Projects for Capstone Design (ME4182/GT4823)

Spring 2020

Sponsored Projects

http://projects.gatech.edu

External Sponsored Projects

- Projects to solve a real need!
- Additional facilities including on-site trips
- Additional resources for M&S
  - Sponsor might provide additional funds/support
- Discuss NDA and IP terms upfront

ANNOUNCEMENTS

- Social “Mixer” with sponsors today (1/6) between 3-4pm in CULC #152

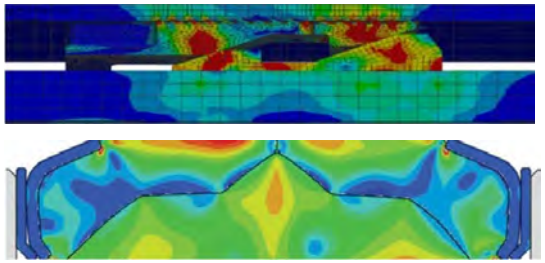
- For Interdisciplinary Class (GT4823-MEA, MEB, MSE, ECE, BME and ME4182-J)
  - Tomorrow’s studio (1/7) will begin at 8am in GTMI/MaRC Auditorium
  - Thursday’s studio (1/9) will begin at 8am in GTMI/MaRC Auditorium

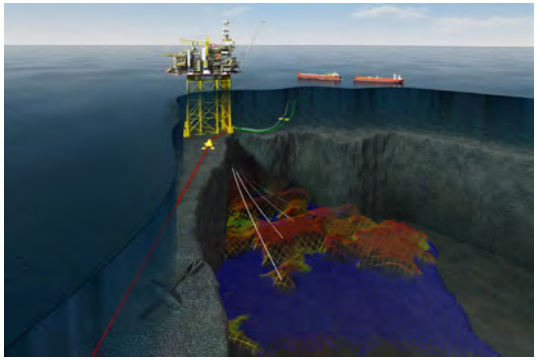
Sponsor Pitch Sequence

- C01-Packer Data Analysis Automation and Predictive Intelligence
- C06-Unmanned Ground Vehicle (UGV) for US Army Special Operations Rangers – Ground Capabilities
- C07-Unmanned Ground Vehicle (UGV) for US Army Special Operations Rangers – Digital and Remote Tech
- C22-Split laser for US Army Special Operations Rangers' machine guns
- C02-Instant Hot Water Solution
- C03-Powerless Leak Detection and Shut-Off Valve
- C08-Ice Bin Cleaning
- C14-Universal Shear Test Fixture for Thermally Broken Building Façade Components
- C15-Rudder Angle Indicator by Contactless Means
- C09-Deployment Offload Control System for Deployable Boom Ground Testing
- C23-Smart Asset Tracking
- C17-All Up Round Weapon Transport mechanism for all Models of Air Force Mobility Aircraft
- C18-Forward Area Refueling Point (FARP) Flow Rate Increase
- C04-PrimalFeeder: Blue tooth/wifi capable Raw/Wet pet food auto dispenser with app
- C11-Baby and Me, Life Vest
- C05-Canine Dental Disk Prototyping
- C12-Ceiling Screens to Control Malaria Mosquitos in Sierra Leone
- C10-DelivHer FemCare Absorbent Menstrual Cup
- C26-Multi-Use Performance Space
- C19-Wifi enabled Wireless Video Laryngoscope with Software Application
- C20-Spinal Decompression System
- C16-Alcohol Vending Machine - Automation of Opening Canned Beer and Delivery of Opened Canned Beer to Patron
- C25-ChockBot™
- C24-House Energy Audit/Assessment Tool
- C21-Logistical Vessels for Space Operations
- C13-Design of process to manufacture training samples for ceramic tile grinders
- F01-Seeing Like a Bike

Packer Data Analysis Automation and Predictive Intelligence

- Problem
  - Costly/manual tests
  - Non-optimal return on data
- Solution
  - Optimize test results
  - Pass/Fail Automation
  - Predictive intelligence
- Testing
  - FEA simulations
  - Calculation verification





3RD Ranger Battalion

Fort Benning, Georgia

Projects:
1. Unmanned Ground Vehicle
2. Split Laser Indicator

Remy Myhre
Frank Horbay
Dave Bryan
James Kazunas

Introduction

Unmanned Ground Vehicle

- In combat, we need to observe target buildings up close.
- Right now, Soldiers do this in person, exposing them to serious danger
- We believe we can solve this problem with robotics.

Unmanned Ground Vehicle

The Ranger Regiment is seeking two interdisciplinary teams to create an unmanned ground vehicle.

Objective: Build an unmanned ground vehicle, which allows Rangers to observe buildings from a safe distance.

Team 1-

Develop the robot.

Focus:
-Design the Chassis
-Make the robot able to traverse the terrain found in combat

Team 2-

Develop the wireless transmission module to control the robot.

Focus:
-Maximize the Control system's range
-Create a software application to control the robot

Post-Creation Timeline

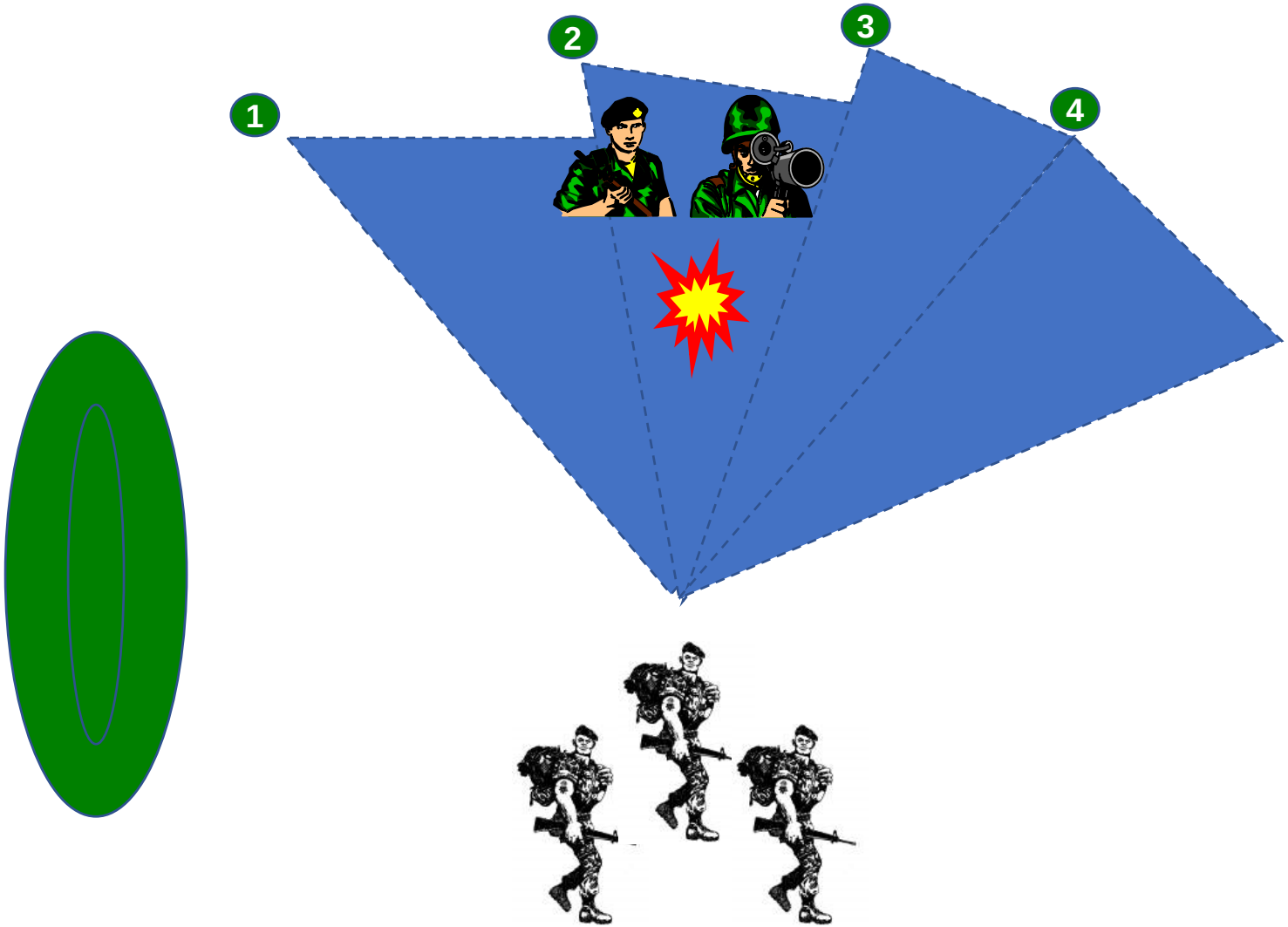
Summer 2020: Field testing during Ranger Regiment's largest annual field exercise

If the unmanned ground vehicle performs well in testing, we will use it in combat operations in Afghanistan by year end 2020

Split Laser Indicator

- We want our MGs to support our Soldiers as long as possible during an assault
- We must keep our MGs 15 degrees away from our Soldiers.
- We don’t have a visual indicator to guide the machine guns at night.
- We think we can solve this with a dual adjustable laser

Background: Maneuver Basics



What You can Expect from Us

- Treat you as a member of our team- this work is extremely important
- We will make ourselves available over the phone and in person- you will need to attend some training events in person and interview Ranger leaders to gain a thorough understanding of what our missions require
- We will bring you in to our training (night vision goggles, machine gun training) and immerse you with our Rangers.
- We will provide responsive feedback to questions, concepts, or ideas
- We will provide material support as required

What You can Expect from Us

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RHEEM MANUFACTURING COMPANY

GEORGIA TECH CAPSTONE PROJECTS

HEATING COOLING WATER HEATING

FOUNDED IN

1925

BY BROTHERS

Richard & Donald Rheem

Leading Global Brand In Water Heating

12,000 Employees Worldwide

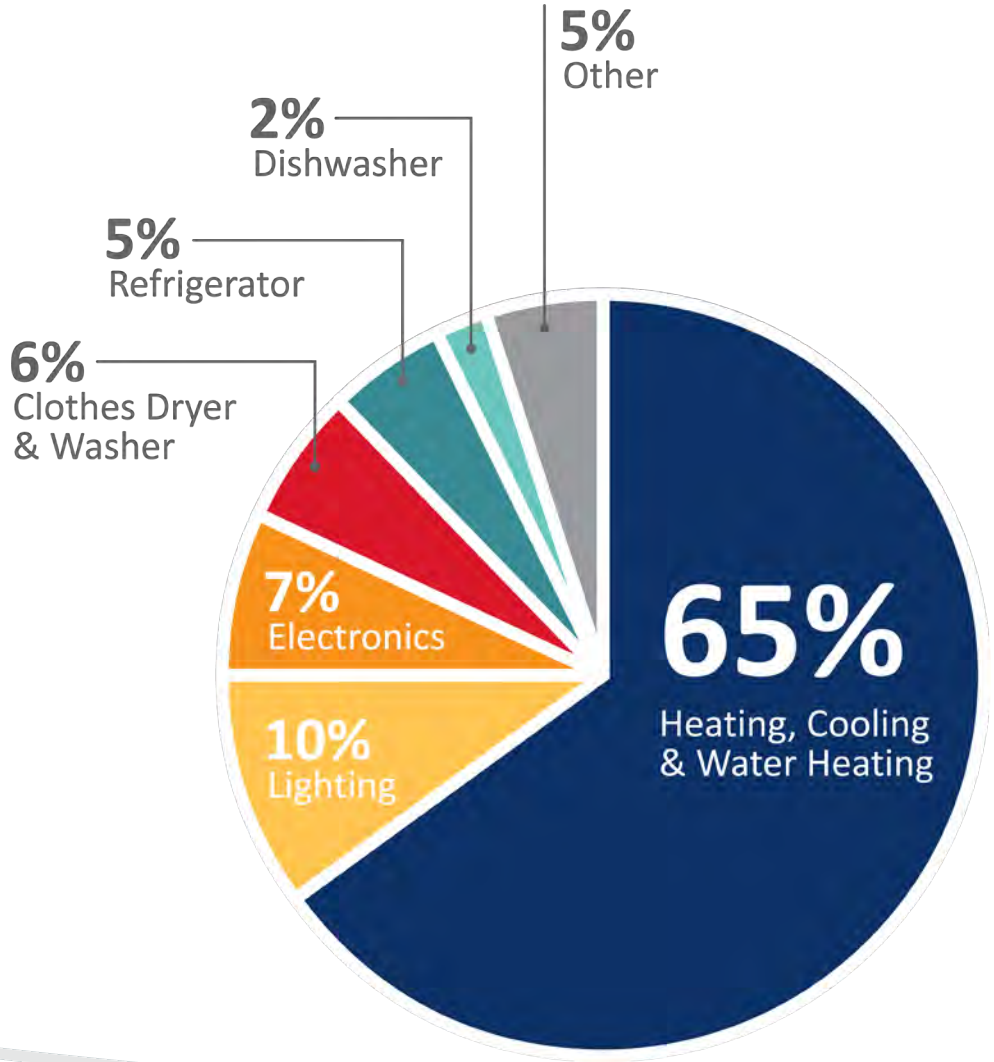
Paloma

Privately Held by Paloma Industries, Nagoya

Products Available In Over 50 Countries

Only Manufacturer of Air, Water & Refrigeration Products

The Rheem Difference: Air + Water



RHEEM IS THE ONLY COMPANY who can help a homeowner control 65% of their home's energy usage.

Rheem Sustainability

Degrees of Innovation

We are focused on innovating with intent, engineering solutions with lifetime sustainability in mind—from material selection to smart features to responsible recycling.

Our 2025 goal: Launch a line of heating, cooling and water heating products that boast a 50% reduction in greenhouse gas footprint.

Degrees of Efficiency

We strive for operational excellence, working smarter and more sustainably to consume fewer resources, generate less waste and ensure simpler, safer processes.

Our 2025 goal: Reduce greenhouse gas emissions by 50% and achieve zero waste to landfill in our global manufacturing operations.

Degrees of Leadership

We hire and inspire our teams to be next-generation thinkers and responsible stewards of our industry, the greater community and the environment.

Our 2025 goal: Rheem will train 250,000 plumbers and contractors on sustainable products or sustainable installation and recycling best practices.

Project 1 - Water Sustainability - Instant hot water solution

- Water is the largest natural resource but only 3% of it is freshwater, of which just 1/3 is accessible for use in agriculture and cities. At this pace, the world is projected to face a 40% global water deficit by 2030
- In the US, there is 250 billion gallons of fresh water is being wasted every day when waiting for domestic hot water…

Explored Solution

- Provide instant hot water at the point of use and create a solution to preserve world resources!
- Solution not to use any external power (no need for electrician to be hired for installation)
- Solution to handle hot water need for hand wash for a regular house hold
- Should be easy to install…

Project 2 - Leak sensor/detection and shut-off valve without controls

- 40% of all homeowners experienced water damage in the US
- Having a water damage is 10x more than likely than fire damage
- This causes big disruption in people's lives and creates large insurance claims
- Existing solutions out there are expensive and complex (apps, requires power, expensive valves)

Explored Solution

- Create a solution to prevent water damage hassle that doesn't require any app, any power, and any internet integration…
- Simplicity can save the day..!

