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**Project: Color Detection**

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**Supercomputing Challenge: Final Report**

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**Executive Summary:**

Although we may often overlook them, colors are a very prevalent and important part of our life. However, how often do we utilize technology in order to get an advantage on color detection? According to *Envision Intelligence* “Color is one of the most influential attributes of light, although we may not be aware of this fact and its importance. Nonetheless, color plays a distinctive role of immense importance in our daily life and quite a few industrial and scientific applications. The number of sensors dedicated to sensing color is minimal, and the existence or operation of such sensors are little known to the public. (Teja, 2018)” Through this we can see how little these devices are being utilized, especially in this day of technology. So, how can we, as students, start to utilize this color detection technology in ways that are relevant and interesting to us? Women in STEM 310 has decided to find ways to utilize color detection in a way that is relevant to them for another robotics challenge that they compete in. As they work towards their goals in color detection they also look over other ways in which these systems are applicable and how to apply them.

**Statement of the Problem:**

In this world of advancing technology the Women in STEM 310 team had the question “how can we incorporate color detection into our lives?” or, more specifically, “how can we incorporate color detection into schools in a way that would be relevant?” With this question in mind, the team decided to incorporate and explore color detection into one of their robotics challenges. Through this challenge, that many schools compete in, the team looked at all the ways implementing color detection through this way could benefit their goals.

**Proposed Solution:**

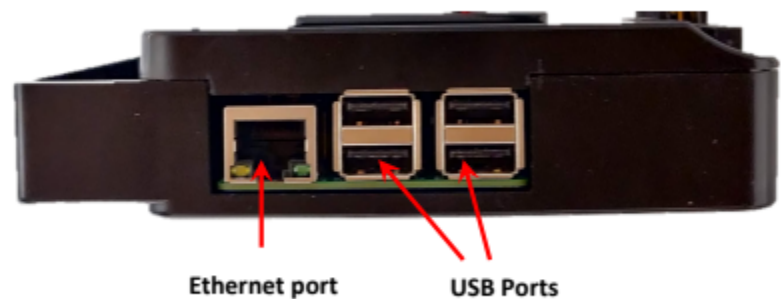
The members of Women in STEM 310 compete in many different challenges. One of these challenges, Botball, requires a lot of color detection in order to complete certain tasks and gain more points in order to “win” (Botball). The desire to make color detection easier in this challenge sparked our interest in color detection and how we could improve upon it. Additionally, it was a fun and creative way to start an introduction to color detection that could easily be taught to other peers, students, etc. who could use this type of “tool” in their project. Currently, we have been using the Botball modules and provided cameras in order to learn about and reach our goal. However, we have also looked into other units that might help us complete our task although looking much further into these devices has been discouraged by our advisor as that is not our main goal for this project.

## Conclusion of Research:

Thus far, with the current technology, we have been able to connect the camera to the module and are working on the code in order to, hopefully, improve upon it. As we continue on with this unit we have been using the *Botball Workshop Slides* from 2023 so that we can best understand these units and the extent of their possibilities (guide, n.d.). We hope to further our knowledge on computer vision as a whole by looking into other studies such as *COCO* (Lin et al., 2015) and *Hugging Face* ((*Models*, n.d.)). We have also, briefly, explored other options, such as raspberry pi and LoRa units. However, exploring these other options was discouraged by our advisor since they were not directly related to the challenge that our main units apply to which is why we haven't pursued any other paths further. Although, if needs be, we would be able to use a few different units in order to accomplish our goal.

## Issues Faced:

With projects such as these there are always issues that appear. Some of the biggest issues for the Women in STEM 310 team were scheduling/time



management, programming roadblocks, and application issues. Although these issues seemed very prevalent in our work, among other things, the team decided to sit down and make plans to overcome these issues. Even though each member was facing different issues that made it difficult to overcome some issues, the decision to sit down and overcome them made the project possible.

### **Results of Study:**

As we continued in this project, we hoped to successfully identify colors with the Botball equipment by the end of January and spend time improving it throughout February. If we had any more time left then we would've liked to explore the other

possibilities that the invention has.

Although we have only speculated about using this project with other challenges, we can still see how this system can be applicable in many other situations that utilize colors and computer vision. One of our main goals by using this unit is to make the

concept of computer vision easier to grasp and make it a more broad concept for others to understand. We hope that by making this concept more broad and well known then it will be more explored and can continually become more advanced.

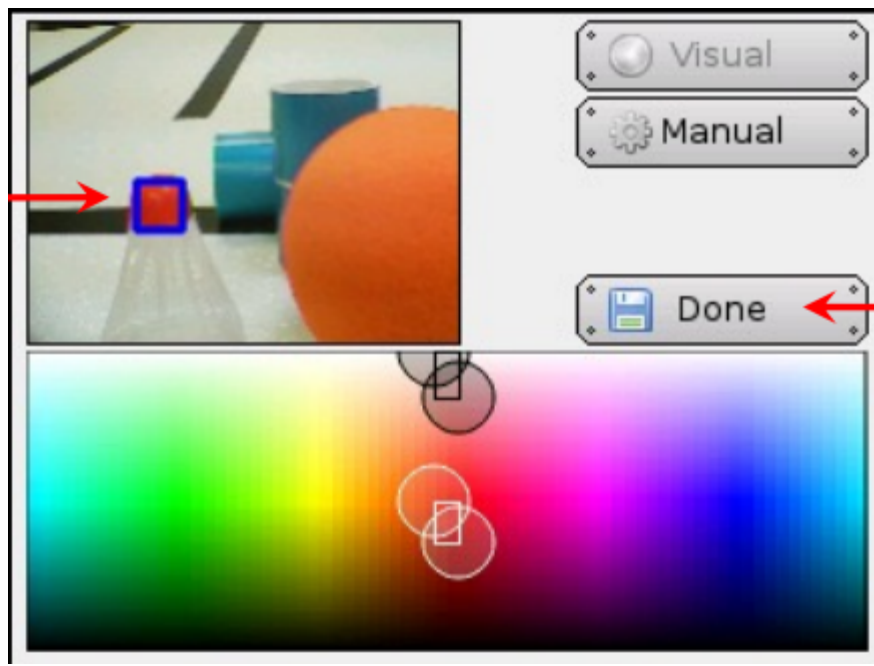


By completing this, *Women in STEM 310*, hopes to better their personal knowledge of code, as well as improve current technologies related to computer vision in order to help the world through innovation.

**Achievements of Project:**

With our advancement in color detection through the *Botball* challenge we have been able to teach others about the importance of color detection without making it

too “complicated” for their first look. Moreover, the results from this project allowed the teammates of *Women in STEM 310* to compete better in their challenge as well as learn better project management skills.



**Verification of Project:**

To verify our project we tried out different code and ran different tests that could verify the different colored objects (mainly cubes) and perform a certain task that was written with the certain colored object. For example, we would allow the camera to verify the color of a red cube. After that we would have a robot move towards the cube, just as a first test. Once that test proved to be successful three consecutive attempts, we would then move onto additional testing. The additional testing would include the robot moving towards the object and then making a servo move, having the robot grab the cube, and seeing if another cube that was a different color would disrupt the color detection processors.



## Acknowledgements

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