Cranbrook Robotics - 39Y

Make It Real Submission

12/7/2020

The AFGA (Anti-Fog Glasses Attachment)

Introduction:

The year of 2020 is an extraordinary one in many ways. COVID-19 has had a significant impact on everybody's life and, to no lesser a degree, the robotics competition. Notwithstanding this plight, just like people in all walks of life have stepped up their effort to overcome the challenges, so has VEX and the robotics programs at many schools. We greatly appreciate their tenacity in allowing this curious yet wonderfully challenging and fun program to continue in times like these, and applaud them for their success thus far.

There still, however, exist many problems that need to be addressed. One vital problem relates to the simultaneous wearing of medical masks and safety goggles. Utterly unique to this year's circumstances, students must wear face masks (to protect from biological harm) in addition to the traditional safety glasses (to protect from physical injury). The warm breath leaking from the top of the mask lands on the cooler lenses of the safety glasses, creating condensation. This problem does not spare the official VEX safety goggles. While this seems just an inconvenient distraction, it has a more serious negative impact on the student players. Foggy vision can (1) cause physical harm (ex. causing wearers to trip/fall) and (2) inhibit competitive integrity (ex. by decreasing driving performance during matches).

Partly to contribute to VEX's relentless effort to make robotics a safe event for all of those who are interested in the world of robotics, and to solve this safety problem, 39Y decided to design the AFGA (Anti-Fog Glasses Attachment).

How It Works

The Anti-Fog Glasses Attachment is made of a flexible rubber-silicon. It can be bent and slotted onto the bottom of safety glasses lenses. After attaching one AFGA to each lens, the user simply puts on the glasses as usual. The comfortable yet present pressure of the attachment against the user's face creates a seal on the underside of the safety glasses. Through this seal, the AFGA inhibits the warm air from entering the safety glasses, mitigating the problem described in the introduction by eliminating condensation inside the safety glasses; condensation on the outside of the lens can be easily wiped off.

Design Process and Pipeline

Only a few weeks after the new robotics season started, our school switched to online courses, and all students went home. While we kept brainstorming with each other, we had not been able to meet to work together in person. Therefore, I, as the captain, took up the responsibility of this online challenge.

I have had little experience with Inventor and Fusion, only experience in less professional, art-catered software such as Blender and Maya. Because of this initial unfamiliarity, I decided to go with the traditional route of real-life prototyping. During the process of sketching, I realized that it would be difficult to create a flat object that, when bent, could precisely fit onto the curved lenses of the safety glasses. To tackle this issue, I built a rough paper draft with the materials I had at home, using my own pair of safety glasses as a reference. Then, I flattened the paper prototype to determine the planar 2D dimensions.

Next, I headed to the Autodesk Design Academy to start learning Inventor, where I learned the basics of 2D sketches and solid body modeling. I started my model by dropping a photo of the paper prototype into the 2D sketch. After multiple revisions, frustrating moments, and reluctant discards, I charged on and finally achieved my design goal with a lightweight and elegant design (using curves and fillets) that is both versatile and comfortable.

For rendering the model, a process I am already familiar with, I used a combination of Inventor Studio Environment and Fusion 360's rendering engine.

The software I used for modeling and rendering: Autodesk Inventor Professional 2020.3 and Autodesk Fusion 360 (education license) V.2.0.9313.

Conclusion and Takeaways

With this year's challenges to robotics regarding COVID-19, a particular and unexpected problem arose: Wearing a face mask in addition to traditional safety glasses causes fogging on the lenses. This seemingly simple problem can have disastrous results. Through hard work and perseverance, 39Y designed a part that solves this problem. In doing so, we have managed to continue the VEX legacy of providing a fun and safe environment for all students who are passionate about learning, creating, and problem solving.

Through the process of conceiving and designing a functioning part, I learned how to meticulously plan from start to finish. I learned to be precise, thoughtful, and adaptive during every step of the process. I have developed further interest in 3D design software and plan to use the techniques I've learned for future robotics projects and beyond. 3D software is an extremely important and powerful tool, and even more so in a time when digitalization is the norm. Specifically for robotics, making 3D models of robots before building, which my school

advocates, avoids the unnecessary touching of parts and materials. Not only is this method safer for students, it also forces them to think deeper and plan ahead.

Whether for design or for art, I think computer aided design programs like these significantly lower barriers of entry into numerous fields, facilitate creation, and unlock raw imagination. In addition, for those who may not have easy access to real materials, Inventor and Fusion makes design a possibility.