Five Coca-Cola Fun Facts

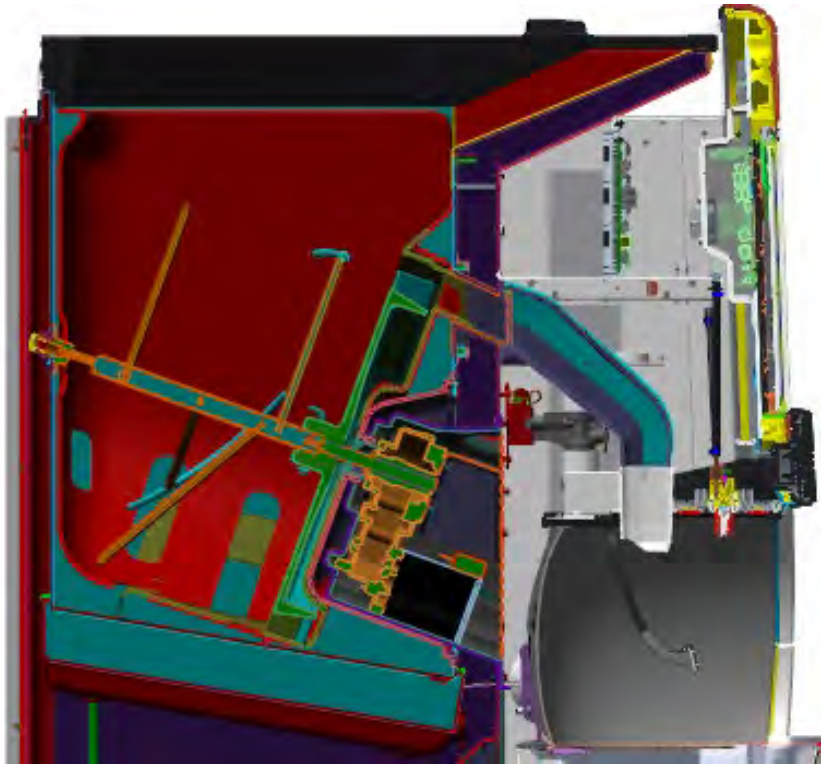
- Coca-Cola is the world's most recognized brand.
- Coke makes so many different beverages that if you drank one per day it would take you more than nine years to try them all.
- Coke owns 20 brands that generate more than $1B in sales per year.
- Of the 57B servings of all kinds of beverages (excluding water) just over 3% are trademarked or licensed by Coca-Cola. It's the most widely distributed product on the planet.
- Only two countries in the world do not officially sell Coke.

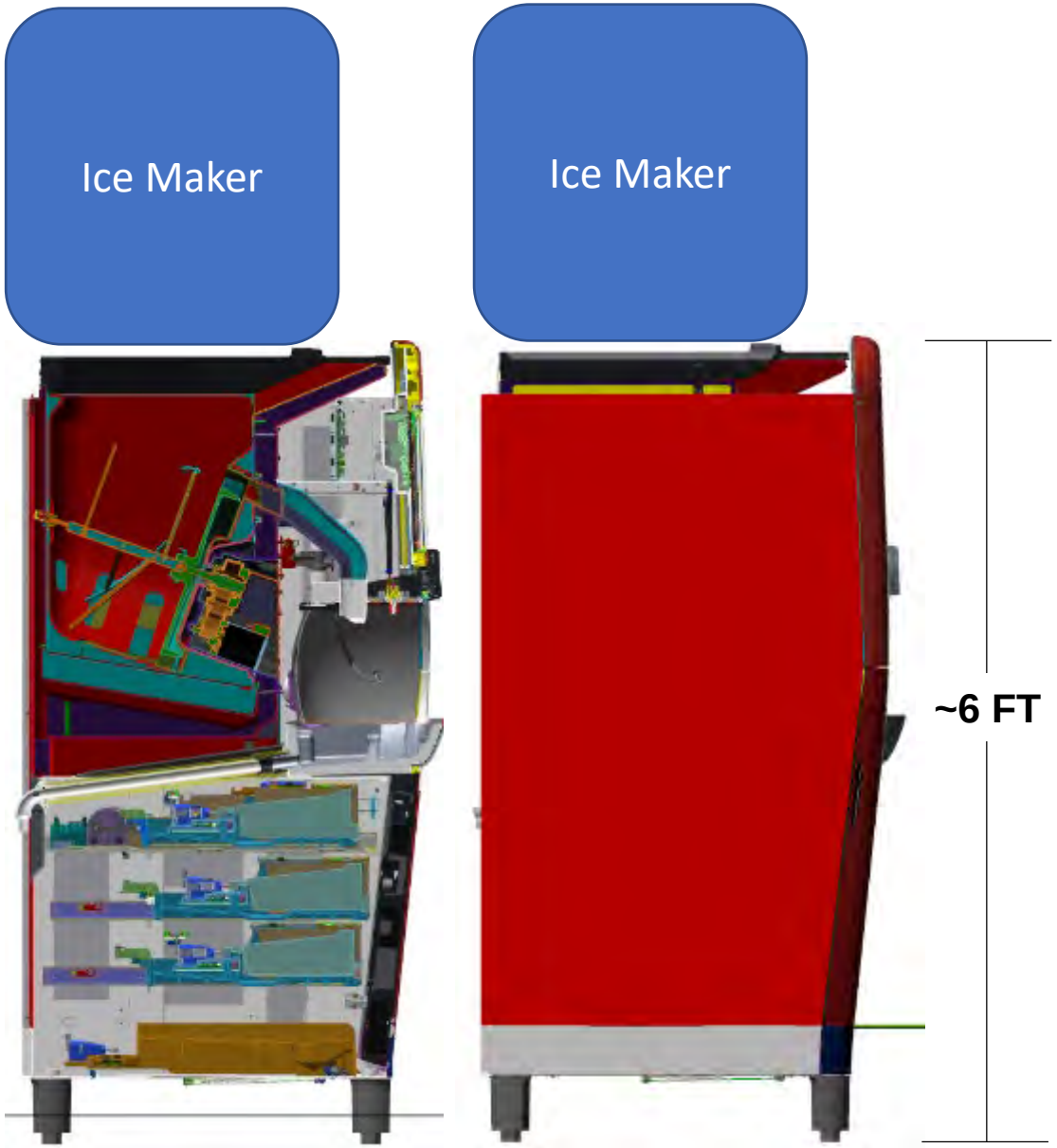
Project Background

How to clean an ice bin?

- How to get around ice maker?
  - Clean in place or ice maker need to be removed?
- Frequency of cleaning is tbd…assume monthly for 10 years for now.
- How to clean behind ice wheel shroud?

- <u>Safety</u> needs to be a top priority
  - Ensure machine is turned off (no auger spinning) if people are scrubbing/getting into ice bin
  - If ice maker is to be removed must have safe/reliable/repeatable way to do this





Why?

- **EU has more stringent cleaning/regulatory laws than US.**
- **EU has ~10% of world's population.**

Desired End Goal:

- **Simple, cost effective way to clean ice bins (ideally by customer) that is safe (for both consumers and customers) and reliable/effective.**

Thank You


Seagram's
GINGER ALE
lime
Sprite
grape
Fanta
cherry
Minute Maid
LEMONADE
pink lemonade
POWERADE
strawberry
Minute Maid
sparkling
DRINKS
peach lemonade
Mello Yello
limeade
DASANI
SPARKLING
lemon-lime

Kawneer Co., Inc – Corporate Profile

Entrances and Storefront

Kawneer Curtain Wall Systems

Windows:

- **Thermal**
- **Ultra thermal**
- **Blast/Hurricane/Tornado protection**

Innovative Solutions

High acoustic and thermal performance systems

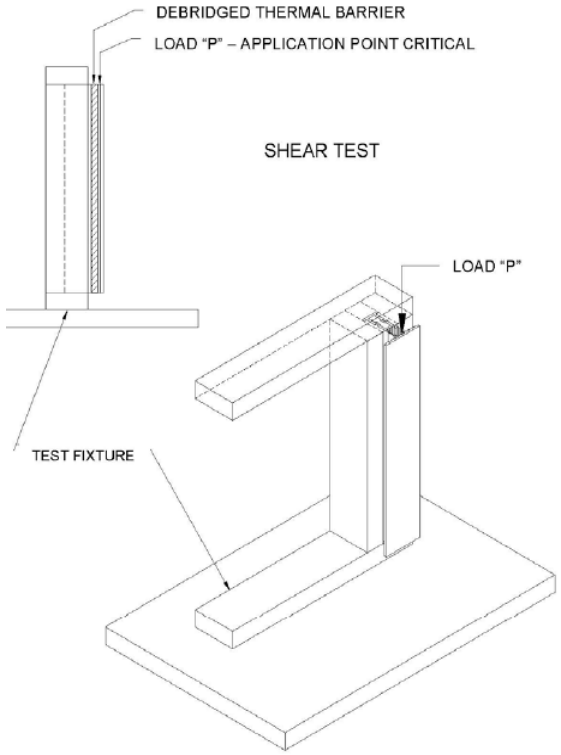
Framing and Sun Control

ARCONIC

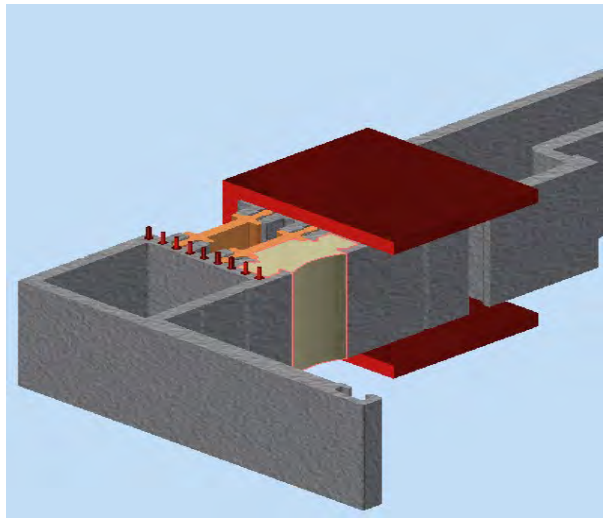
Headquarters and test labs located in Norcross, GA

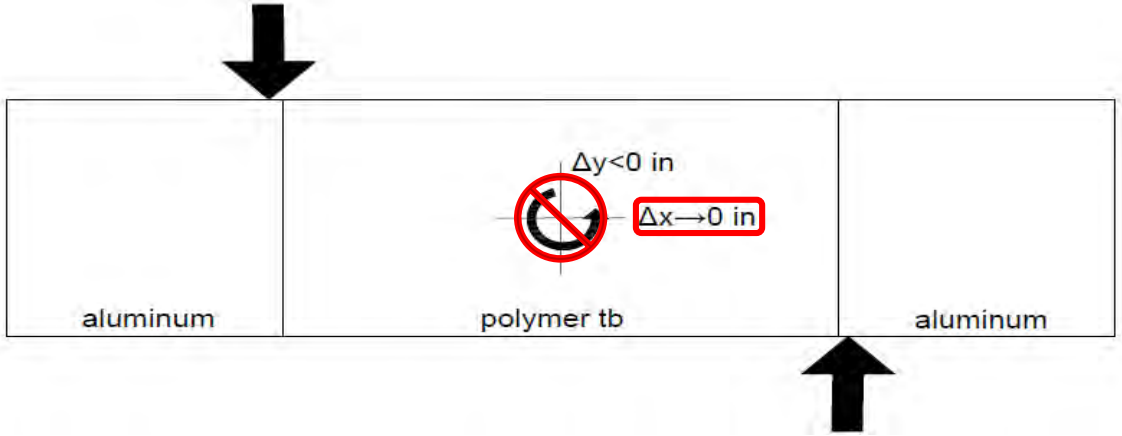
Project Overview – Design and Prototype of Shear Test Fixture

Problem: In shear testing of composite building envelope components, current test fixtures allow for bending moment, particularly in components with deeper thermal breaks (tb). For best results free from tb pull-out, only simple shear should be examined.



test diagram in AAMA 505-17





Objective: Design and build an industry-adopted fixture that does not allow for moment in the specimen during shear tests. The ideal fixture will hold samples of varying depths and can be placed in all approved test equipment (e.g., Tinius, Instron, Shimadzu).

Supplemental Slide – Design and Prototype of Shear Test Fixture

The test fixture should allow:

- Reproducible and repeatable results;
- Easy installation into ram equipment;
- A stable process with low cycle time;
- No small measurement errors to exist;
- Ram force ~ 10,000 lb_f as specified in AAMA 505-17

Opportunities offered:

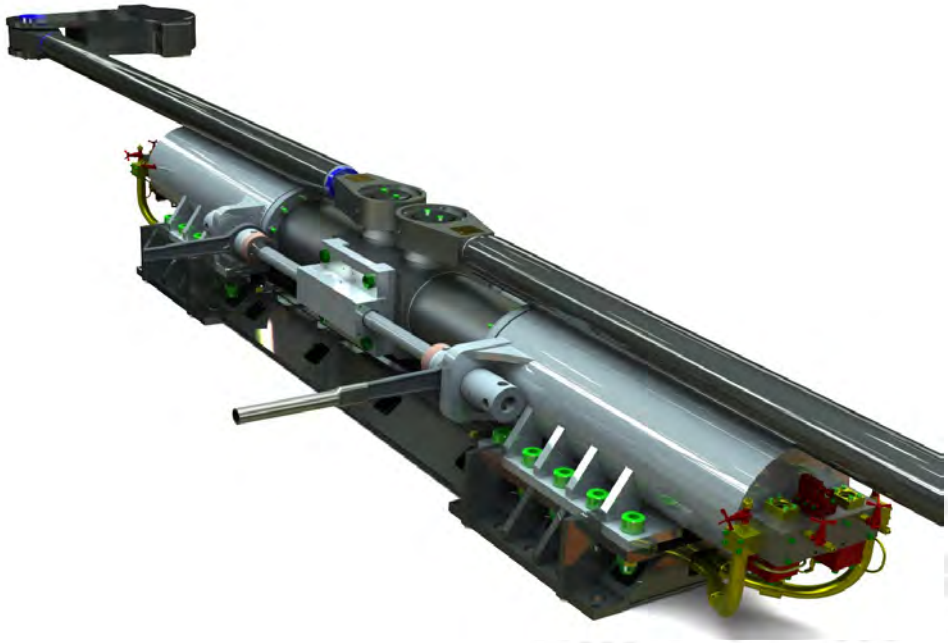
- Visit Kawneer HQ in Norcross;
- Design incorporated into AAMA (American Architectural Manufacturers Association) documentation to become industry-adopted test fixture;
- Gained knowledge of building envelope industry/technology

The fixture should be fitted with a dial indicator to easily measure the metal face displacement as prescribed in AAMA 505-17, §9.5:

9.5 Place the samples in a solid test fixture so the thermal barrier is not supported (see Figure 5). Load to failure at cross-head speed of 5 mm/min (0.2 in/min), in accordance with AAMA TIR-A8 at a temperature of 24°C ± 6°C (75°F ± 10°F). Record failure load for each sample. The failure load shall be defined as the maximum load at failure of the sample, or the maximum load up to a relative axial displacement of the metal faces of 3 mm (1/8 in) measured at the metal/thermal barrier interface, whichever comes first (reference AAMA TIR-A8).

JERED LLC / PAR MARINE

RUDDER ANGLE INDICATOR BY CONTACTLESS MEANS



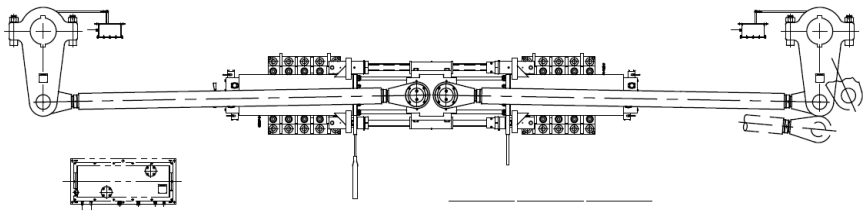
PRESENTED BY:
CORBIN COLLIER, PE – PROJECT ENGINEER
JANUARY 6TH, 2020

Jered LLC / PaR Marine Systems

- Par Marine products range from supplying mission-critical systems, such as aircraft elevators, steering gear, and cranes for naval programs to providing the most advanced fireproofing technologies and door systems in the marine industry.

