

Requirements

Affordable

Carry 2-3 infants per single trip

Self sustaining power for at least 4 hours

Contain medical equipment to support infant

Modular system

Seating for medical professional

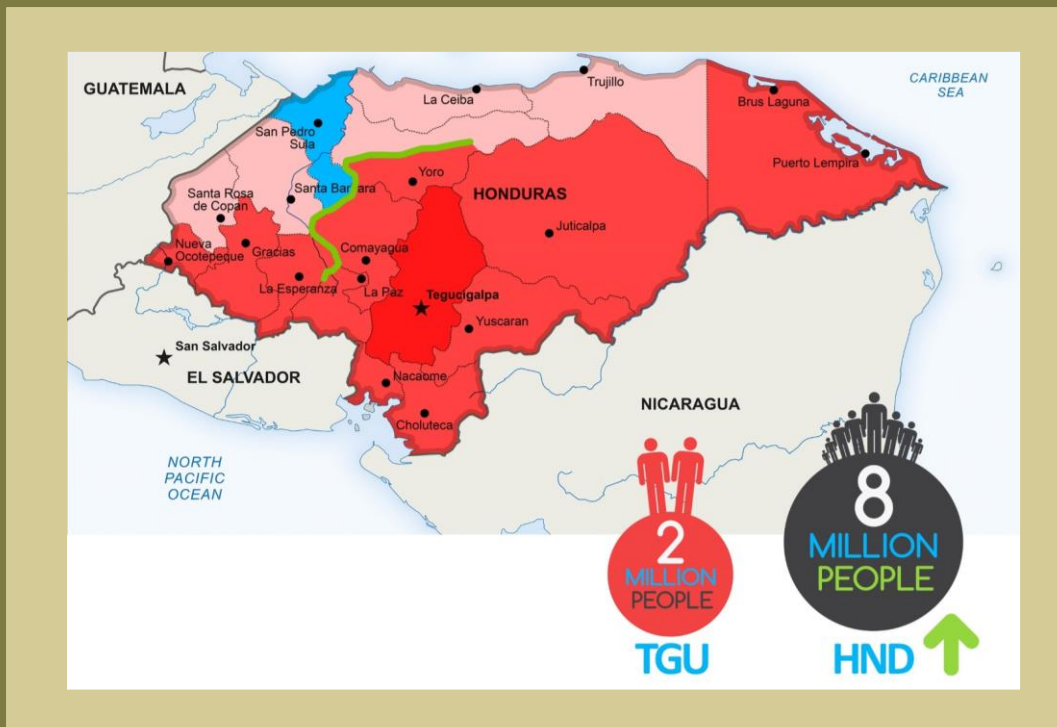
Communication between cab and compartment

Easy to Repair

Background/Problem

Honduras is estimated to have an infant mortality rate of 17.4 deaths for every 1,000 live births¹. Many of these deaths occur in transit from tier two hospitals not equipped to handle critical care newborns to one of the two top level (tier three) hospitals in the country.

Currently there is no reliable form of transportation to move a newborn from one hospital to the other. Many mothers take public transportation, or ride on ambulances packed tight with other ill patients while holding their infant in their arms hoping their child makes it to the hospital alive.

