Wildlife rehabilitation often requires caring for neonatal wildlife, whose survival is dependent on devices like incubators, which regulate the body heat for these animals that are unable to. Although wildlife rehabilitation centers have made significant strides in wildlife conservation, they often do not have enough financial resources required to purchase a high-end incubator. As such, there is a marked need for a wildlife incubator that is low cost, yet still durable, modular, easy to clean, and precise in temperature control.

Currently, one of the most common incubator manufacturers is Brinsea. One of their models, the TLC-50 Zoologica II includes many features but is at a very high price point of $1,199.99. This is a very high cost version of what the team aims to achieve. The rehabilitation center the team is working with, Oaken Acres, needs a dozen times more incubators than they currently can afford from Brinsea.

To create an accessible incubator that will fill this niche, the team has focused on creating low-cost components that are competitive with current products on the market. The team has laser cut the walls out of extruded acrylic, as this is more affordable than injection molding of other plastics as many manufacturers do. These walls slot together using finger joints, which allows for easy assembly and enables the entire shell to be delivered in a small package, as the shell does not need to be assembled prior to shipping. Additionally, when provided instructions users will be able to easily assemble the incubator upon reception. The prototype will also be delivered with electronic components that allow for heating and humidity to be managed within the shell using an Arduino board that powers internal sensors and climate control hardware.The climate control is done through a control loop system, PID. PID allows for control through three components, proportion, integral, and derivative. “P” is proportional to the error, meaning that if the error is high, the output will also be high. “I” is the integral of past error, which seeks to eliminate residual error. The derivative estimates the future error, and thus tries to reduce error based on what is anticipated. Overall, the incubator design is a flexible and novel design that is not pre-assembled for ease of transportation, and is a low-cost, open source version that still contains the necessary components of a wildlife incubator while accounting for a high range of needs in wildlife animal treatment.

This design is validated through individual component testing, as well as whole design testing. The components were tested by ensuring that the temperature and humidity stays within the range specified by the client. This was done by using an external sensor to record values over time, ensuring there were no large fluctuations outside of the specified range. The shell was tested for durability and ease of assembly. This was done by asking people outside of the design team to assemble the shell quickly and ensure that they had no complaints about ease of assembly. Therefore, a design that is easier to assemble at a cost 12x cheaper than our competitors is achieved. That also means 12x more wildlife animals are treated.

At this time, the team is attempting to reduce the space that the circuitry takes up, and install further insulation within the shell that can also be easily assembled by any users. However, the core components and shell are able to be assembled and work as desired, therefore enabling a significant leap in wildlife survival.