

## “Car Part” Incubator Project

**Background:** The aim of the “Car Part” Incubator project is to build an effective, low-cost neonatal incubator with key components from readily available auto parts.

- 4 million newborns die per year in the world- 98% of these in developing countries.
- Neonatal deaths account for 37% of mortality among children less than five years of age
- 28% of mortality in this population occurs because of premature birth
- Current incubators are of limited utility and longevity due to lack of replacement parts, maintenance personnel, and baseline designs intended for different settings

### Methods:

A CIMIT-supported, multidisciplinary team of clinicians, designers, and engineers was assembled to explore the following:

- a prioritized list of design requirements for incubators specific to low-income country settings
- the feasibility of using the “car part” opportunity with respect to building an effective Incubator

We utilized:

- Feedback from health providers overseas as well as locally-administered interactive design reviews and focus groups with domain experts.
- A team of engineers and designers interacted with clinical teams in a rapid feedback cyclical design to develop prototypes over a four month period.

### Results:

- A list of design-requirements and objectives was developed.
- A team of engineers and designers deconstructed a single, operational Toyota 4Runner and, along with off the shelf parts, developed sequential looks-like and works-like Incubator prototypes
- Automotive parts are capable of being repurposed to produce heat, light, air convection, a power reservoir, as well as auditory and visual alarms.

### Discussion:

- Key components of effective Incubators may be supplied utilizing automotive parts.
- Necessary next steps include:
  - (1) Next-generation prototype using feedback from experts and users in developing countries
  - (2) Development of robust safety controls and user interfaces
  - (3) Device approval
  - (4) Manufacturing/distribution
  - (5) Implementation