- PaR Marine has expertise with electro-mechanical, electro-hydraulic, and pneumatic equipment design, systems engineering, advanced automation, and heavy material handling technology along with innovative technologies such as COMFIRE.

Rudder Angle Indicator by Contactless Means



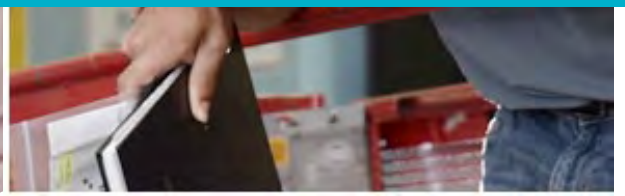
- Background/Problem/Need: Current System accuracy and mechanical linkage means produces variance in feedback rudder angle position as compared to actual rudder angle position. Need to investigate improved accuracy of position measurement and alleviate mechanical linkage inaccuracies.

- Concept: The purpose of this project is to quantify existing accuracy capabilities, determine a non-contact method of position monitoring and demonstrate improved accuracy of system.

- Design Constraints:
  - Measure rudder swing from 0 – 35 degrees port and starboard.
  - Must be contactless.
  - Rotation up to 5 degrees / second.
  - System to be modular for incorporation into existing designs.
  - System to be capable of redundancy.
  - System to be capable of withstanding hi-impact shock environment.
  - System to design for mobile equipment environment.
  - Position monitoring in submersed condition.

- Desired student skills:
  - Testing and Instrumentation
  - Structural Design Capabilities
  - Electromechanical Design
  - 3D Modeling and Drafting



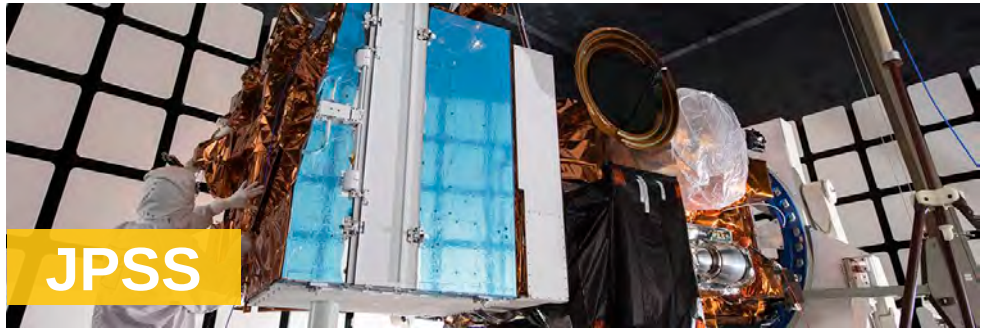


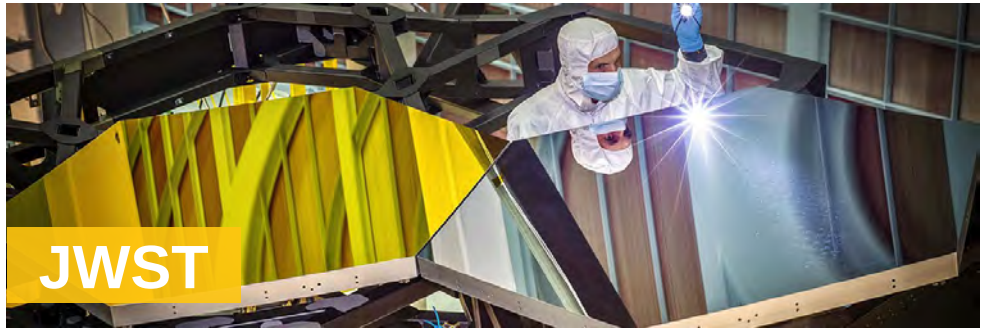

DEPLOYABLE BOOM OFFLOAD CONTROL SYSTEM

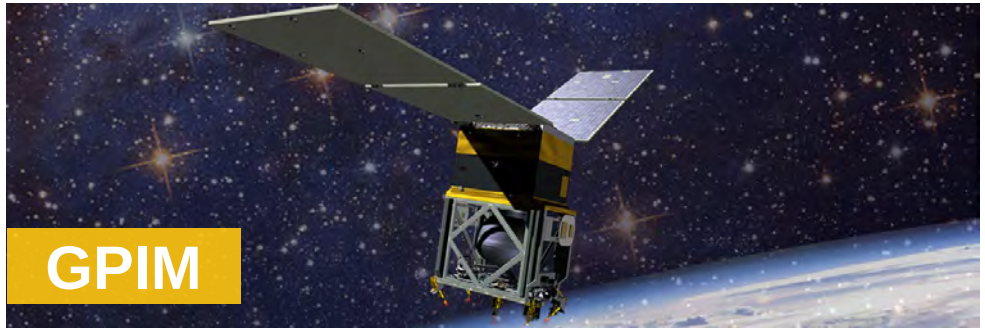
BALL AEROSPACE
BOULDER, CO

BALL AEROSPACE

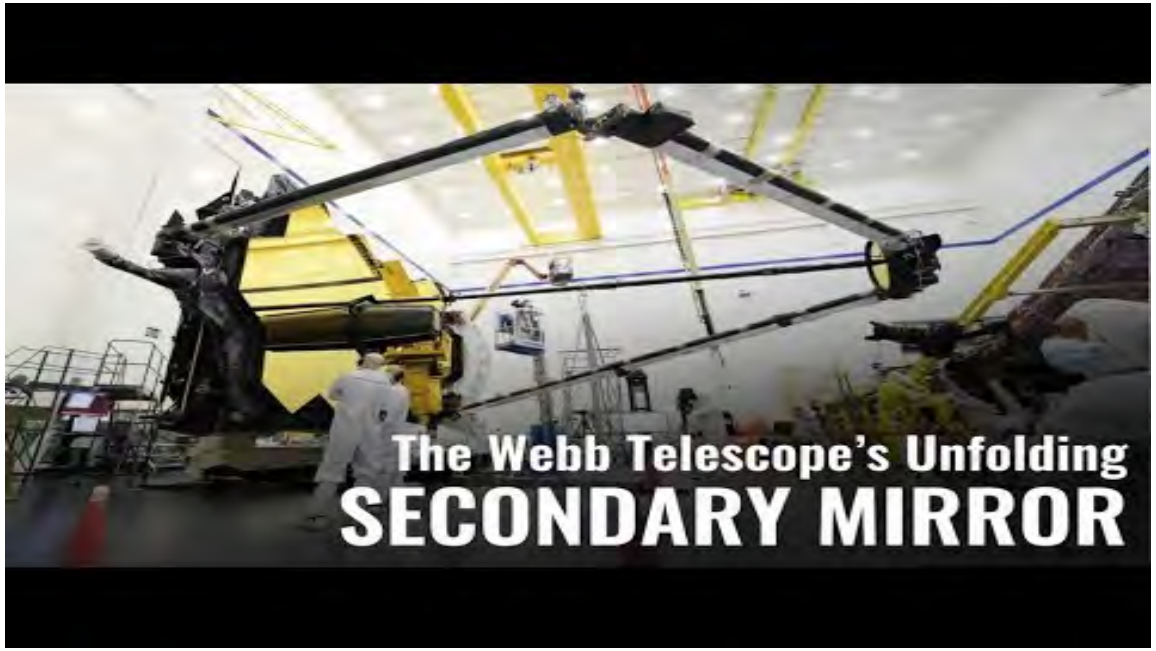
- Civil
  - JWST, NOAA 20, Hubble, Kepler, WFIRST, GPIM, GEMS/TEMPO…
- Commercial
  - Quickbird, Methane Monitor, Phased Array Antennas, LaserCom…
- Defense
  - WSFM, OPIR, F-35, SBSS…
- More At: ball.com/aerospace







DEPLOYABLE BOOM OFFLOAD FIXTURE



JWST Secondary Mirror Deployment:
Credit: NASA, youtube.com

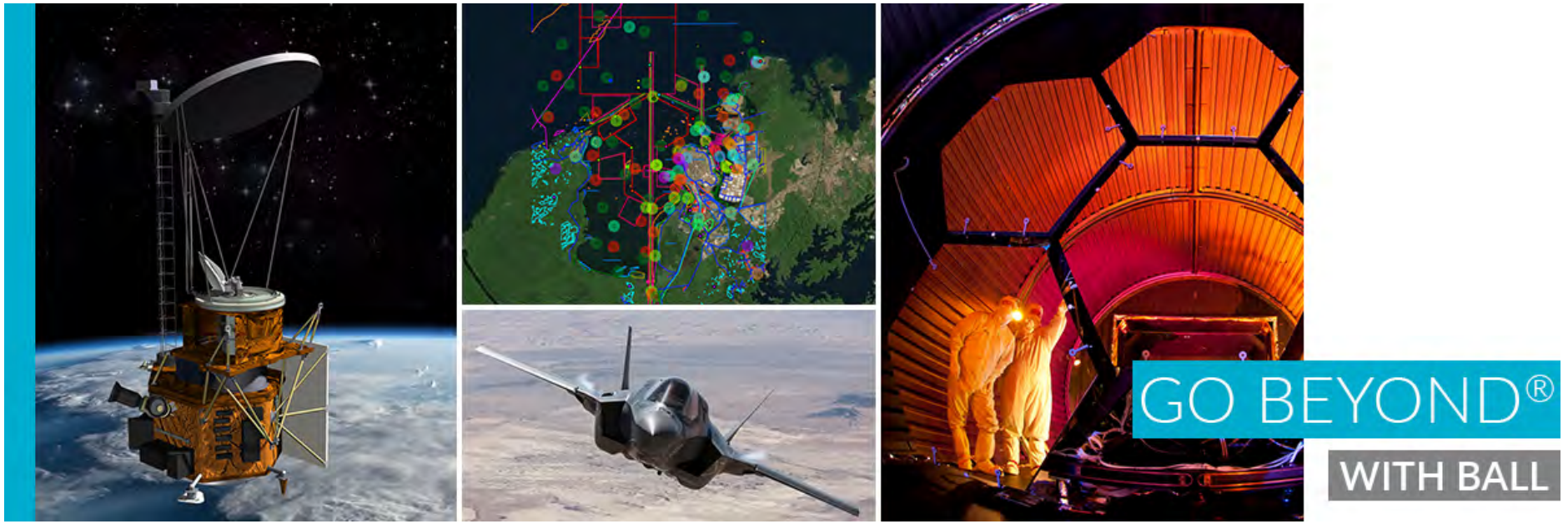
GOES-R Boom Deployment:
Credit: NGIS/Orbital ATK, youtube.com

PROJECT HISTORY

- Continuation of Fall 2019 project.
- Existing Gantry to incorporate control system.

WHY THIS PROJECT

- Aerospace Industry Experience
- A Large Mentor Team
- Impact NextGen Space Flight Systems



AGCO Smart Logistics
Smart Asset Tracking

Vision
High tech solutions for farmers feeding the world

Who Are We?

Challenger | FENDT | GSI | MASSEY FERGUSON | VALTRA

For demanding agribusinesses, **Challenger** is high-performance, reliable and intelligent machinery providing unmatched productivity.

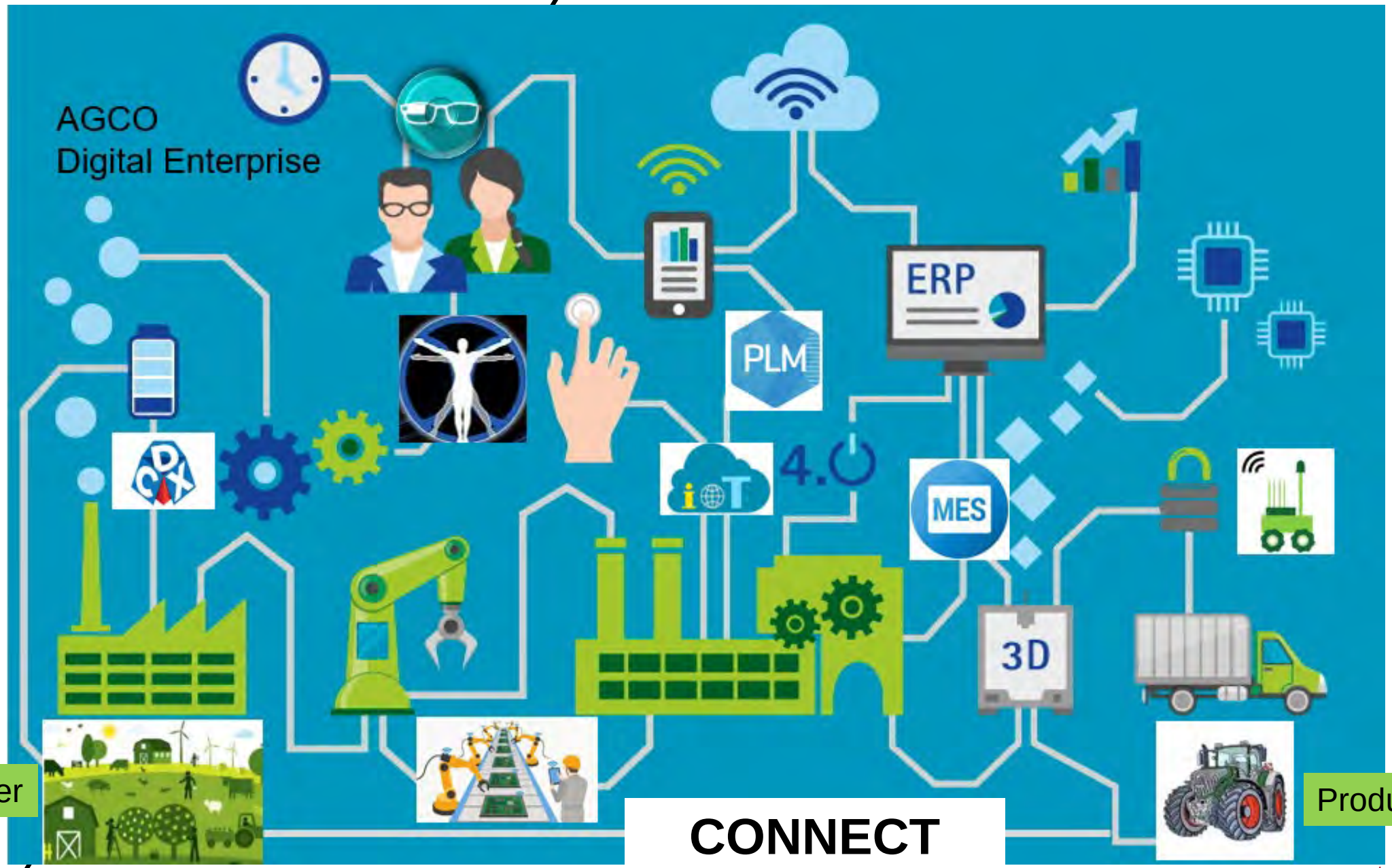
Fendt is the leading high-tech brand for customers with the highest demands and is regarded as the innovation leader for agricultural machinery.

GSI's full range of grain and protein solutions mean your entire enterprise can achieve maximum efficiency, productivity and profitability.

Massey Ferguson, with more than 160 years of innovation and experience, offers one of the most complete lines in the industry.

Valtra, renowned for its reliability, longevity and Nordic heritage, is centered on true versatility and dependability.

AGCO
Your Agriculture Company



CONNECT EVERYTHING

AGCO
Your Agriculture Company

Digital Innovation

A.R. Training

AGVs

Predictive Maintnc.

