Department of
**COMPUTER SCIENCE
AND ENGINEERING**

Senior Design Day 2020

COMPUTER ENGINEERING

Augmented Reality Interface System (ARIS)

Team Members:

David Woodward
Juan Ruiz
Timothy Stern
Nick Bratsch

External Sponsors/Mentors:

NASA SUITS
Jay Estes, NASA, Chief Engineer

Internal Sponsors/Mentors:

Dr. Robin Pottathuparambil, Faculty Mentor
Alejandro Olvera, Lab Manager
UNT Computer Science and Engineering
Department

Abstract:

ARIS was created to address the increasing need for technologies that assist astronauts with the elevated demands of lunar surface exploration and extreme terrestrial access. The system combines a Head Mounted Display (HMD) in Augmented Reality with an External Hardware System (EHS). These two systems working together provide an easy-to-use, unobstructive tool enabling astronauts to take on a more autonomous workflow. The HMD consists of multiple panels with additional tabs displaying mission objectives, audio logs, real time telemetry data, and navigation tools. Additionally, the EHS includes an external glove and chest system that will provide inertial measurement, force sensors attached to the fingers, and live camera feeds. Both systems put together create our expansive and dynamic augmented reality device that will assist astronauts meet increased demands in a wide variety of environments and challenges.

Power Termination, Diversion, and Notification Using "COSMIC"

Digital Eagles

Team Members:

Luis Garcia   Robert Moore

Tyler Hebert

Michael Helwick

External Sponsors/Mentors:

Dan Combe of COEVAC LLC
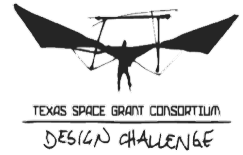
Internal Sponsors/Mentors:

Robin Pottathuparambil

Alejandro Olvera

Abstract:

Currently, the established types of gas monitoring in most homes is insufficient. Most only test for one type of gas, and at levels that are already dangerous. Even when such monitoring equipment is present, the only action it can take in an emergency is a simple alarm. Our solution is a unique system that can monitor several kinds of harmful gases and take actions to save lives in the event of an emergency. These actions include alerting the user through their mobile phone once a gas level has reached its threshold set by the user, activating venting equipment, and deactivating appliances that may be releasing harmful gases.
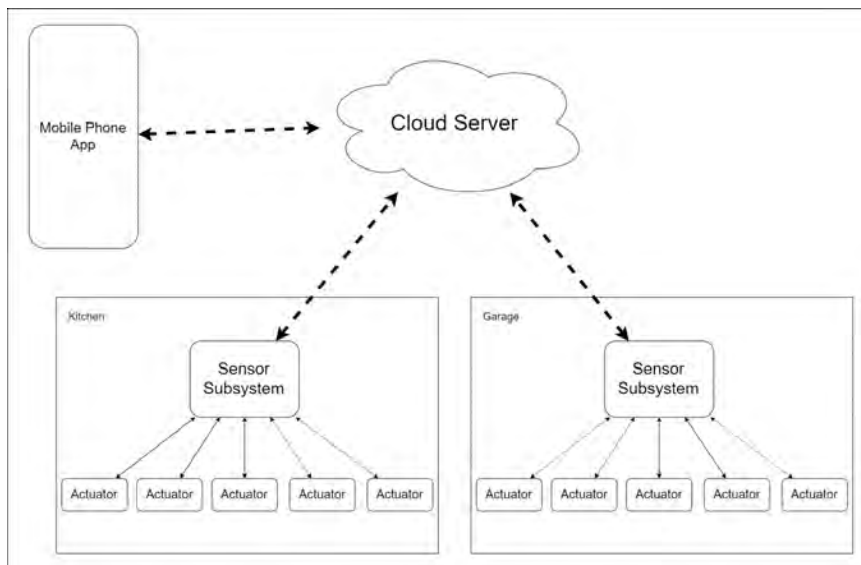
Vehicle Interchangeable Electronic Controller (VIEC) Network System

Team Members:

Christopher Labra
Edgar Sanchez
Christopher Parten

## External Sponsors/Mentors:

George A. Salazar, P.E.
Tim Urban, PhD
Talia Jurgens

Internal Sponsors/Mentors:

Robin Pottathuparambil, PhD

Abstract:

On board each space craft there are an abundance of controllers that control various systems within them, but no matter how much planning goes into each space mission errors can occur, such as one of these controllers malfunctioning and needing to be replaced. Sending another craft to service the broken one is too time consuming, and sending additional types of each controllers increases the cargo weight, which also increases fuel consumption and ultimately increases the cost of the mission. The Vehicle Interchangeable Electronic Controller (VIEC) Networks System aims to ease these problems by creating a system of Interchangeable Controllers (ICs) that can be interchanged at any time with any of the other controllers already on board. The server that manages this system will keep track of which controllers are plugged in, and which controllers need reprogramming to run its new and updated systems. A universal connector will be used to interface with the many ICs with corresponding input and output devices. The simulated systems will be a Habitat Lighting System, Environment Monitoring System, Reaction Control System, and a Voice Over Internet Protocol Communication System.
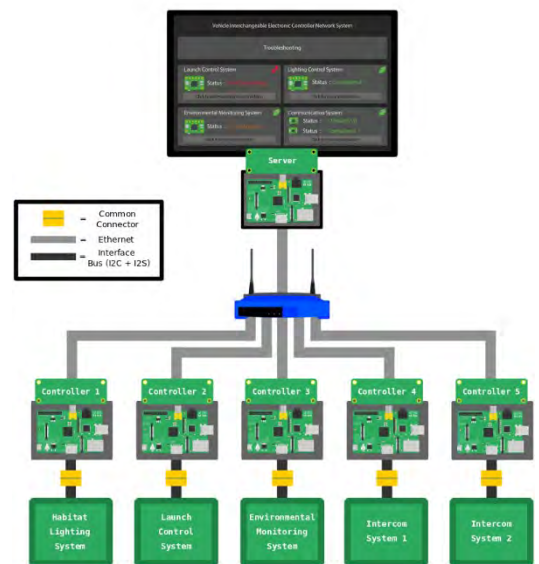
Team Olympus
PRIVATE CLOUD WITH WIRELESS INTERNET OF THINGS (IoT)

Team Members:

Jess Stacy
Daniel Dorsey
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Daniel Potichko

External Sponsors/Mentors:

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Internal Sponsors/Mentors:

Robin Pottathuparambil, PhD
Senior Lecturer at the UNT Computer
Engineering Department
Phone: 940-369-8807

Abstract:

Our client has had problems with previous systems where space communication architecture is generally characterized by anemic on-board processing platforms, and a bottleneck and latency in the backhaul to Earth. To tackle this problem our team examined a open source IoT private packages and implemented two different applications on it. We created and tested these applications on the package to seek to leverage standards-based Commercial Off the Shelf (COTS) hardware and software products in a closed environment.

Team Agrosensor

Team Members:

- Casey Heath
- Patrick Land
- Ramiro Ortiz
- Nicholas Stencel

External Sponsors/Mentors:

- University of North Texas

Internal Sponsors/Mentors:

- Dr. Pradhumna Shrestha
- Alejandro Olvera

Abstract:

Our project, Agrosensor, is an automated plant monitoring system that deals with agriculture systems. It seeks to ease the difficulties for farmers as they maintain the conditions a plant grows in. In order to mitigate the chance of crop failure, the agricultural sector favors automation tools for minimal labor and cost efficiency.

The system we have designed will monitor soil moisture, temperature, pH levels, and plant appearance and can alert the user should there be any issues Users will be able to customize which plants are available for monitoring and may update values to tailor which threshold(s) are necessary for plant longevity.

This technology is not only applicable on a large commercial environment; it can be used at home as well, to monitor household plants and make sure they don't die prematurely, and live full healthy life cycles.

Intelligent Door Lock
Black Theory

Team Members:

- Fadi El-Nemri
- Angelica Reyes
- Matthew Boyer

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- University of North Texas
- Dr. Pradhumna Shrestha

Abstract:

This door utility addon takes on the challenge of home security while also adding a level of convenience and streamlining of the front door entry process. A common issue in today's age is packages being stolen, with this *intelligent lock* you can grant access to a delivery person and have them place the package inside your home without having to be there during pickup. Additionally, this solution is unique in that it uses RGB-D information to help with spoof-proofing, something no other product does.

The robust and advanced hardware used in for this system allows for expandability of features, including the integration of a touch screen for easier access to profiles and much more.

Smart Home Assisted Living by Team Nibbles

Team Members:

- Michael Poole
- Jose Pena
- Joseph Vo
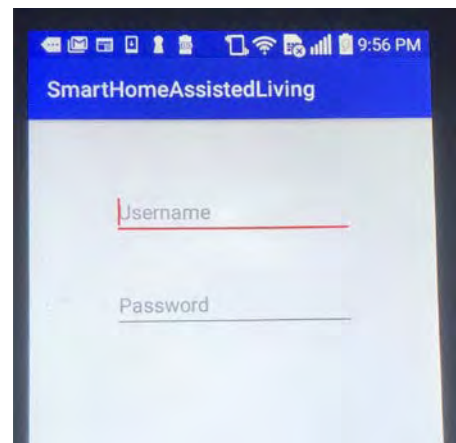
External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- University of North Texas Computer Science and Engineering Department
- Pradhumna Shrestha

Abstract:

Our Smart Home Assisted Living project aims to solve the issue of balance between the autonomy of a patient and ensuring that the proper care is given with an appropriate amount of health and safety monitoring. Smart technology provides us with a great amount of potential within this area as mose healthcare systems meant for an in-home structure fail to make use of wearable technologies and smart devices to make patient care more accessible. It helps caretakers with increased amounts of data of their patient's behavior and health outside of any in-home visits. This data can be used to make changes to evaluations and decisions regarding these patients. This will be done with the incorporation of a mobile application to provide health status updates to patients and their healthcare providers, vital monitoring through the use of a wearable fitness watch, a wearable distress button, and a smart hub that is also served as a programmable pill box.