Review Progress, Plan Next Steps, Create Stakeholder Map & Observe Users

EN2160 - Electronic Design Realization

Industrial End Effector

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Introduction

In fast-paced industrial automation, a new end effector equipped with four Time-of-Flight (ToF) sensors is designed to enhance accuracy and efficiency. Unlike conventional grippers, this innovative tool detects box orientation in real-time, allowing the robot to adjust its grip instantly for a secure hold, regardless of how the box is positioned. This advancement minimizes errors and delays, reducing production downtime and damage, while also accommodating various box shapes and sizes without manual adjustments. By streamlining workflows and decreasing product damage, this smart end effector not only improves operational efficiency but also delivers cost savings, making industrial robotics more reliable and adaptable.

Review Progress

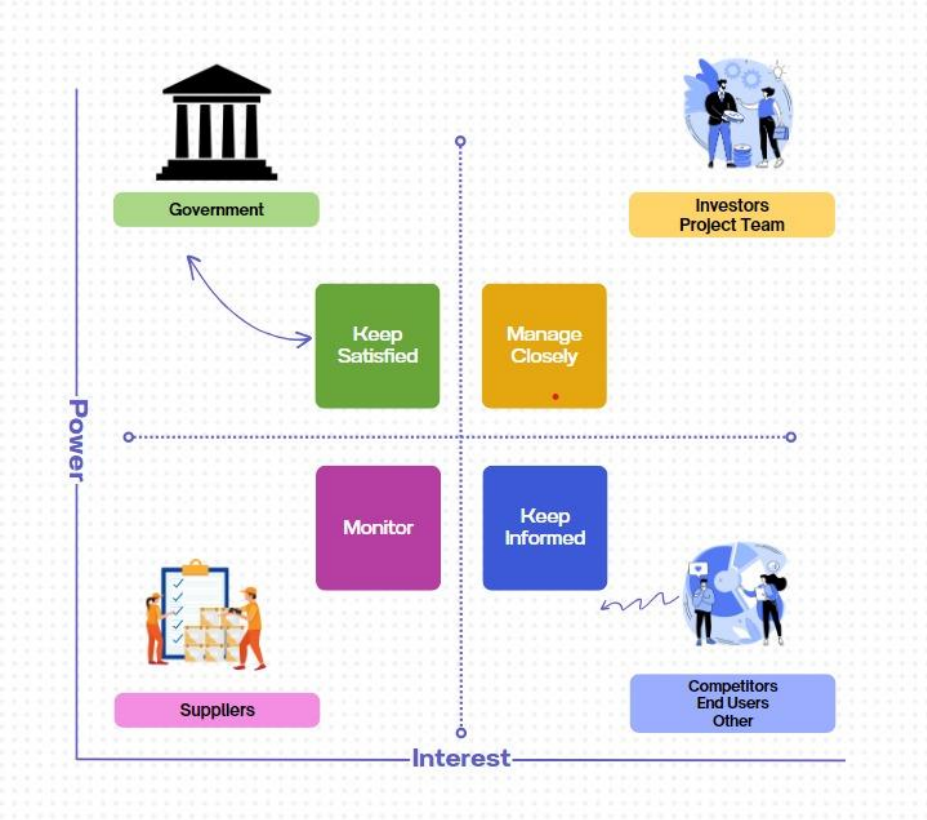
From the selection of the project, we have considered several ideas such as using LiDAR sensors, machine vision techniques, and Time-of-Flight (ToF) sensors. After reviewing various videos and research papers, we have concluded that utilizing ToF sensors is the most effective approach. Subsequently, we have opted to detect the orientation of the box using four ToF sensors and transmit this information to the robot control panel. To achieve this, we will employ the Modbus protocol and provide the feed through a USB output. Currently, we are sketching the basic design of ToF sensor placements and studying the Modbus protocol.

Plan Next Steps

Our next steps involve conducting laboratory testing with four ToF sensors attached to a panel and boxes with different orientations. We will measure distances using these sensors and adjust the orientation accordingly. Subsequently, we plan to plot a graph of the orientation in degrees relative to each ToF sensor reading and establish the mathematical relationship between them. This is our immediate focus. Following this, we intend to convert the data into a format relevant to the robot control panel using coordinates. For this task, we will utilize the Modbus protocol.

Create Stakeholder Map

As an undergraduate group working on the project, the primary stakeholders include the project team of us, who are responsible for design, testing, and implementation. The University of Moratuwa, supervising the project, plays a crucial role in providing guidance and resources, ensuring academic standards are met. Industrial clients, which could be simulated or hypothetical, represent the end-users of the end effector, highlighting the importance of meeting industry needs and aligning with real-world applications. Suppliers of components and materials provide essential resources for building the end effector, contributing to the project's success and functionality. Additionally, classmates may serve as collaborators or provide valuable feedback during various stages of the project, fostering collaboration and knowledge exchange within the academic community. Finally, the academic community benefits from potential contributions to research, enriching the learning experience and advancing understanding in the field of industrial automation.



Observe Users

We have found some similar projects related to this, and below, we have listed them.
ABB Robotics - Palletizing Cartons (youtube.com)

ABB Robotics - Palletizing drums of paint (youtube.com)

Palletizing Robot Handling a Variety of Boxes (youtube.com)

Conclusion

In conclusion, our end effector project involves a diverse set of stakeholders, each with unique needs and expectations. From the project team responsible for its development to the University of Moratuwa providing guidance, and potential industrial clients seeking practical solutions, addressing the requirements of each stakeholder group is crucial for the success of our endeavor. By carefully considering and catering to the needs of these stakeholders, we can ensure the successful marketing and adoption of our end effector in the industrial automation sector.