Smart Watch

Andon

Additive Mfg.

PLM

DES

Exo Skeleton

Smart Glasses

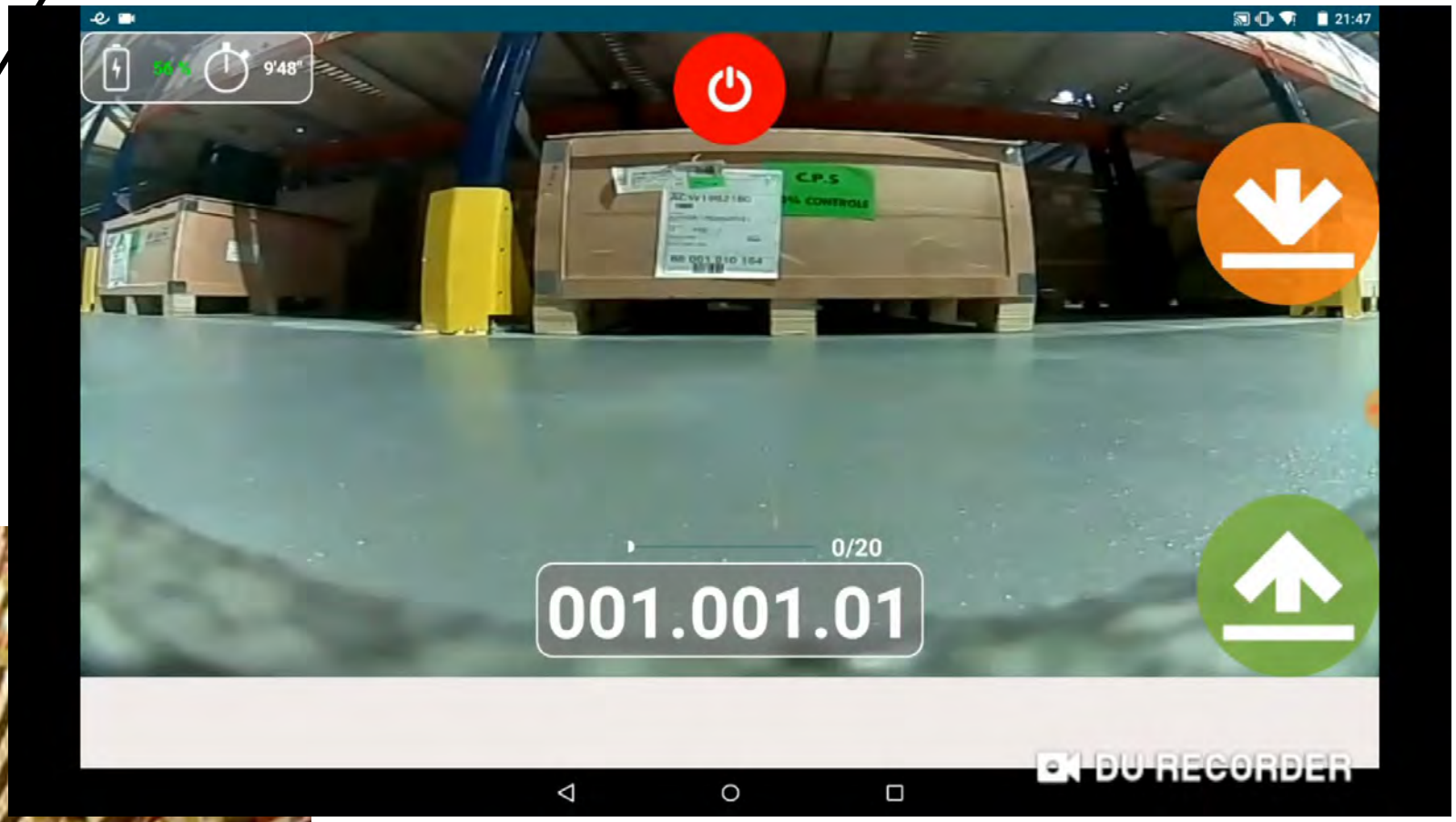
Smart Tools

Cobots

Connected Logs.

Advanced Warehousing Drones

- Increased Productivity
- Automatic identification location of hard-to-reach inventory in warehouses
- Worker safety
  - No lifts



AGCO
Your Agriculture Company

Autonomous Guided Vehicles

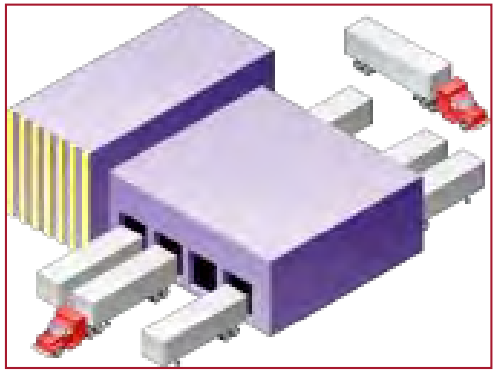
REDUCED LABOR,
PREDICATABILITY AND SAFETY
MODULAR GROWTH

Jackson, MN

AGCO
Your Agriculture Company

The Challenge
AGCO Smart Label – Changing the Approach to Logistics

Cross Dock / Consol - Deconsol



Warehouse / Super Market / Line Side

1) Scan and load shipping data on Bar code Sensor / Send ASN

NFC

2) Scan sensor / Complete Receipt / Load WMS # / Load next location

SAP WM

3) Confirm put away with scan or RPA / Track and Trace internally

How? Co-Develop thin film sensor technology and integrate into a bar code that is programmable -

Deliverable:
Potential solution/s and demonstrated working POC

Wifi

AGCO
Your Agriculture Company

Business Problem Statement & Vision

Passive tracking – all movement of the assets need to be done without any manual action. The limited manual action should be to link the asset to the tracker/sensor.

- **Intralogistic beacons**
  - wifi-type signals.
  - cheap.
  - applied to parts and kits/carts; difficult to apply to parts and easy to mount to kits/carts.
- **In/outbound beacons**
  - GSM and wifi type signals
  - require bigger batteries
  - more expensive.
  - applied to deliveries (boxes) and finished goods. Easy to apply.
- Both types are returnable.

Technical guidelines

- **Outdoor tracking** – end of the production line and the position of tractor tracked from there on.
- **Indoor tracking** – track where a particular asset is within the warehouse (with wall separations, metal racks, machinery etc)
- **In transit track and trace** – asset moves between plants within AGCO or if moves to and from suppliers and dealers.
- **Temperature** – functional in a temperature environment ranges from -25 degrees to +50 degrees C .
- **Altitude** – functional at elevations of 2.4 KM's.
- **Environment** – functional when exposed to rain, snow, dust, and some levels of oil and lubricants.
- **Geography** – utilized on the North American, South American, European, African, Asian, and Australian continents.
- **Governmental Regulatory compliance** - the North American, South American, European, African, Asian, and Australian continental.
- **Battery life** – range from 5-24 months (may need to be adjusted)
- **Cost** – goal is < $0.15 per label

AGCO Your Agriculture Company

AGCO PARTNER TEAM

Executive Project Sponsor
Hans-Bernd Veltmaat
SVP Chief Supply Chain Officer

Business Owner
Greg Toornman
VP Supply Chain

Project Lead
Peggy Gulick
Dir Digital Transformation,
Global Manufacturing

Rick Reuter
ProjMgr
Global Digital Lead

Andreas Frank
COE leader
Industry4.0 Lead EAME

Daniel Cantarelli
Industry4.0 Lead SA

USAF - Agile Combat Employment

Agile Combat Employment Goal:

Service, Re-Fuel and Re-Arm 4x A-10s and 2x HH-60s, organically, in a bare base environment in minimum time.

Limiting Factor:

Transporting All Up Rounds (AUR) inside cargo aircraft.

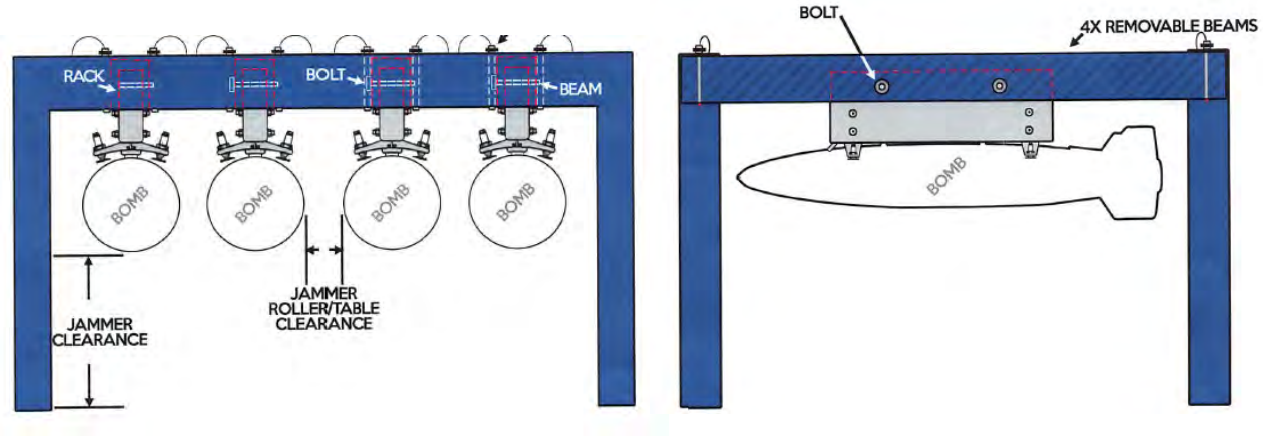
- **AURs are munitions (bombs and missiles) that are built up to the point, that they can be immediately loaded onto fighter aircraft.**
- **Currently there are no approved/safe transportation racks or storage for aircraft shipment of AURs.**

USAF – All Up Round Shipment

What we need:

- **Some type of trailer mounted (preferred) or palletized shipping container for All Up bombs and missiles that will be safe for air transport.**

Example Idea:



23d Fuels Management FARP team

Who:
MSgt Richard Bartley and TSgt Matthew Forehand from Moody Air Force Base.

What:
Support worldwide combat search and rescue missions needing an immediate on-call response by providing fuel in austere locations with a minimal footprint. Team consists of nine local members (part of only 63 total in the Air Force).

Missions supported:
- Hurricane Harvey
Two members deployed to College Station, Texas for Beaumont rescue operations resulting in 900 people saved

- Operations OAKEN STEEL and INHERENT RESOLVE
Four members deployed to Horn of Africa to support combat search and rescue operations completing over 23 flying missions

Forward Area Refueling Point (FARP) Flow Rate Increase

Background: The FARP capability was designed to refuel small frame aircraft such as helicopters in a remote or austere environment when air-to-air refueling is not feasible and fueling stations are not accessible. FARP operations consists of a tanker aircraft (C-130) acting as the source of fuel as well as multiple small frame aircraft as the receivers.

Problem: The need for FARP operations have advanced from supporting helicopters to fighter aircrafts as receivers. More fuel is required to be pushed to fighters and at a faster rate as fighter aircraft can burn fuel at a faster rate than what is being pushed from the tanker. The capacity of the tanks as well as the burn rates increases the refuel time which keeps the aircraft on ground at a remote/austere environment longer than what is needed.

Solution: Increase the gallons per minute from the tanker aircraft to two or more receiver fighter aircraft in order to reduce the ground time of all aircraft.

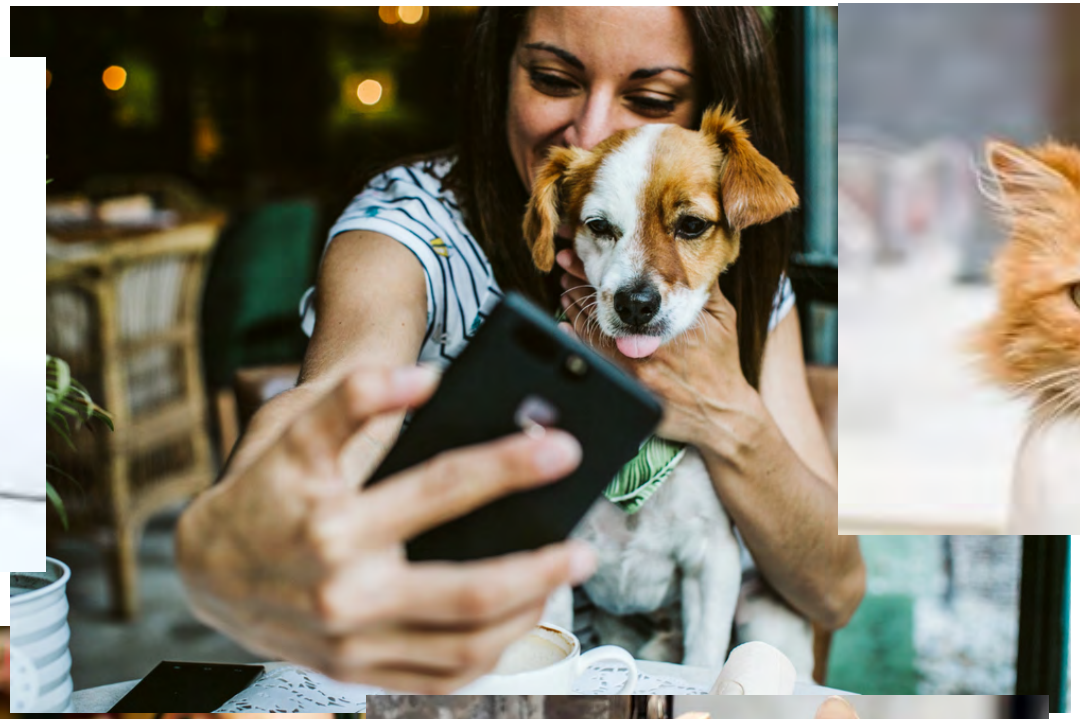
Primal Feeder

Ebony Hilton, MD

January 6, 2020

ejhilton@gmail.com


HAPPY




Yellow Ground Corn
Yellow Ground Corn
Dye Coloring
Chicken By-Product
Corn Gluten Meal
Whole Wheat Flour
Rice Flour
Potato Starch
Meat & Bone Meal
Vitamin Pre-Mix
Propylene Glycol
TADA!


