



Progress Report

for an automated snowboard binding securing system



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Overview

Throughout the past three months, the Research & Development team of JAC Innovations has made strong and positive strides towards the completion of the Auto Secure Bindings (ASB). We have been strictly adhering to the original milestones and key functional requirements to the best of our abilities.

We are currently at the integration phase of ASB where we combine both the wireless control unit and binding unit. This would enable us to conduct testing to ensure both units function properly and interacts with each other flawlessly. Meanwhile, we will continue to finish various components.

Technical Development

Wireless Control Unit

Hardware

We are delighted to report that the hardware aspect of this unit is completed. The placement of the microcontroller board, radio frequency transceiver, LEDs and battery pack in a confine space posed as a challenge to our development team. As a result, the dimension and implementation of this unit has gone through several major changes since the beginning of the development. The circuitry and other components have been assembled correctly and enclosed in a customized water-proof enclosure. The main modification was in size, which is larger than proposed. One major change involved the introduction of fourth button on the unit as a safety feature to prevent accidental contact of the command buttons. Nevertheless, the changes we made do not sacrifice any of its proposed functionalities.

Software

The engineers were successful in uploading test code to the microcontroller board. We tested the wireless module by sending messages to the binding unit from this unit. The security features for prevention of undesirable contact to the buttons was also tested. The skeletal code for the controller has been completed. Only some functions need to be modified to reflect the send message format.

Binding Unit

Hardware

The fabrication of the binding unit was slightly delayed due to a shortage of parts. We have specified a set of gears system in our design specification in order to give us the best performance. However, the period of time spent finding the gears set with the exact specifications took much longer than expected. Despite the setback, the fabrication of the binding is expected to be completed within the time period specified in the schedule. The two binding bases have been built with the hinges securely mounted. The back-plate has also been mounted onto the back hinges. The only item left on the agenda is the adjustment of the front-plate and the angles of the front hinges. The development team has installed the motors required for the release and rotation of the bindings. The microcontroller board, wireless module and battery have been securely assembled inside a water-proof enclosure. Overall, the hardware aspect of the binding unit is close to completion.

Software

The engineering team have successfully programmed the actuation of the bindings. By using a motor driver, the microcontroller unit was programmed to be able to actuate either left or right binding. In addition to that, it was able to actuate either the front or back binding or both plates. This movement is achieved while the locking mechanism of the hinges was not installed. The engineers have also established interaction of the binding unit to the wireless control unit.

Budget

The Chief Financial Officer (CFO) of JAC Innovations has reported the development cost of ASB has gone over the initial budget of \$680 reaching approximately \$800. This is a result of our company underestimating the cost required for shipping from the United States of America. The shipping and handling fee cost more than expected and they account for more than 12% of the total budget, roughly \$100. A majority of the funds was spent on the hinges, because it would be too time-consuming to fabricate hinges from scratch which possess our desired functionalities. We chose to spend the money instead of time in this aspect. JAC Innovations is grateful to the Engineering Science Student Society (ESSS) of Simon Fraser University (SFU) for its contribution of \$610 from the Engineering Science Student Endowment Fund (ESSEF). This contribution covers 76% of the overall cost. We are planning to submit an application to the Wighton Fund to sponsor the remaining amount of the cost for the ASB prototype. The major components for the prototype have been purchased. However, there are still materials and parts which may be required during the build. Therefore, the development cost is not expected to change drastically.

Human Resources / Team Dynamics

The members of JAC Innovations have been working together seamlessly during the entire development phase. It is very fortunate that there is cooperation and contribution by the members with their best effort of keeping the project on track. The team maintains a healthy relationship and shows respect towards each other. There are frequent email exchanges and phone conversations to keep everyone updated on the project as well as each member's tasks. Formal and informal meetings were held regularly to ensure the project is following our proposed schedule. We are familiar with each individual's strengths and weaknesses since we have previously worked together as a team. Therefore, this valuable experience only strengthens our friendship and team chemistry.

Action Items

The next milestone of the ASB prototype is the completion of the binding unit fabrication with all hardware in place. After the fabrication of binding unit is completed, the remaining tasks are integrating of the two units and improving the exterior aesthetics of the product.

The engineering team will thoroughly conduct testing on the prototype once the integration phase is completed to ensure all function specifications are met. We are going to conclude the testing phase by testing the extreme cases and boundary cases. It is important to ensure the prototype is going to function properly and safely in different realistic scenarios. To conclude the development of the ASB prototype, the engineering team is going apply waterproof and shockproof material to all of our electronic components. The completed ASB prototype will be a system that has undergone a full-scale in-depth testing ensuring every component is working properly both individually and as a whole system.