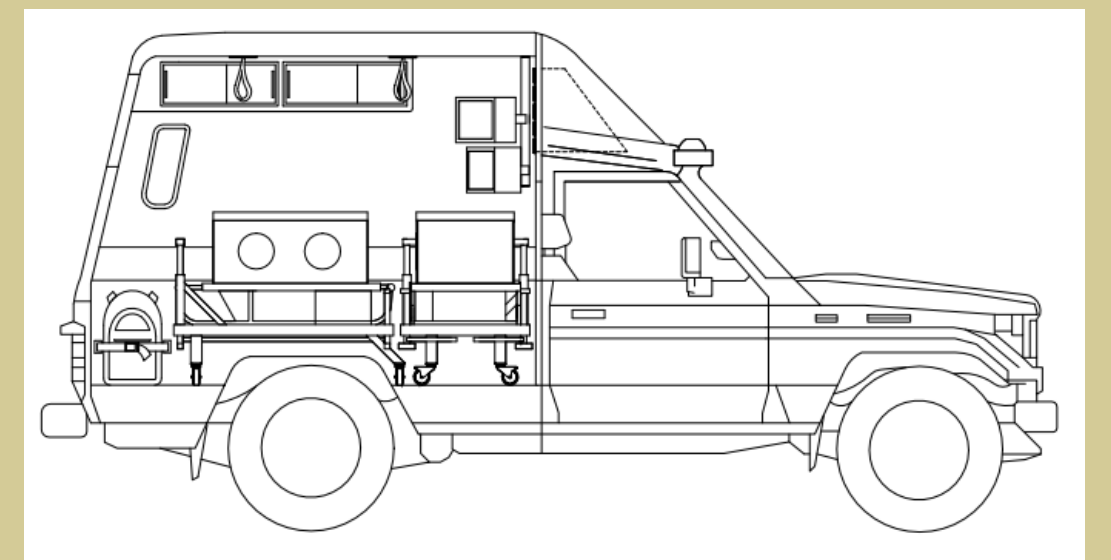


The Solution

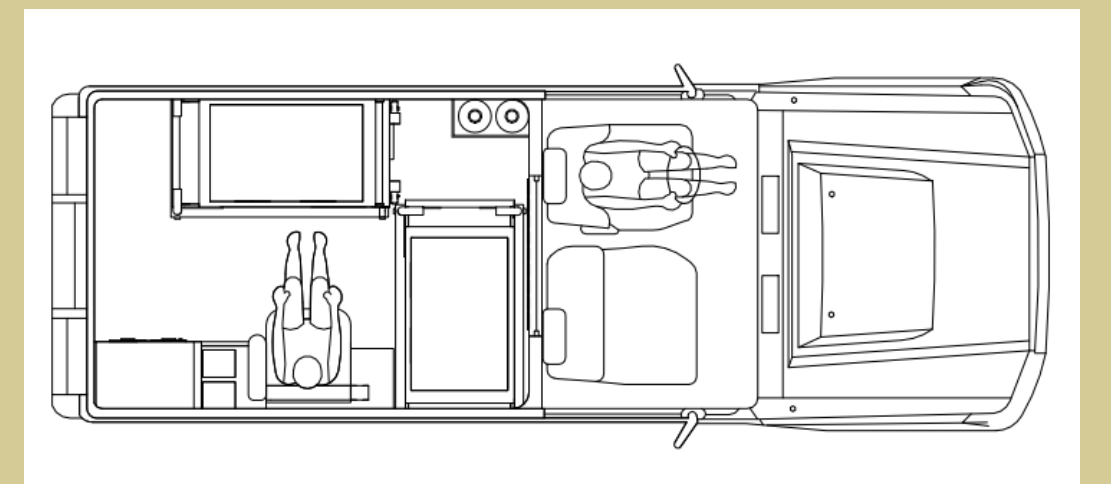
In collaboration with Little Angels of Honduras, The Angel's ARC was tasked with creating a proposal and prototype for a neonatal ambulance for intra-hospital transportation. Providing safe, life sustaining transportation for premature and critical care infants. Aiming to help Little Angels of Honduras in their mission to increase the survival rate of infants in Honduras.