© Imgur


PetSafe

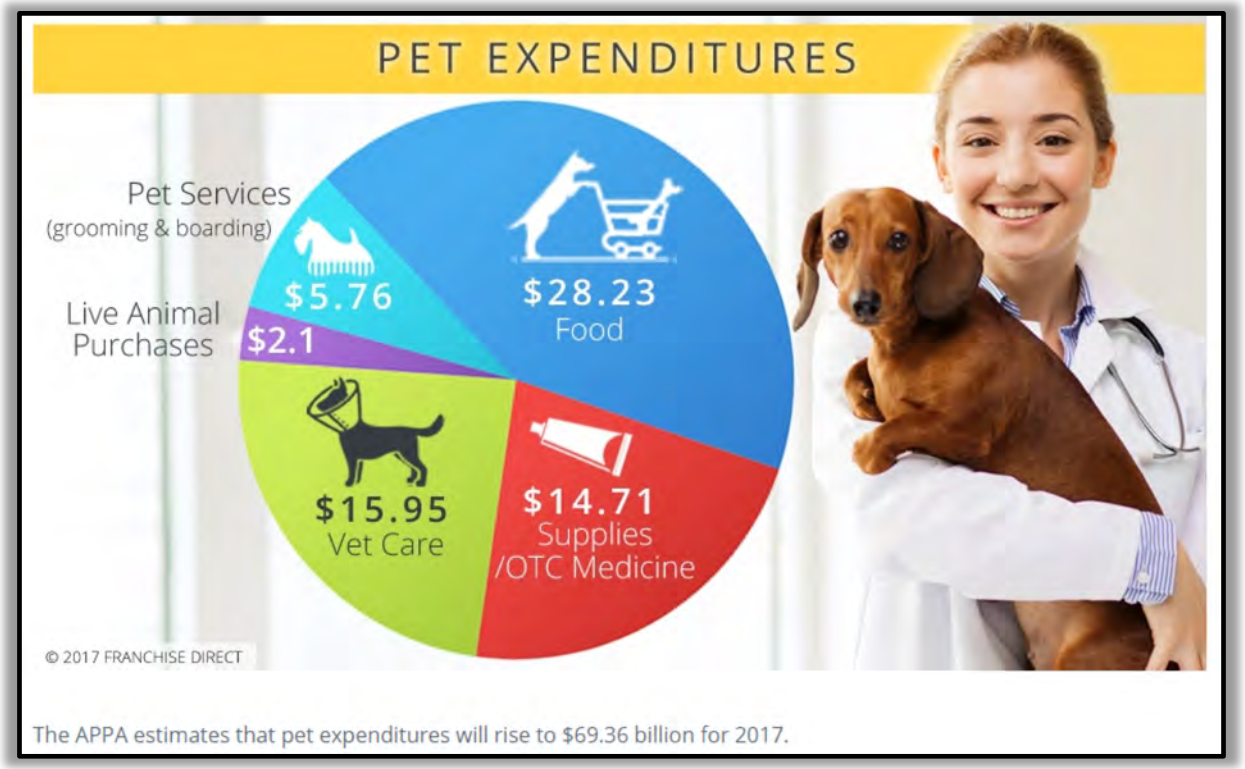

PetSafe


Healthy
Holistic
BLUE
WILDERNESS
100% GRAIN FREE
HIGH PROTEIN ~ GRAIN-FREE
TURKEY & CHICKEN GRILL
NET WT 12.5 oz. (354 g)


ADD WATER


PRIMAL
Quality
MADE IN THE USA
WHOLESOME FREEZE-DRIED RAW FOOD
FOR DOGS
PRIMAL
FREEZE-DRIED
NUGGETS
87% TURKEY, SARDINE, ORGANS & BONE
13% PRODUCE & SUPPLEMENTS
TURKEY & SARDINE FORMULA
★ Complete and balanced freeze-dried raw diet.
★ Turkey raised without antibiotics or added hormones.
★ Grain & gluten free. ★ Corn, wheat & soy free.
★ Naturally derived vitamins & minerals.
14 OZ
JUST ADD WATER
MAKES 3 lbs+
PRIMALPETFOODS.COM


THE FARMER'S DOG
DOG'S
TURKEY RECIPE
Prepared with on
April 10, 2019



- Design: Small, Sleek, Quiet
- Feeding Station: low to the ground, for smaller dogs and cats to utilize.
- Durable: Able to withstand the most aggressive of dogs.
- Device Safety
  - Easy to clean compartments: raw food
  - Mechanical components are well protected to ensure safety of pets (i.e. curious cats can not stick paw into contraption)
- App Specifics
  - User friendly programmability
  - Specify amount of food (1/8 cup, 1/4 cup, 1 cup)
  - Scheduled feeding times

Primal Feeder

Thank You!

Small Business Labs

Tracking and Forecasting the Trends and Shifts Impacting the Future of Work, Small Business and the Gig Economy

« NPR on the Gig Economy | Main | Declining Corporate Longevity »

WELCOME TO SMALL BUSINESS LABS

Small Business Labs, from Emergent Research, covers the key social, technology and business trends impacting small businesses

February 01, 2018

Dog Walking Company Wag Raises $300 Million

Wag calls itself the "#1 dog walking and dog sitting app for busy dog owners".

And backing this claim up is their recent $300 million funding round.

Subscribe To Small Biz Labs

EMERGENT RESEARCH IN THE NEWS

Forbes: More Americans Try The Digital Nomad Lifestyle


Healthy
Holistic
BLUE
WILDERNESS
100% GRAIN FREE
High Protein ~ Grain-Free
Turkey & Chicken Grill
Net Wt. 12.5 oz.


THE FARMER'S DOG
DOG'S
TURKEY RECIPE
Prepared with
April 10, 2019
FRESH PET FOOD
We test on humans.
IF YOUR DOG DOESN'T LOVE IT, SEND IT BACK. WE'LL EAT IT.



Baby & Me Life Vest

Ebony Hilton, MD

Capstone Project

January 6, 2020


EXIT


DEMO
Thailand!


INFANT


US AIRWAYS


US AIRWAYS

Design:

- Buoyant: Adult and 2 small children
- Small, sleek design that allows for optimal mobility of parent's arms
- Lightweight, Sturdy material
- Durable material, unable to be punctured
- Adjustable straps for optimal fit for adult and two children (ages 0-4yrs old)
- Auto-inflates quickly
- Capable of active inflation via air ports
- Reflective for easy spotting in dark waters
- Ideally allows for skin-to-skin contact to at least help to decrease hypothermia should end in cold waters
- Shield's child's face from water

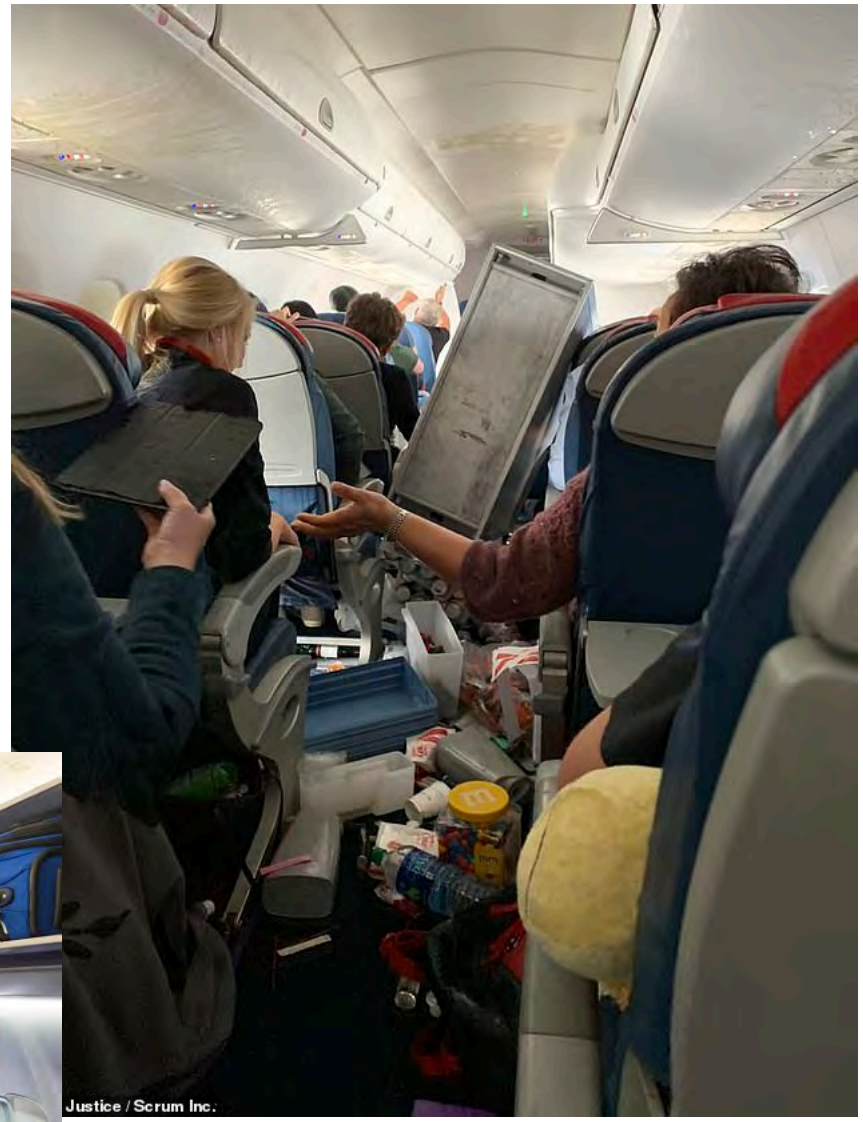

BOEING
737 MAX


CARNIVAL VICTORY


DBX
VERVE VEST
YOUTH
BODY WEIGHT 50-90 LBS
S COAST GUARD
PPROVED
DBX

Rescue Me
Float With Me
Baby and Me Life Vest
Life Nest
Forever With Me


© Alamy


Justice / Scrum Inc.

Fresh Petcare

Reinventing Oral Care for Pets

About Us

- Start Up Company begun in early 2018.
- Finalist at ATDC's Startup Bootcamp.
- Experienced entrepreneurial leadership in a number of industries – Medical Devices, Professional Services, Out-of-Home Digital Media, and Franchised Restaurants.
- Have been a part of raising nearly $75M from public and private markets for prior start ups.
- Have established relationships in the pet care industry to scale quickly.

Why?

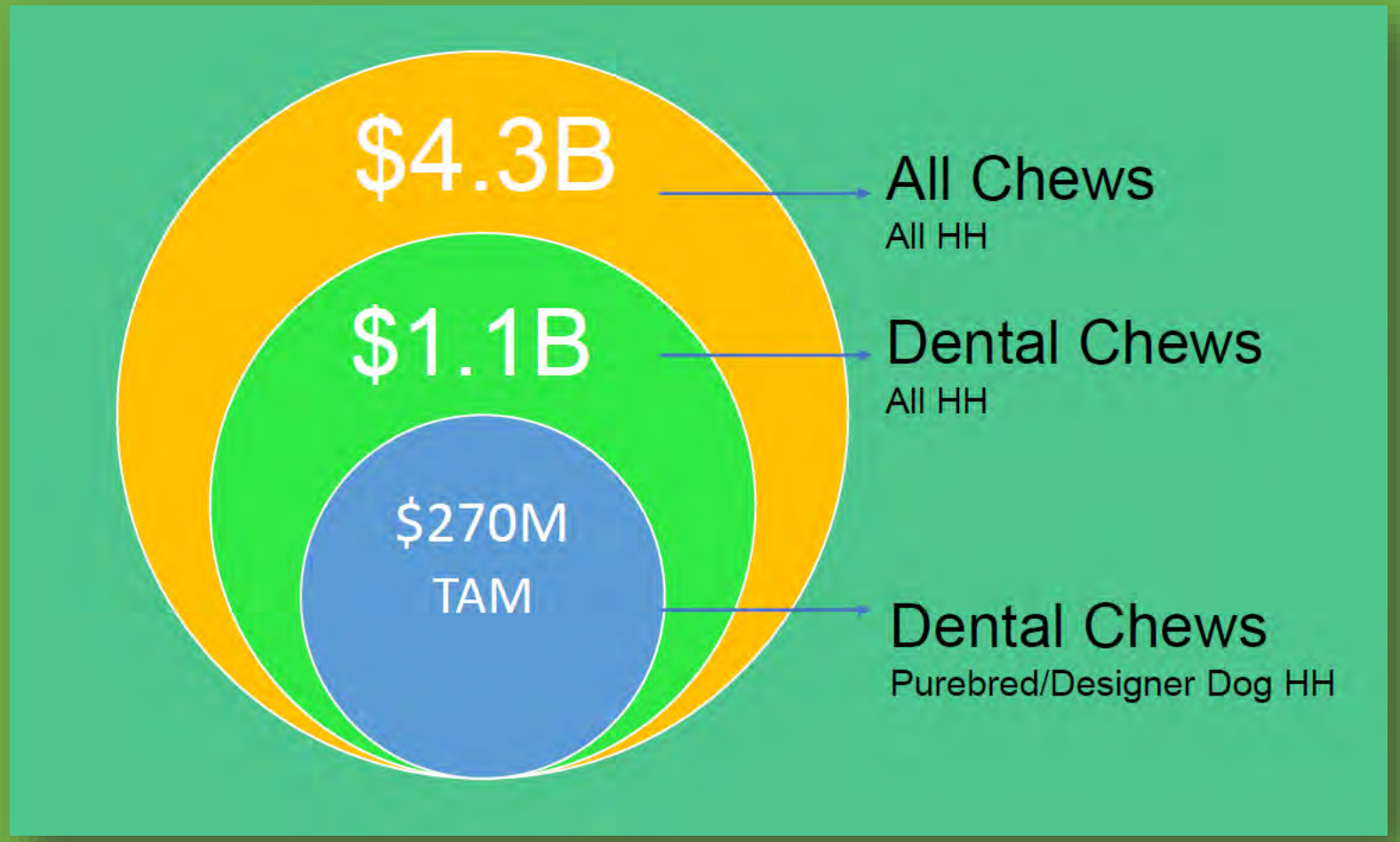
- Periodontal disease is the most common clinical condition occurring in adult dogs and cats, and is *entirely preventable*.
- By three years of age, most dogs and cats have some evidence of periodontal disease.
- Only 4% of pet owners brush their dog's teeth daily.
- Good Oral Care can add 2 to 3 years to the lifespan of a dog or cat.

Current Oral Care Solutions

How Are We Different?

- Unique delivery mechanism to clean teeth and gums as well as brushing and much more effectively than chews
  - Already proven effective in minimally viable product form
- All-natural formulation
  - Already proven effective in paste form
- Product delivers instant feedback to owner, so they know it's working
- Opportunity to leverage a key customer insight to develop next generation canine dental disk AKA "Gumdrop™"

Current Dog Oral Care Market



Fresh Petcare

Reinventing Oral Care for Pets

Designing Ceiling/Eave Screens to Control Malaria Mosquitoes in Sierra Leone, West Africa

Centers for Disease Control and Prevention (CDC)

Drs. Rebecca Levine and Brian Gurbaxani

Malaria and Mosquito Control in Sierra Leone

Population: 7.6 million (2017)

UN Human Development Index Rank: 181 out of 189 (2019)

- Malaria is a mosquito-borne disease that sickens at least 2.2 million Sierra Leoneans each year, including ~1 million children.
- Insecticide-treated bednets are currently the only mosquito control intervention to prevent malaria, and challenges exist around their use.
- Housing modification through screening represents a long-term strategy for mosquito control that is not based on bednets.

