processing.

4. Data Processing: The data collected by the LIDAR sensor is processed by the software running on the Arduino microcontroller. The software uses algorithms to analyse the data and generate a 3D point cloud of the scanned object. The point cloud is a set of data points that represents the surface of the object in three dimensions.

5. Output: The output of the system is a 3D point cloud of the scanned object. The point cloud can be saved in a variety of file formats, such as STL, OBJ, or PLY. The point cloud can be imported into 3D modelling software for further processing, such as mesh generation, surface smoothing, or 3D printing.

The methodology for the proposed system is designed to be simple and easy to use. The system's flexibility and customizability make it suitable for a wide range of 3D scanning applications. The use of open-source hardware and software also makes the system accessible and affordable.

4. CONCLUSION

In conclusion, the 3D scanner system using Arduino and servo motors with LIDAR sensor provides an affordable and efficient solution for 3D scanning applications. The system is easy to build and can be customized to fit various scanning needs. The system's accuracy and real-time scanning capabilities make it a valuable tool for industries such as engineering, architecture, and healthcare. Future research could focus on improving the system's speed and developing a user-friendly interface for non-technical users.

5. REFERENCES

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BIOGRAPHIES (Not Essential)

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