



Senior Design Project

Computer Vision-based Robotic Arm Using Pixy Cam

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Faculty Advisor:

Dr. Riasat Khan

Assistant Professor

ECE Department

Fall, 2021

LETTER OF TRANSMITAL

October, 2021

To

Dr. Mohammad Rezaul Bari

Chairman,

Department of Electrical and Computer Engineering

North South University, Dhaka

Subject: Submission of Capstone Project Report on “Computer Vision-based Robotic Arm Using Pixy Cam.”

Dear Sir,

With due respect, we would like to submit our **Capstone Project Report on “Computer Vision-based Robotic Arm Using Pixy Cam”** as a part of our BSc program. The report deals with robotic arm working process through computer vision system. This project was very much valuable to us as it helped us gain experience from practical field and apply in real life. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you kindly receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

.....
Anika Nawer Eva
ECE Department
North South University, Bangladesh

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Tabassum Bintah Yeahyea
ECE Department
North South University, Bangladesh

.....
Md. Abdullah-Al-Noman
ECE Department
North South University, Bangladesh

APPROVAL

Anika Nower Eva (ID # 1611688042), Tabassum Binth Yeahyea (ID # 1530438042) and Md. Abudullah-Al-Noman (ID # 1610593042) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled “Computer Vision-based Robotic Arm Using Pixy Cam” under the supervision of Dr. Riasat Khan partial fulfillment of the requirement for the degree of Bachelors of Science in Engineering and has been accepted as satisfactory.

Supervisor’s Signature

Riasat Khan

Dr. Riasat Khan

Assistant Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

Chairman’s Signature

Dr. Mohammad Rezaul Bari

Associate Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

DECLARATION

This is to certify that this Project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

Students' names & Signatures

1. Anika Nawer Eva

2. Tabassum Binth Yeahyea

3. Md. Abdullah-Al-Noman

ACKNOWLEDGEMENTS

By kindness of the Almighty we have successfully completed our capstone senior design project entitled “Computer Vision-based Robotic Arm Using Pixy Cam”

Our deep gratitude goes first to my faculty advisor Dr. Riasat Khan, who expertly guided us in our senior design project throughout the whole CSE/EEE499A and CSE/EEE499B. His guidance helped us in all type of research, writings and completing the project.

Our sincere thanks also goes to North South University, Dhaka, Bangladesh for giving us such a platform where we can have an industrial level experience as a part of our academics.

Last but not the least, we would like to thank our family as their inspiration and guidance kept us focused and motivated.

ABSTRACT

COMPUTER VISION-BASED ROBOTIC ARM USING PIXY CAM

Many facets of human existence have been influenced by robotics. Industry activities have become more automated, increasing efficiency while lowering the time and human labor. With time, electronic technology has advanced. The objective is to make the robots as human-like as possible. In challenging situations, humans are unlikely to act successfully. In this work, robots will be used to perform a comparable job in a far more efficient manner. This research has built a robotic gripper that can select and arrange objects to complete tasks. This study utilizes the picture acquisition methodology to distinguish picked and placed objects according to the object's color and also calculated the distance from the center of the arm. It can also detect the geometrical shape of an object. The robotic arm detects the object by its color, then preprogrammed command is generated in the robotic arm to pick the object, after picking up the object the arm releases the object according to its color behind the fixed positions of the robotic arm, then the arm comes back to its initial coordinate of the position. The pixy cam helps to load an image to detect the geometrical shape. It also detects the size of an area of the different geometrical shapes in the compare method.

Keywords— robotic arm, PixyCMU, servomotor, Arduino, intelligent system, color sorting