Design Process

- Vehicle Choice**
- Toyota LandCruiser 70series
 - Accessible in Honduras
 - Easy to repair
 - Raised roof from 4ft to 5ft

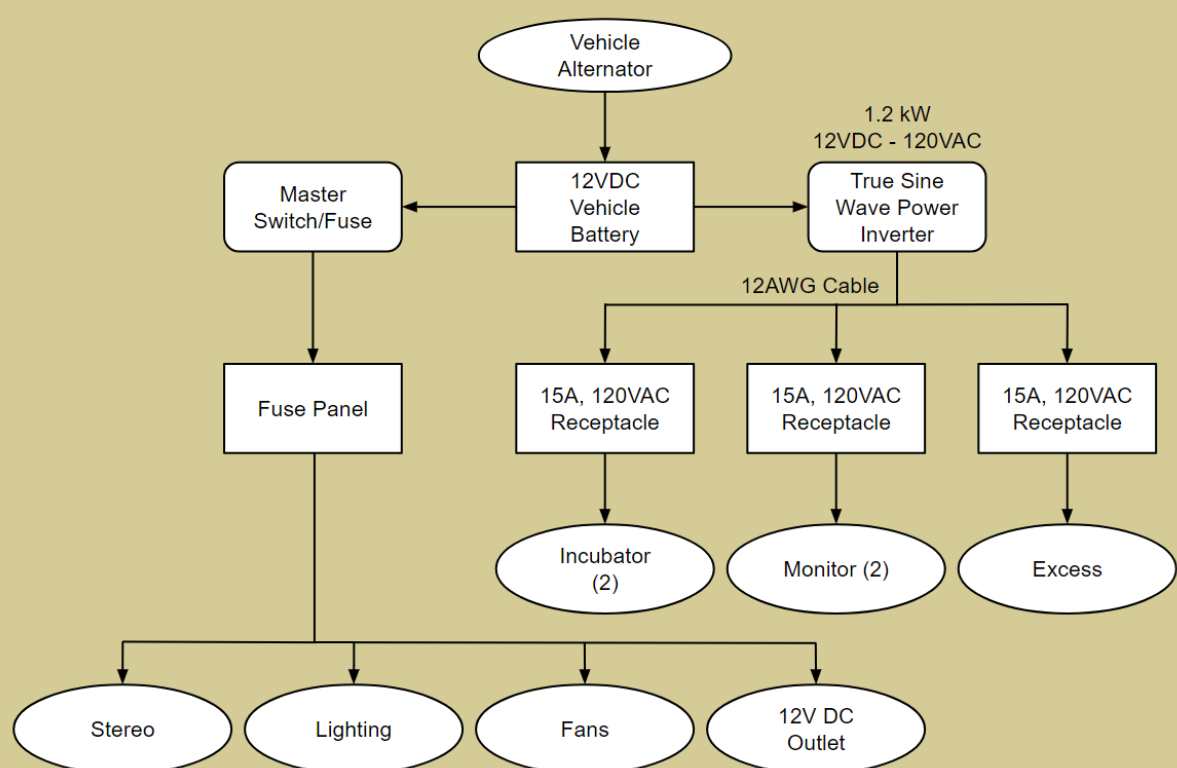


- Vehicle Layout**
- Two incubators
 - Removable incubator system
 - Allows for control over number of infants transported
 - Medical attendant seat
 - Easily reach equipment and incubators
 - Communication window between driver and attendant



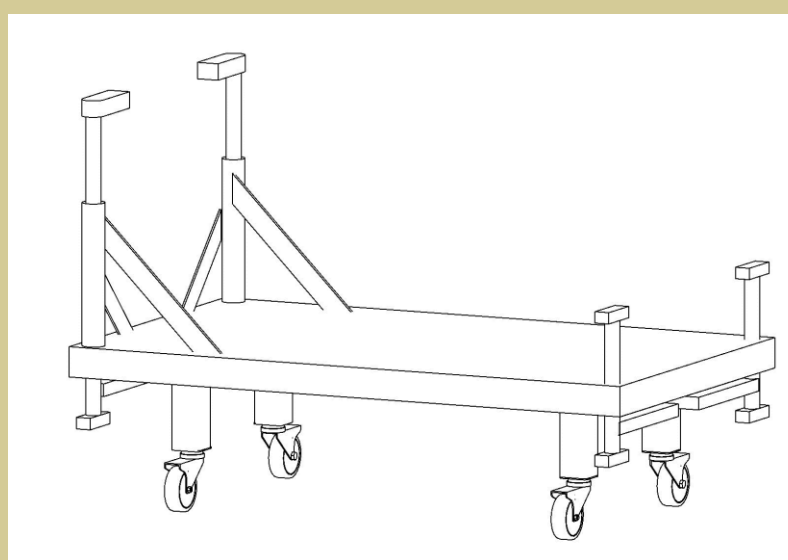
Electrical System

- Sustain power for at least 4 hours
- Added a power inverter to include support for 120V AC outlets, lighting, exhaust fan and other equipment
- Small scale testing was successful



