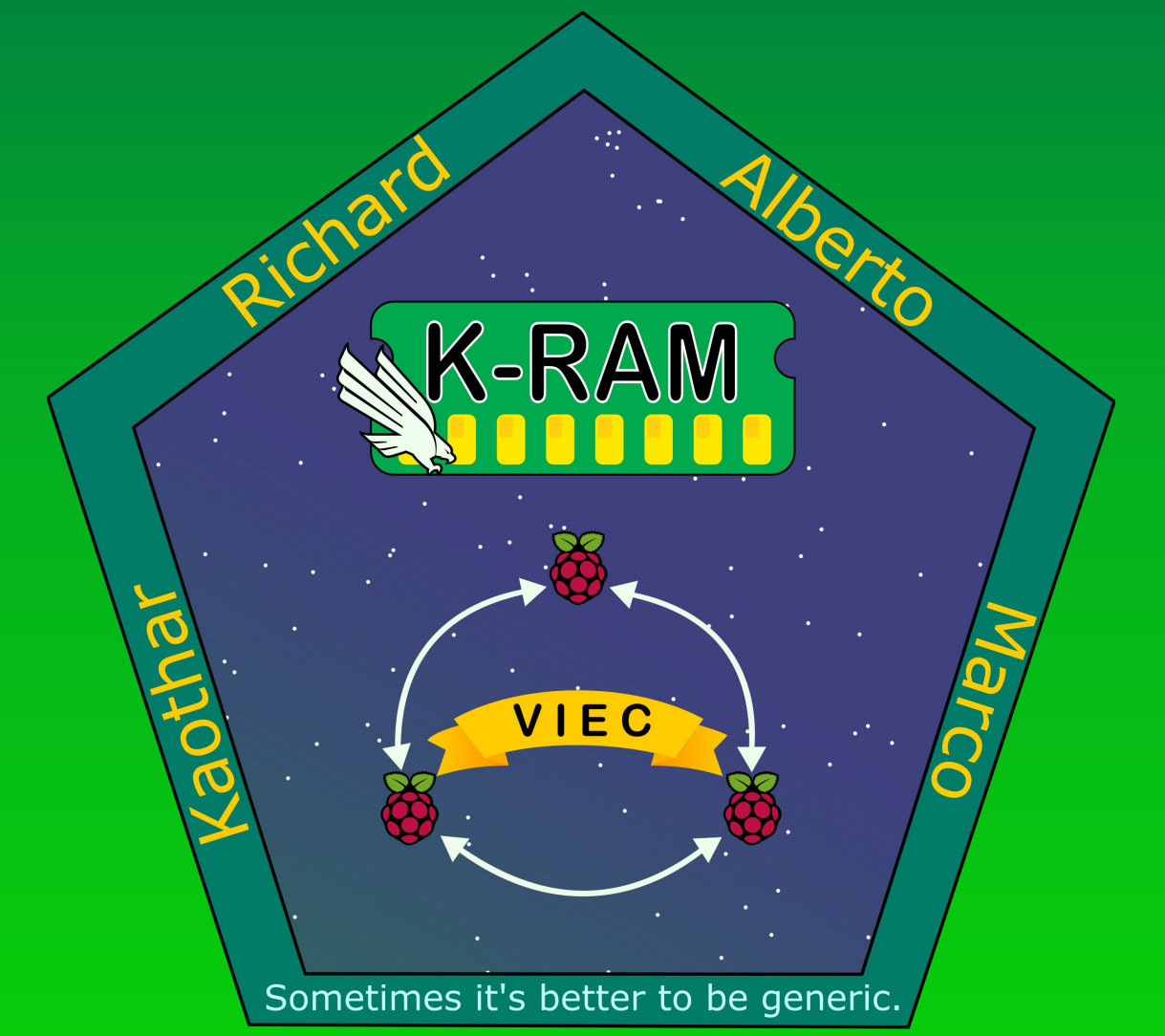




# Vehicular Interchangeable Electronic Controller (VIEC) Network System

Team K-RAM: Marco Duarte, Richard Ervin Jr., Alberto Olvera, and Kaothar Sowemimo  
Advisors: George Salazar, PE and Robin Pottathuparambil, PhD  
Department of Computer Science and Engineering, University of North Texas



## Purpose

During long-term space missions, vehicle replacement components and parts will eventually be needed

- Sending replacement parts a large distance away from Earth is untimely
- Loading many unique pieces onto spacecraft is expensive due to increased mass

## Proposed Solution

In order to reduce the amount of parts needed, the VIEC Network System, a system that promotes flexibility and interoperability, has been created. This system has:

