Project Proposal:

Automated IoT Cuboidal Box Dimension Measurement and Labelling System

Group Members:-

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Introduction:

The purpose of this project is to design and develop an IoT-based automated system for measuring the dimensions of cuboidal boxes and applying labels with unique IDs and barcodes. The system will utilise SONAR sensors to accurately measure the dimensions of the boxes as they move along a conveyor belt. This project aims to demonstrate the integration of IoT, sensor technology, and automation for industrial applications.
Objective: The primary objective of this project is to create a reliable and efficient system that can automate the process of measuring cuboidal box dimensions and applying identification labels. The system should ensure accurate measurements and minimise human intervention, leading to increased productivity and reduced errors in the labelling process.

Components and System Architecture:

Conveyor Belt: The conveyor belt will transport cuboidal boxes through the measurement and labelling stations. It will be equipped with sensors to detect the presence of boxes and control their movement.

SONAR Sensors: Around 6 SONAR sensors will be strategically placed along the conveyor belt's path. These sensors will emit ultrasonic waves and measure the time taken for the waves to bounce back after hitting the box's surface. This data will be used to calculate the dimensions of the box.

Microcontroller Unit (MCU): A powerful MCU (e.g., Arduino, Raspberry Pi) will interface with the SONAR sensors, process the sensor data, perform dimension calculations, and control the conveyor belt's movement. It will also manage the communication between the IoT components.

IoT Connectivity: The MCU will be connected to the internet using Wi-Fi or Ethernet. This connectivity will enable remote monitoring, data logging, and control of the system. Cloud platforms like AWS, Azure, or Google Cloud can be used for data storage and analysis.

Label Printer: Once the dimensions are measured, the system will trigger a label printer to generate labels containing a unique ID and a barcode representing the dimensions and other relevant information.

Workflow:

The operator places cuboidal boxes on the conveyor belt.
As a box moves along the conveyor belt, the SONAR sensors collect data on the dimensions of the box.
The MCU processes the sensor data, calculates the dimensions, and triggers the label printing process.
The label printer generates a label with a unique ID and a barcode, including the box's dimensions.
The label is automatically applied to the box as it continues to move on the conveyor belt.
The system sends measurement data and label information to the cloud for storage and analysis.

Benefits:

Accuracy: The use of SONAR sensors ensures accurate and reliable measurements of box dimensions.
Efficiency: Automation reduces the need for manual measurements and labeling, improving productivity.
Data Analysis: Cloud connectivity enables data analysis and performance monitoring.
Error Reduction: Minimized human intervention reduces the risk of measurement and labeling errors.

Educational Value: The project provides practical experience in IoT, sensor technology, and automation.

Conclusion:

This IoT-based automated cuboidal box measurement and labeling system presents a practical application of technology in an industrial setting. By integrating SONAR sensors, MCUs, label printers, and cloud connectivity, the system showcases the potential benefits of automation in enhancing accuracy, efficiency, and data management. This project aligns with the principles of Industry 4.0 and offers valuable learning opportunities for students interested in IoT and industrial automation.