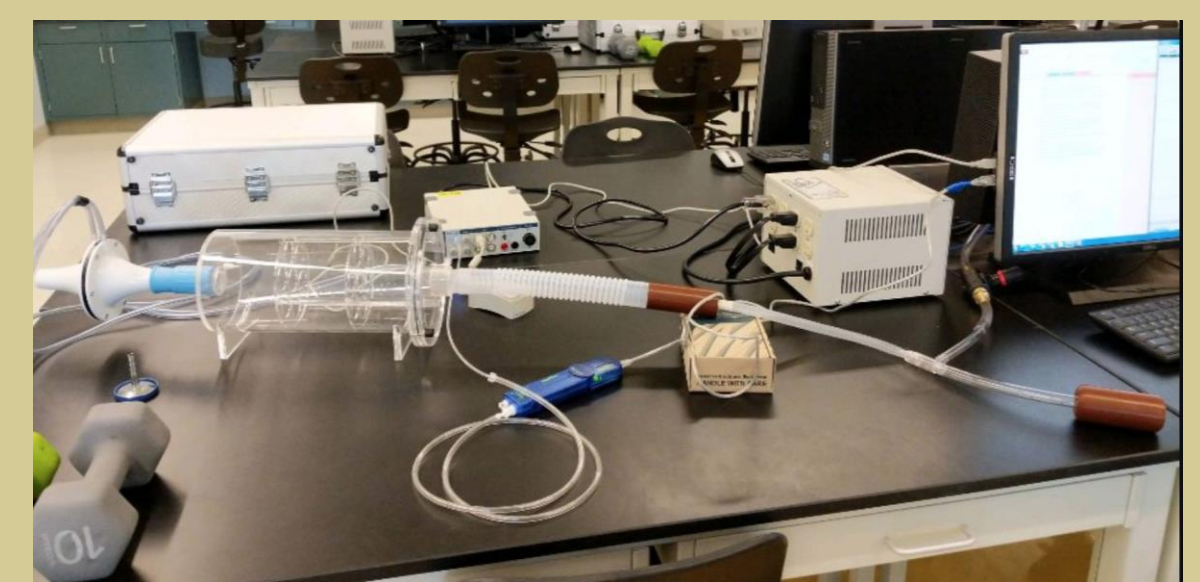
The Incubator Cart

- Fits 185A+ Transport incubator
- Carts designed to fit over the wheel well
- Includes an anchoring system to the vehicle floor
- Incubator secured to the cart with winching straps



NeoPuff Ventilation

As a potential cost-saving mechanism our team also developed an alternative to a traditional ventilator used a CPAP machine. The proposed design is a mechanical solution which utilizes a series of valves releasing at set pressures and a 3D printed adaptor to control ventilation. The system was testing with a custom-designed test rig, and it was determined that the proposed pressure driven design was insufficient. For future design iterations a powered valve design would be necessary for successful implementation.



Project Outcomes

The final deliverables of our project were a functional design for a neonatal transport ambulance, a full bill of materials, and a full scale space-prototype to exhibit the design. Our team was able to successfully meet these goals and deliver a fully functional design which met all of the major customer requirements.

Line Item	Estimated Cost
Vehicle Chassis	\$35,000
Chassis Modifications	\$30,713
Incubators	\$51,857
Power Equipment	\$1,485
Large Medical Equipment	\$14,662
Small Medical Equipment	\$3,777
Additional Expenses	\$20,624
Total Anticipated Cost	\$158,120



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