Houses with Open Eaves and No Ceilings

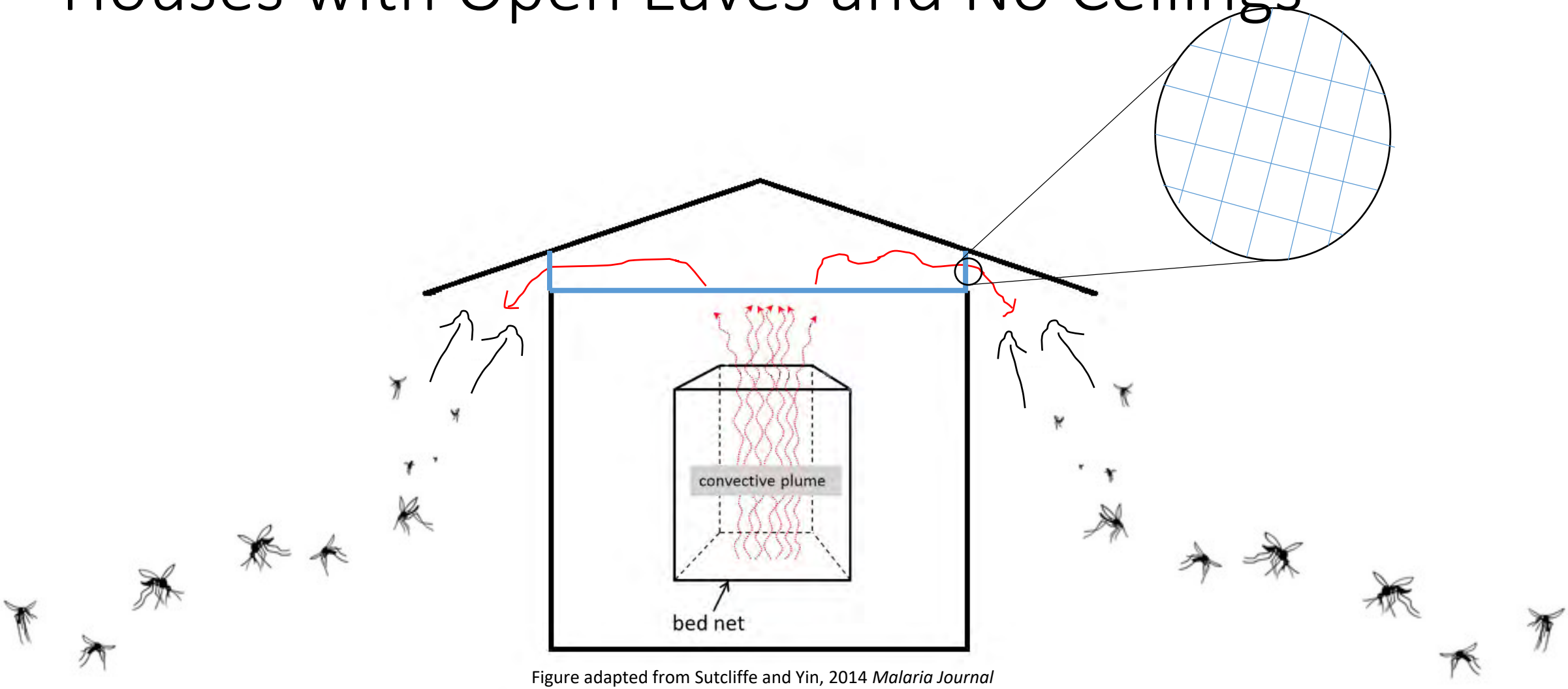


Figure adapted from Sutcliffe and Yin, 2014 *Malaria Journal*

Project: Design Ceiling/Eave Screens

- Porous to air but not mosquitoes (preserves airflow in homes, doesn't trap heat)
- Adaptable (able to easily attach to a variety of wall substrates and house shapes)
- Durable (resists weathering and access by rodents, bats, scorpions, and other pests), tear resistant
- Lightweight and easy to install (perhaps with installation tool or anchoring pins)
- Low cost (made using local materials or cheaply imported materials)
- Insecticide-treatable? (can the material be impregnated or sprayed with insecticides?)

Skills Needed:

- Creativity
- Determination
- Can-do attitude
- Industrial Design
- Materials science
- Mechanical engineering

CHANTÉ KNOX & DIA DAVIS

ANU CLEAN CUP

CHANGING THE FEMININE CARE LANDSCAPE

www.DelivHer.com

THE EVOLUTION IN FEMININE SANITARY CARE

Safe

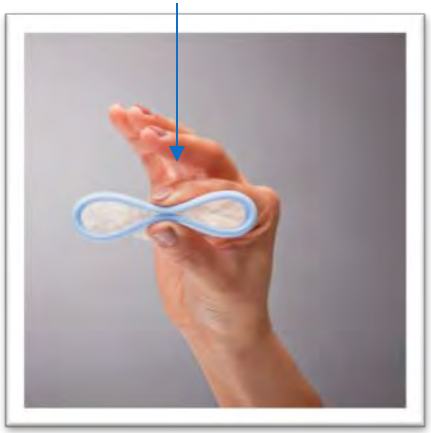
Absorbent

Extended wear

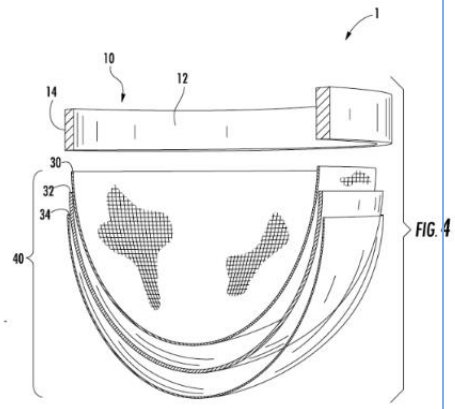
PATENTED

Anu™ Clean Cup

THE ONLY ABSORBENT CUP



Patented Technology



Anu Clean Cup
US PATENT # 10016308 / July 10, 2018

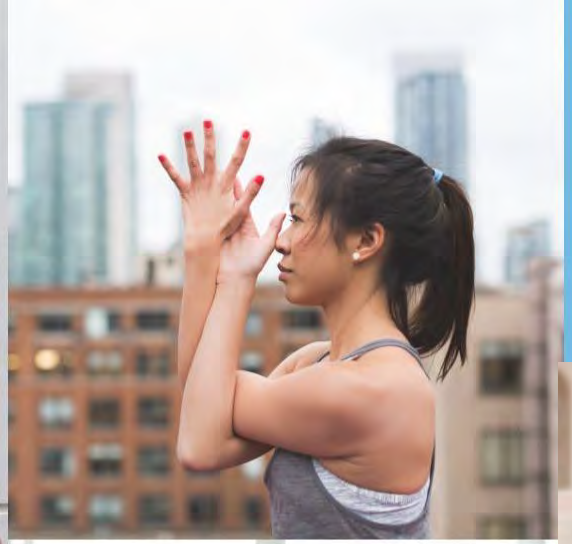
Anu™ Clean Cup

CUSTOMER DISCOVERY

Interviewed 240 women ages (18-55):

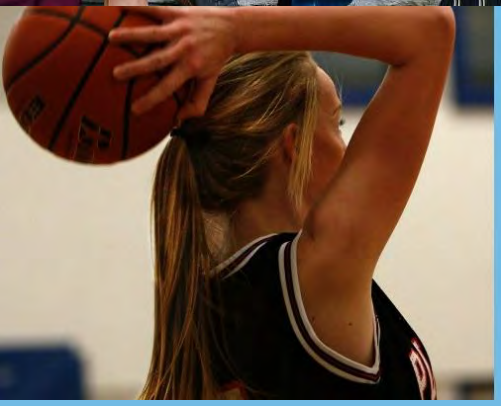
67% of women were dissatisfied with the traditional sanitary products on the market.

Anu™
Clean Cup



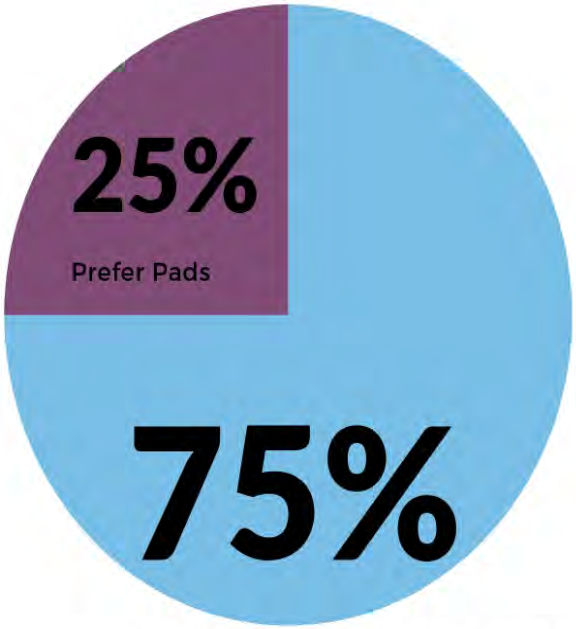
DEMOGRAPHICS

Menstruating Women
18 - 45



Anu™
Clean Cup

MARKET



U.S FEMININE SANITARY CARE MARKET SIZE

50 MILLION WOMEN AGES (18-45)

Spend $1.21 Billion Annually

Source: U.S. Census Bureau; National Center for Health Research

GO TO MARKET STRATEGY

DIRECT SALES ONLINE

LIMITED LICENSING

Manufacturing/Distribution Partnerships

WHOLESALE

Anu™ Clean Cup

ANU PRODUCT COMPETITION

DIRECT

USD$15 - 14CT

USD$35 - 1 CT

Anu™ Clean Cup

USD$5.99 - 7CT
USD$9.99 – 14CT

INDIRECT

USD$6.99 - 34 CT

USD$6.99 - 36 CT

UNFAIR ADVANTAGE

- By Women for Women
- Built-in Recurring Revenue Model
- Global Need
- Game Changing Technology
- Issued Patent

Anu™ Clean Cup

MEET THE TEAM

CHANTE KNOX

CEO, Founder, Inventor

JUSTIN MILLER

Patent Attorney Global Manufacturing

CAITLIN O'DONNELL FERGUSION

Social Entrepreneur

DIA DAVIS

COO, Startup Development, FinTech

GENESIS PLASTICS & WELDING

Manufactures

SANJAY AHUJA

Financial Advisor

DR. MONLOUIS

GSU ENI Faculty Advisor

Anu™ Clean Cup

Callanwolde
FINE ARTS CENTER

MULTI-USE
PERFORMANCE SPACE

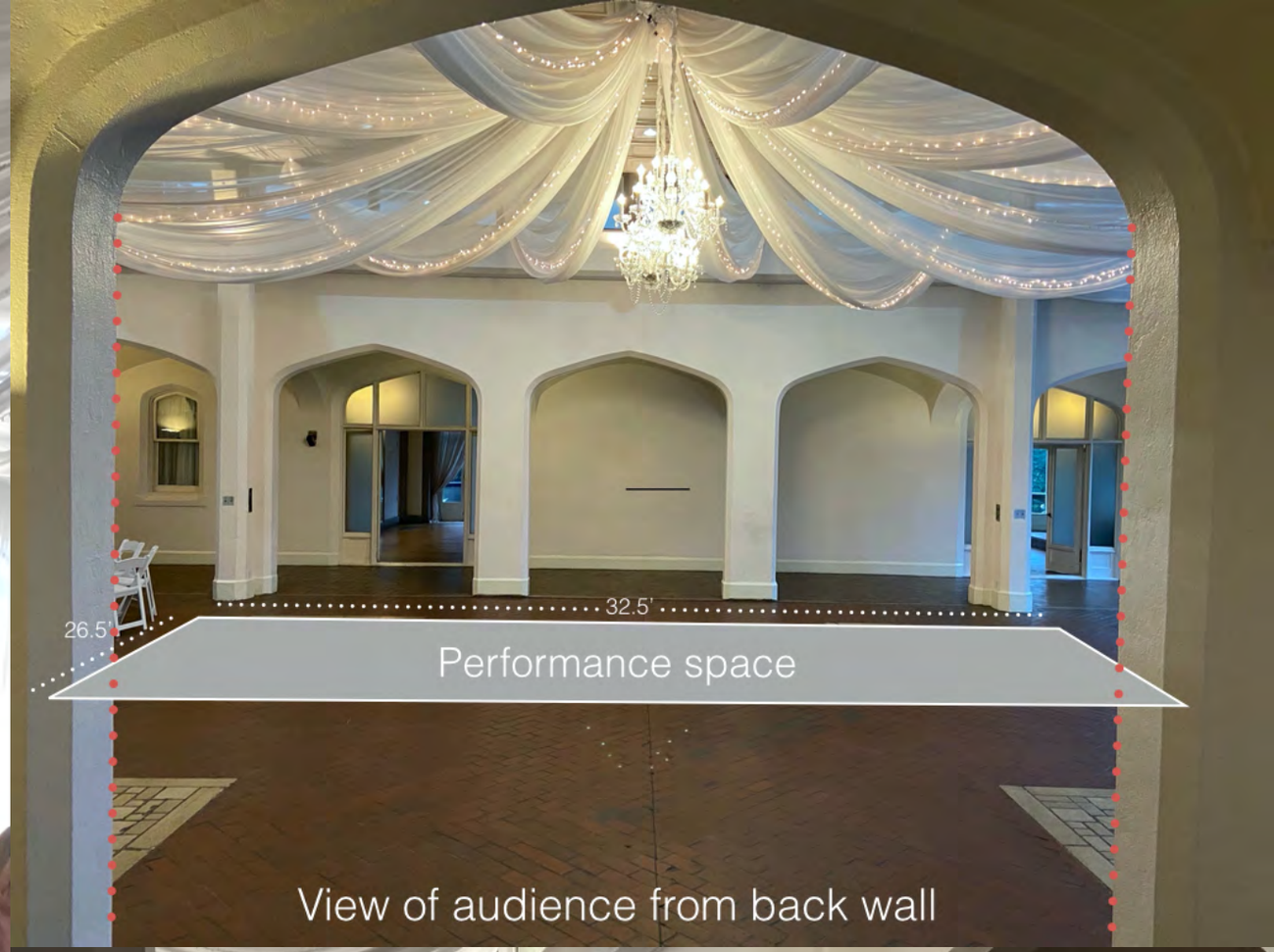
Weddings

Dance
Performances

Artist
Market

Holiday
Events

Camp



View of audience from back wall

C19-Wifi enabled Wireless Video Laryngoscope with Software Application

- https://prezi.com/view/ixRBpMfEJiWMUpJ7gOxG/

Spinal Decompression Device

The end of back pain as we know it….

The Problem

1. 31 million Americans currently experience low-back pain
2. 80% of the world population will experience at some time
3. Single leading cause of disability worldwide
4. Most common reason for missed work
5. Second most common reason for doctors visits
6. Most cases are mechanical or non-organic
7. $50 billion spent each year on relieving back pain

Spinal Decompression

The act of gently stretching the spine, which immediately changes force and position

- Pressure relieved off of spinal disks (gel-like cushions between vertebrae)
- Over time, negative pressure may cause bulging or herniated disks to retract
- Can take pressure off the nerves and other structures in spine (promotes movement of water, oxygen, and nutrient-rich fluids into disks to heal)
- Decreases chemicals in damaged tissues from inflammation

Problems with Current Solutions

1. Expensive
2. Inconvenient
3. Bulky/large
4. Time consuming
5. Do not utilize tech
6. Can be DANGEROUS

Prototypes

- Wearable
- Discreet
- Easy to use
- Utilizes tech
- Compactable
- Economical

Luke Keller
678.522.1366
Lucasterrykeller@gmail.com

THE CANTAINER

The Cantainer

CAPSTONE PRESENTATION

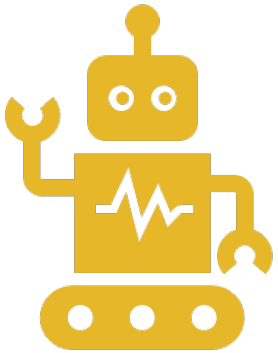
Current Problem:

Overwhelmed employees delivering drinks.

Long lines causing attendees to miss events.

Solution: “The Cantainer”

Through



A system that reduces operating cost and wait time for consumer.

