Firefighter Information Mask - Tyco Scott Safety Company

The TYCO Scott Safety Company had a need for developing an innovative firefighter information mask. The final design meets the customer needs and includes a data acquisition device that receives and transmits information from sensors back to a processing unit. A camera was implemented into the mask design that transmits photographs back to the base. A display module is now available to each firefighter providing visual information obtained from the sensors. The design also includes a tracking system allowing base to accurately locate each responding firefighter during an operation. An efficient power source is attached to the mask and devices, all while keeping ergonomics a high priority. Below is a CAD drawing of the final design:

The customer needs were identified and assigned design specifications to meet these needs. Of the four concepts that were previously selected for further analysis, the single microprocessor design has been chosen as the lead concept. The design contains three sensors, one thermal camera and one tracking device connected to a microprocessor. The microprocessor then transmits the sensors data to a display on the firefighter mask and wirelessly transmits live thermal video of the operation back to base from the thermal camera. All of these components are powered by a small, efficient power source. Through investigations were performed on each of the components to determine which existing products best met the customer needs. Research tables depicting the top competitors for each component can be found in section 8.4: Component and Component Selection Process. An alpha prototype was constructed consisting of 3D printed housings for each of the components that will be assembled to the mask. A temperature sensor and electrical components were purchased to construct a thermal sensor prototype for the mask. A performance test was conducted on the temperature sensor prototype to determine its reliability.

The team recommends two paths to take next. The first path is to conduct further research and development on a wireless LED wristband display for the temperature and cylinder pressure as well as a smaller, lighter thermal camera. The second path is to develop a HUD that can be integrated directly onto the screen of the mask. This will allow for minimum obstruction to the firemen’s view and more information can be generated for the firemen without adding more components. Either one of these paths can be taken for the next phase of development. By improving these two designs in the next iteration, the mask will become more ergonomic and user friendly.