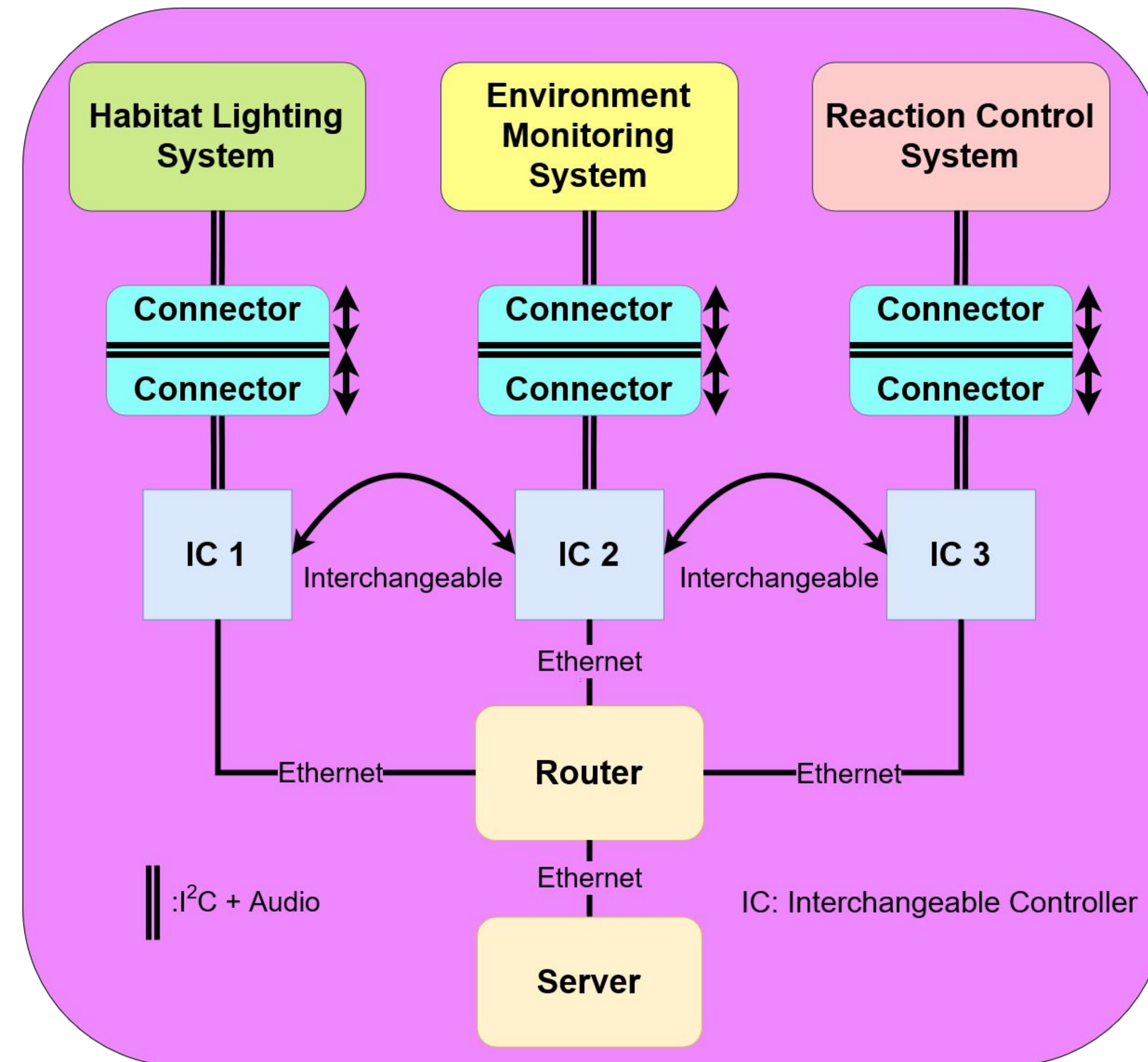
- Interchangeable controllers that can perform a variety of vehicular tasks
- A common bus to interface and communicate with the vehicle functions
- A system-wide universal connector to enhance the interchangeability of the controllers