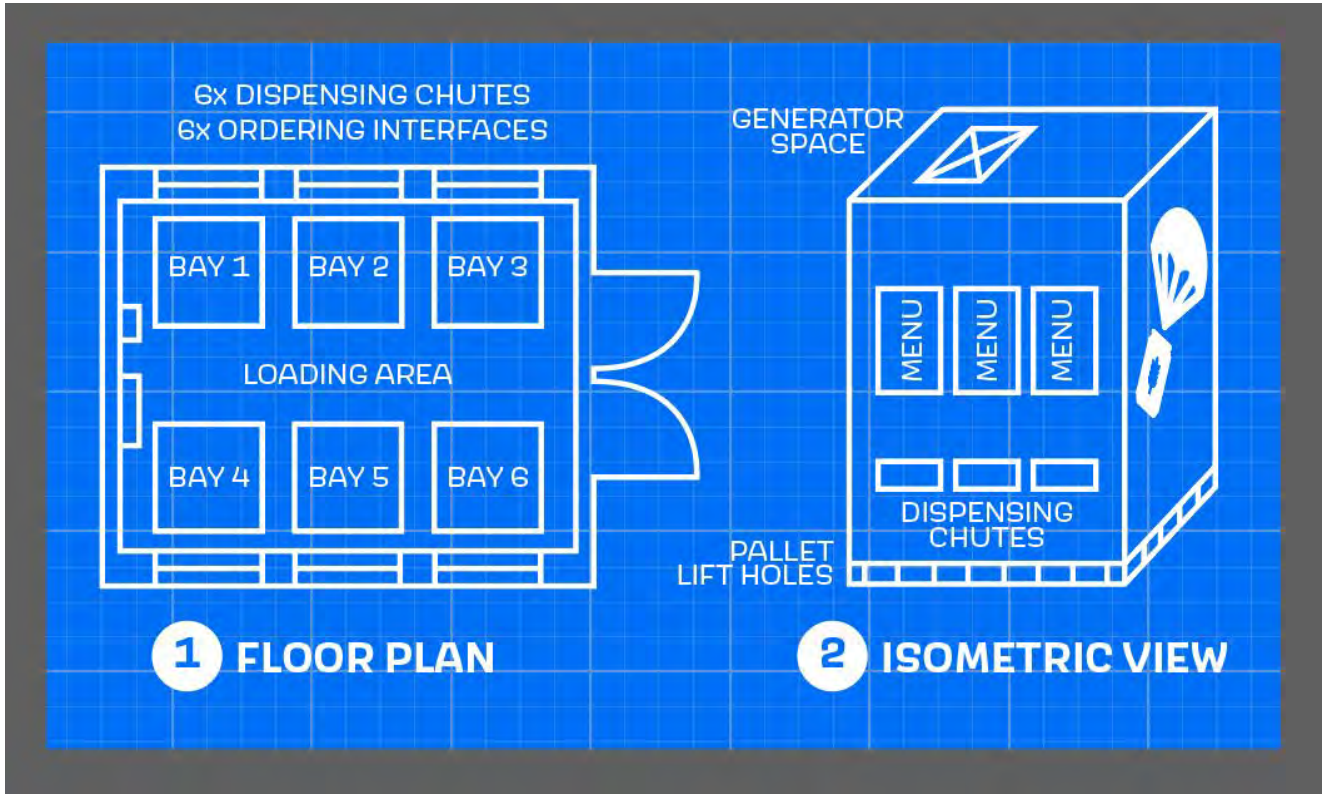
Alcohol Vending Machine.

THE CANTAINER

Project:

Retrofit a canned vending machine to deliver an Opened Canned Beer.

THE CANTAINER



Minimal Viable Product:

Opened Can Alcohol Vending Machine

THE CANTAINER


THE
CANTAINER
CANTAINER
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THE CANTAINER

THE CANTAINER

WILLIAM DOXEY
Founder & CEO
Atlanta, GA

www.TheCantainer.com
doxey@TheCantainer.com
C: (912) 536-6544
O: (404) 482-3961

@TheCantainer

ChockBot® – Automating Airport Safety

Jay Tison
jaytsn05@gmail.com
404-312-4326

Problem Statement

- Commercial aircraft operations worldwide require wheel chocks for boarding, de-boarding, and parking
  - Ground personnel currently place and remove chocks as part of normal operation

- Automating the chocking process with a robotic vehicle benefits airport operations
  - Time and motion / efficiency of ground personnel – focus on other duties
  - Boarding / de-boarding during lightning activity, when tarmac closed to ground personnel
  - Brake reliability and time-on-wing extension – no extensive parking brake use after landing
  - Safety: De-conflict already bustling tarmac and prevent head / neck injuries or lacerations

- Team Goal
  - Review design initiated by Fall ’19 Semester Team for one week and determine go-forward plan

- Desired Candidates
  - Mechanical, electrical, and computer engineering design or manufacturing
  - Programming experience, preferably with autonomy or robotics
  - Great Attitude!

Energy Burden Reduction Analysis Tool

Garry A Harris

Center for Sutainable Communities

Energy Burden Reduction Analysis Toll

Energy Burden Reduction Analysis Tool

- ECO District Hampton Roads Project
- Largest African American Community in the Country
- Over 5000 single family homes
- Many built in the early 50's, 60's and 70's
- Many are life long residents in the community; 30 through 60 years
- Many homes built under different codes and standards; very inefficient

Energy Burden Reduction Analysis Tool

- ECO District Hampton Roads Project
- How Can We Efficiently Scale Up Energy Burden Reductions
- Design, Develop and Deploy a Tool
- Verify the effectiveness of various heating and cooling devices
- Full scale energy audits may be too expensive
- Residents NOT fully knowledgable to understand audits results and implementation

Energy Burden Reduction Analysis Tool

- ECO District Hampton Roads Project
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- Residents NOT fully knowledgable to understand audits results and implementation

Energy Burden Reduction Analysis Tool

The tools once designed, tested and deployment will help

Save hundreds of dollars in energy costs

Create a healthy home, and

Help to change energy efficient behaviors resulting iin other costing saving measures

Students will be required to design , devlopment and deploy a successful working prototype

SCOUT AEROSPACE

GEORGIA Space Grant Consortium

Background

- Scout Aerospace LLC is an orbital transfer vehicle and spacecraft manufacturing company.
- Both the government and industry are seeking was to commercialize LEO and Lunar regions.
- Scout Aerospace has received funding through the Georgia Space Grant Consortium to provide research opportunities for Georgia Tech students.
- Other companies such as Orbit Fab and Northrop Grumman have already approached problems such as refueling and launch to resupply.
- Scout believes that better transportation infrastructure in orbit will be vital to the space commodities market.

Northrop Grumman's *Cygnus* resupply drone captured by ISS. Credit: NASA

Orbit Fab's *Rigid Tanker* Prototype. Credit: Orbit Fab, orbitfab.space

Concept

Scout Aerospace is requesting design for shipping container used in transport of goods through cislunar space. This container will be a feature in a larger logistics system.

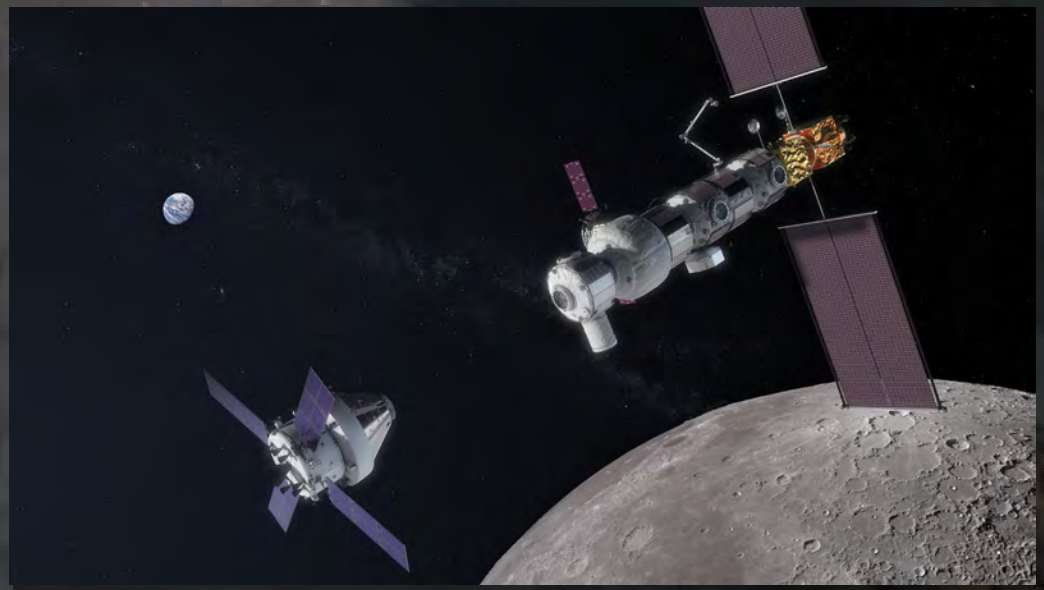
Design Requirements

- **Container must be able to accommodate up to 22.5 m^3 of pressurized cargo.**
- **Container must be designed to protect contents against the space environment for a service life of at least 10 years.**
- **Container must be able to hard dock with ISS and NASA Gateway.**
- **Container dimensions must be constrained to fit inside fairings offered by SpaceX, ULA, and Ariane.**
- **Container must be designed in such a manner to be "stacked" in a cylindrical pattern**
- **Container must include markers for machine vision to track and grapple.**

Deliverables

Scout is looking for Capstone to provide the following:

- **A parametric analysis that includes**
  - **Gross volume**
  - **Cargo Volume**
  - **Gross Mass**
  - **Cargo Mass**
  - **Power Requirements**
  - **Radiator Requirements**
- **Artistic Rendering of the final design**
- **Cost estimates and feature trade space**



Artistic rendering of proposed Gateway Station. Credit: NASA

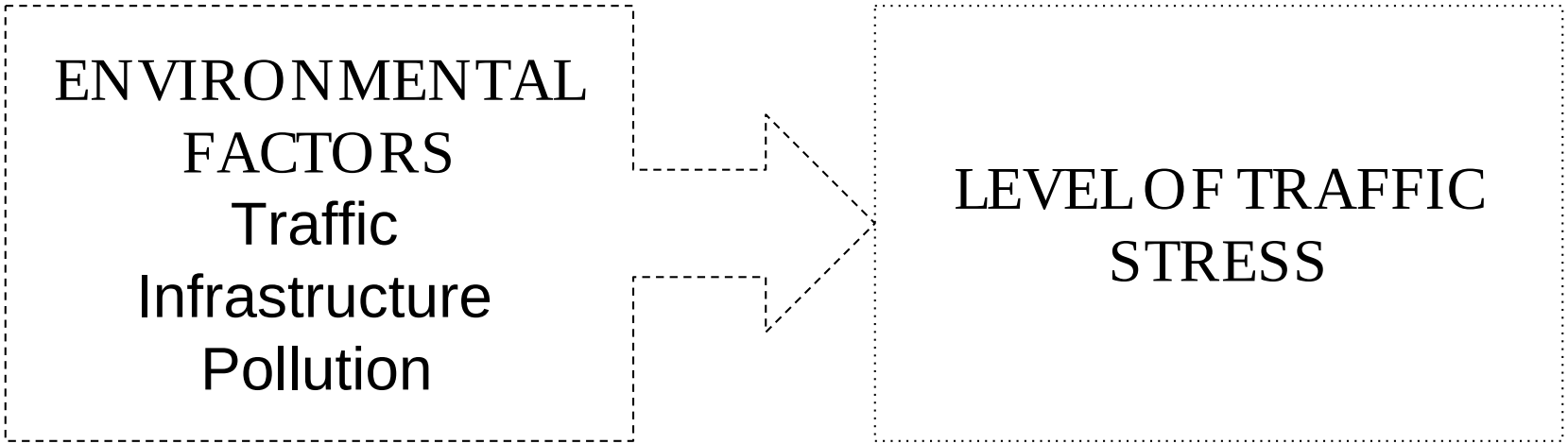
C13-Design of process to manufacture training samples for ceramic tile grinders

- Siemens Energy designs and manufactures industrial power generation units that involve the use of annular combustion chambers. There is a need to insulate the hot gas components using ceramic tiles along the circular periphery of the chamber.
- The goal of this project is to design and validate an inexpensive manufacturing process to build testing samples from ceramic.

