

## **Previous Goals/Were Goals Achieved?**

Our goals since our last presentation included adding burn degree to the neural net, finishing the user interface prototype, and working to fully integrate everything into our front end design. Our neural net has been able to differentiate between healthy skin, burned skin, and background, but we needed an additional parameter, burn degree differentiation. We also planned to continue to verify and revise our user interface design as we review android developer guidelines and feedback from our sponsor and, potentially, nurses from the Vanderbilt burn center. Our most immediate objective was to completely integrate all sub-functions that have been individually developed into our user interface design, giving us a fully operating application. This requires completion of algorithms for calculations, importing the user interface code onto a mobile phone device, and updating the Java format so that the transition between all systems is clean before all other aspects can be linked within the application. Additionally, we needed to work on finalizing the validation criteria that we would use to test our final application and propose improvements as needed.

Another goal we achieved this week was to deploy the BuilderX UI code to an Android phone. The code was written in React Native and was sufficient for displaying the static, non-functional features of the app, however there were layout and maintainability issues with the BuilderX output. To remedy that issue, we began translating the BuilderX code into a more up-to-date version of React Native and we are currently working on concurrently fixing the layout issues and adding basic app functionality.

## **Progress Since Last Time**

Since completing a full UI prototype on BuilderX, our team has begun to apply our UI design to a working mobile application. Upon attempting to convert the exported BuilderX code directly to React Native, we realized multiple formatting issues and therefore have worked on fixing formatting and functional issues. In addition, after reviewing and comparing our UI prototype to the flowcharts for transfer and fluid calculations, we encountered few discrepancies. These differences have been brought up to our sponsor for clarification and possible revisions to our UI design.

The major progress in image differentiation is a significant expansion of our subimage training base. Dr. Kumar supplied us with 120 more full burn images to supplement the 80 images we had already classified. We classified the extra 120 images to expand our base from about 18000 subimages to 54675 subimages, over tripling our training base. We've gone on to retrain with this larger base and have increased the validation accuracy to over 85%. The training process now takes approximately 50 minutes per epoch. We trained for 12 epochs and plan to train for over 20 epochs to increase accuracy further.

## **Challenges Faced**

One of the issues we faced in the past week was to deploy the BuilderX React Native code to an actual Android phone. After some difficulty with setting up an older React Native environment and older libraries, we were able to deploy the code to the phone. However, there were UI layout issues due to the inherent code structure of the BuilderX output, so we are

translating the BuilderX UI code into a more compact and flexible version. We will be continuing this effort over the next week.

### **Goals Moving Forward**

Moving forward we aim to continue to improve and update our neural network through the additional training with more images. This will allow the neural network to better categorize subimages of skin, and this will reduce the errors within the system while increasing both our specificity and sensitivity. Additionally, we will begin to integrate the neural network into the front end design of our application to create a working prototype of our final design which we can begin using in order to test the validity of our design. This process requires the conversion of code from older versions of react native to newer ones, and the seamless connection of the front end user interface, camera application, and neural network. We believe that this aspect of the design, while time consuming, will allow us to create a fully functional prototype that we can begin to test. These parameters will be determined within the next one to two weeks in order to determine what statistics we need to record in order to determine the validity of our solution, as well as the impact this application has on the current standard of care. Finally, looking forward to design day, we will begin to formulate the background, methods, and other introductory parts of our design poster. Doing so will allow us to have a cohesive outline in place when working towards design day, and it will free up time in order to focus on the iterative process of updating our application in order to better address the needs of the patients and Burn ICU.