TWO-AXIS ROBOTIC ARM FOR SURFACE MAPPING

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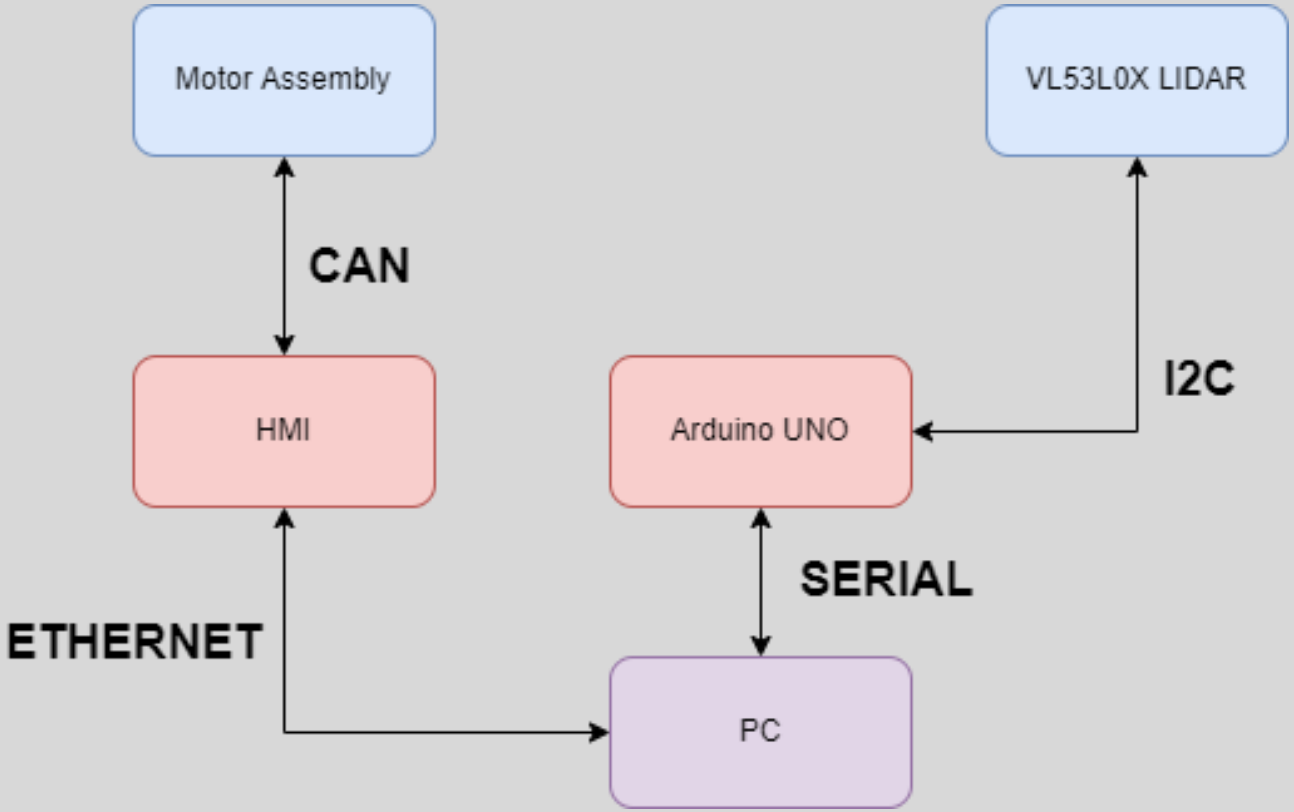
PROJECT OVERVIEW

- The goal of the project is to map an unknown surface and store it as Point Cloud Data.
- The surface is to be mapped using a LIDAR sensor mounted on a two-axis robotic arm.
- The arm is driven by stepper motors while the LIDAR sensor interfaces with microcontroller.
- The data collected is sent to a PC for Point Cloud Data generation.

PROJECT SETUP

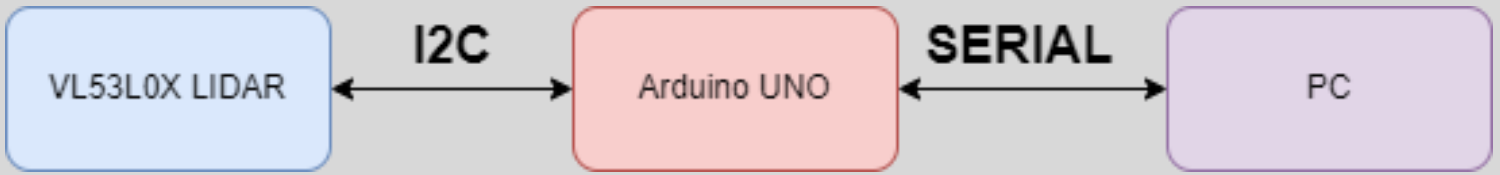
- Two-axis arm setup
- Stepper motors
- LIDAR sensor
- Arduino UNO
- HMI
- Computer System for LIDAR data storage and processing

BLOCK DIAGRAM



PROGRESS – 1 – LIDAR Data Collection

- Communication is established between Arduino UNO and LIDAR sensor through I2C protocol.
- The distance data measured by the LIDAR is sent to the Arduino every 1 second.
- Serial communication is established between Arduino and PC.
- Arduino send the data as a custom dataframe.
- Python script is used to log the serial data as a CSV file onto the PC for further processing.



PROGRESS – 2 – Data Processing

- Validity of every dataframe is verified by checking the length of the dataframe and it's starting and ending character.
- The sequence number, distance, and the motor count values are picked for further processing.
- Motor angle is calculated using count values.
- Given the joint data and the LIDAR measurement, kinematics is used to generate the Point Cloud Data which is plotted.

THANK YOU