## Design

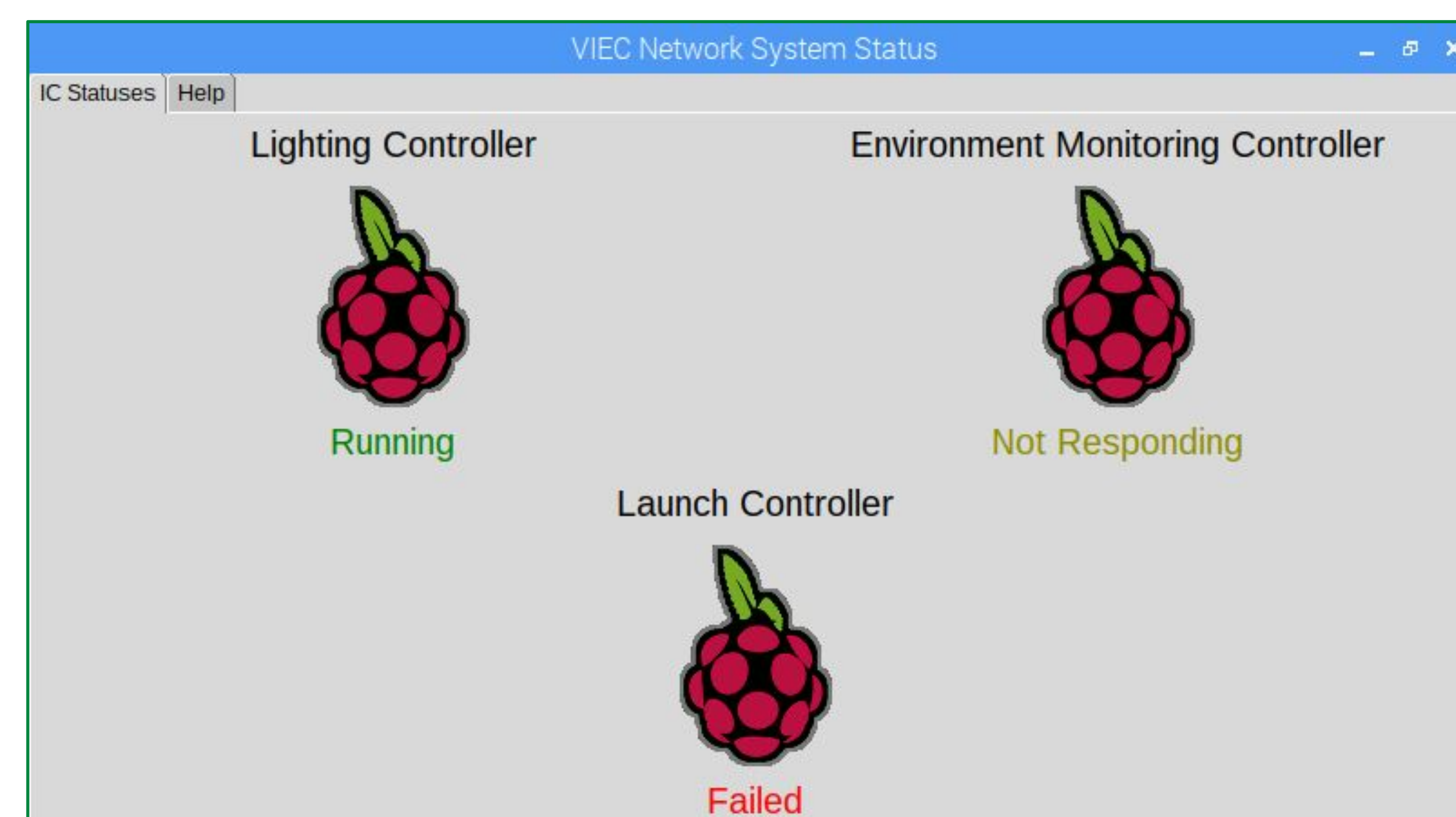
The VIEC Network System will have three main parts:

- A server to manage the system
  - Deploys the appropriate application onto each connected IC based on its position
  - Monitors each IC's status and displays it on a GUI
  - Manages a database of connected ICs and what application they are running
  - Detects new ICs connected to the system
- A universal connector that can interface the ICs with the corresponding peripheral devices
- A hardware identifier that designates the function the IC is connected to

## Diagrams



VIEC Network System



Server GUI

Interchangeable Controllers can have the states of:

- Running
- Not Responding
- Failed
- Offline

## Test Applications

The ICs will each run a different application acquired from the server that corresponds to the position of the station they are plugged in to. The applications include:

- Habitat Lighting System - turns on lights if motion is detected.
- Environment Monitoring System - keeps track of various values such as temperature, and gas levels and issues an alert if any dangerous levels are sensed.
- Reaction Control System - simulates the thrusters of Orion.

## Test Results

Requirement	How it was Tested	What it Verifies	Results
Deploy applications	Check if IC has the file	Demonstrates that it is feasible to send needed programs to the ICs	PASSED
Application Identification	Check if value is the same as switch	Shows that it is possible to find the position of an IC in the network	PASSED
Simulate 2 or more vehicle systems	Swapping the IC into different systems and verified that they are executing	Reveals that multiple systems can be handled in the network	PASSED
Common Connector	Plugged the IC into different systems	Proves that the IC can interface with any system	PASSED

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