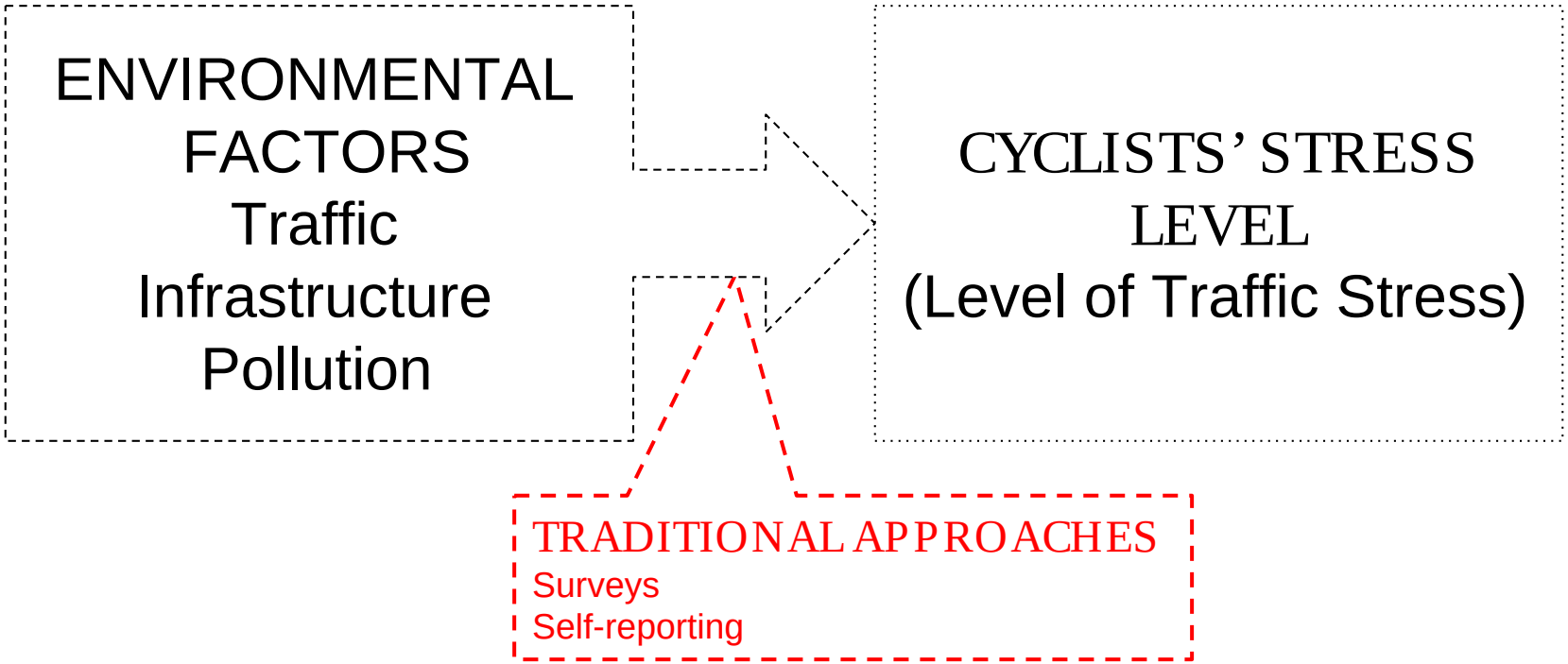
SEEING LIKE A BIKE

Chris Le Dantec – ledantec@gatech.edu

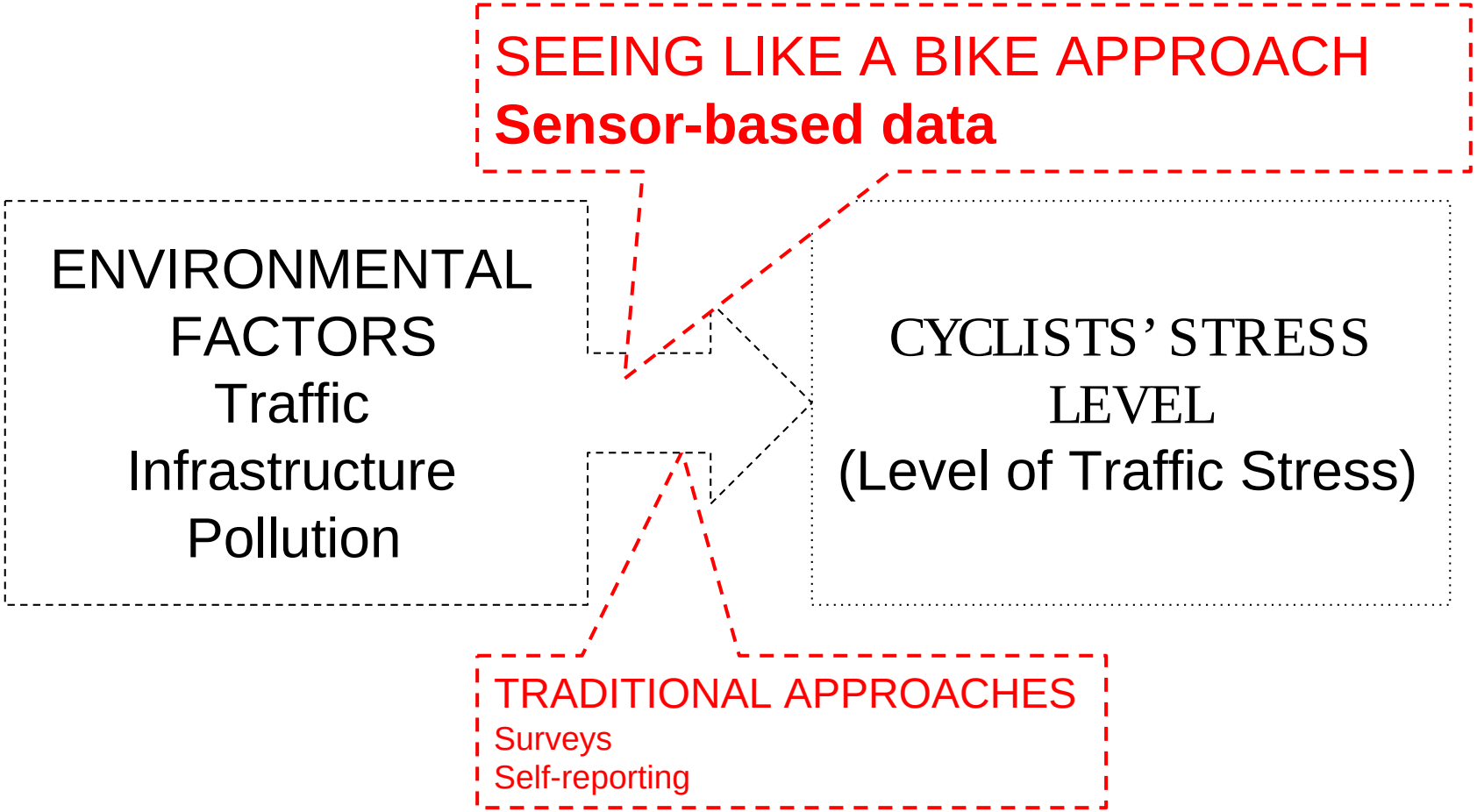
STUDY FRAMEWORK: LTS MODEL



STUDY FRAMEWORK: LTS MODEL



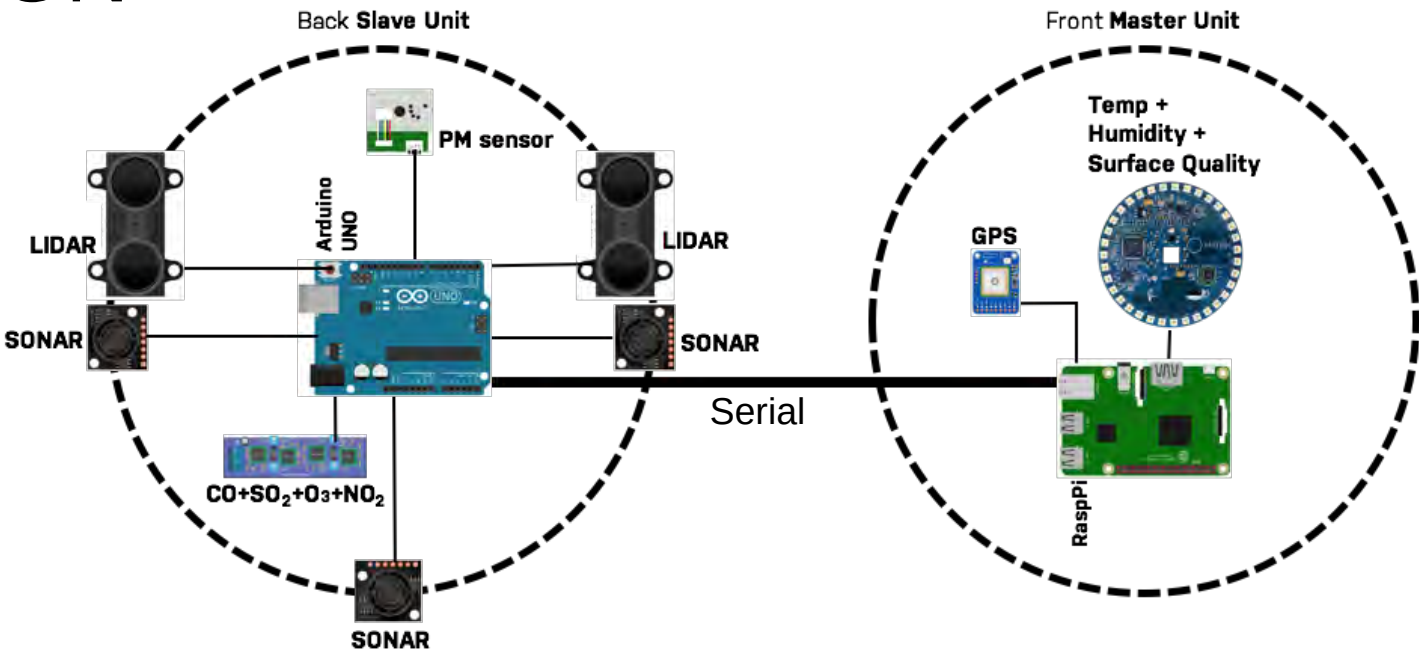
STUDY FRAMEWORK: LTS MODEL



SYSTEM DESIGN

Simpler SW Architecture:
REST APIs + Socket Apps.

Smaller Packaging:
Space Optimization



Fewer Devices:
Two MicroControllers
(Master and Slave)

Lightweight Communications:
Serial Communications.

Solid Boxes and Mounts:
Robust 3D Design


MATRIX
MATRIX

DESIGN GOALS

Sensors Design Challenges

Energy consumption
Communication complexity
Cost ineffectiveness
Portability
Physical vulnerability

Blue Light Incubator

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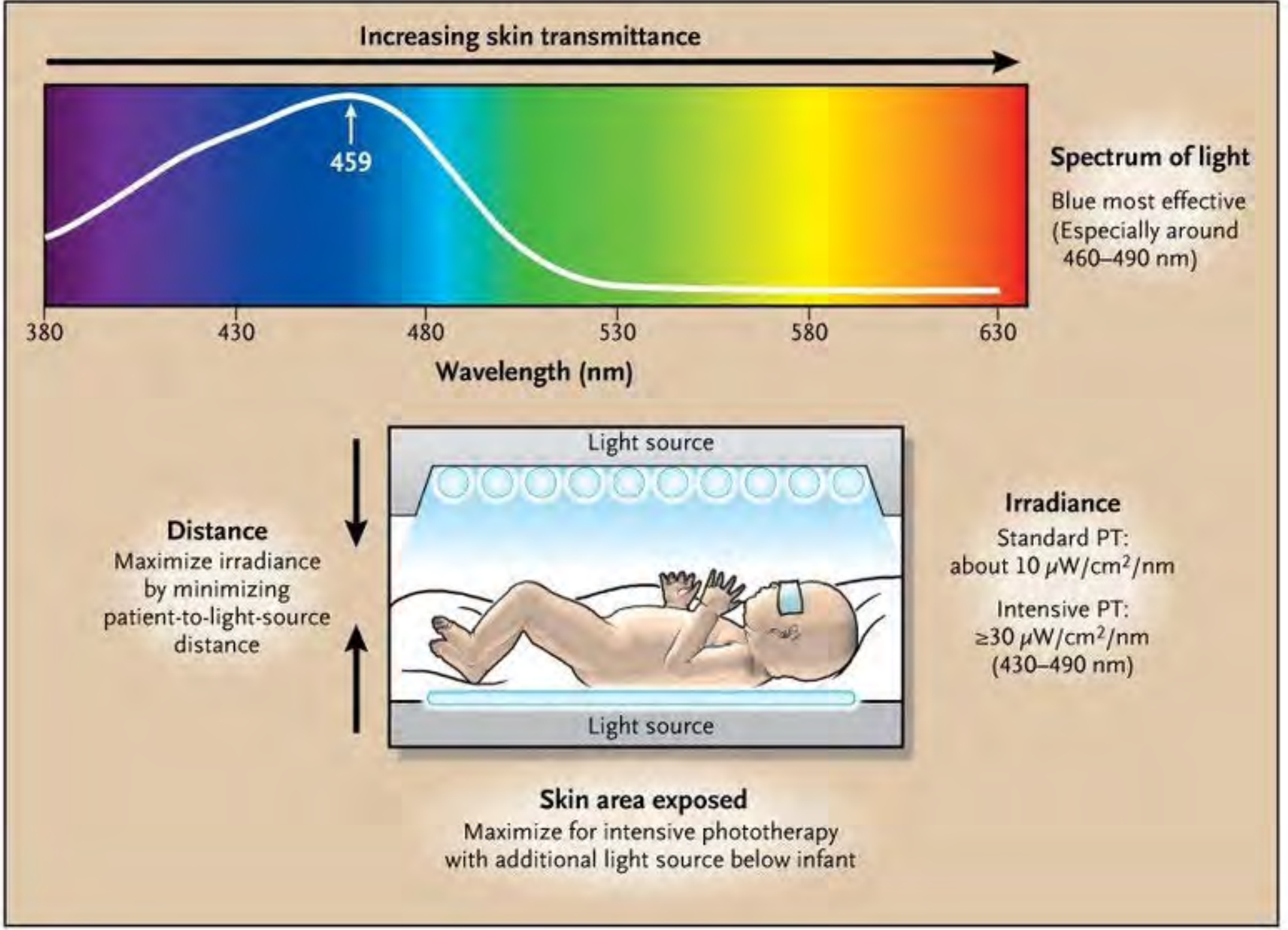
Treating Jaundice Symptoms



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Saudi Arabia
Mecca
مكة
Red Sea
Western Sahara
Mauritania
Mali
Niger
Chad
Sudan
Eritrea
Yemen
Dakar
Senegal
The Gambia
Guinea-Bissau
Guinea
Sierra Leone
Liberia
Côte d'Ivoire
Burkina Faso
Ghana
Togo
Benin
Nigeria
Lagos
Gulf of Guinea
Cameroon
Central African Republic
South Sudan
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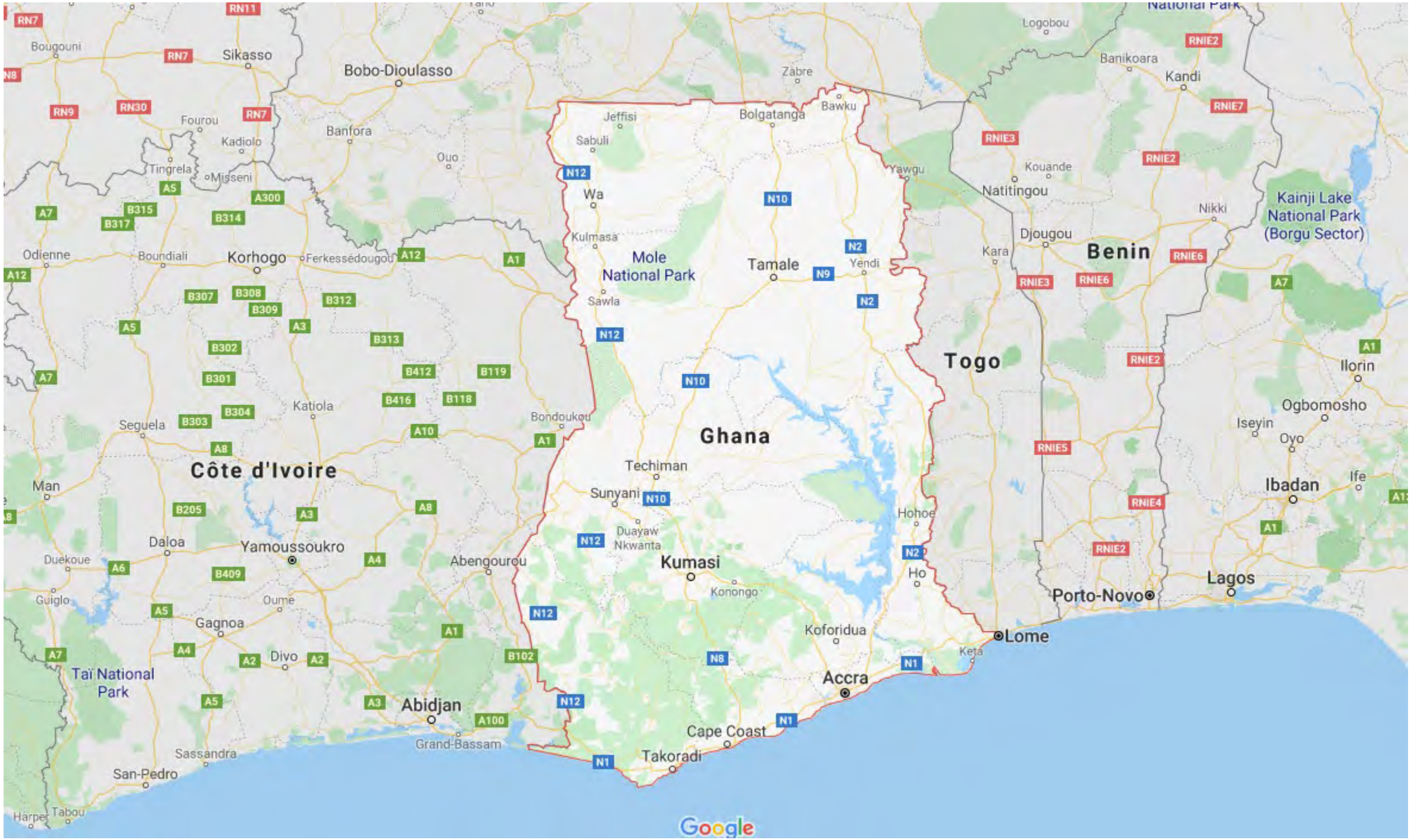
Uganda
Kenya
Rwanda
Nairobi
DRC
Google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Bolgatanga
Bawku
Sabuli
Tingrela
Misseni
Wa
Yawgu
Kouande
Natitingou
Nikki
Kainji Lake National Park (Borgu Sector)
Odienne
Boundiali
Korhogo
Ferkessédougou
Kulmasa
Mole National Park
Tamale
Yendi
Djougou
Kara
Benin
Sawla
Togo
Ilorin
Ogbomosho
Iseyin
Oyo
Katiola
Bondoukou
Ghana
Seguela
Côte d'Ivoire
Techiman
Man
Sunyani
Ibadan
Ife
Hohoe
Daloa
Yamoussoukro
Duayaw Nkwanta
Duekoue
Abengourou
Kumasi
Ho
Konongo
Lagos
Porto-Novo
Guiglo
Oume
Gagnoa
Koforidua
Lome
Keta
Taï National Park
Divo
Accra
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Lekma Po
NUN
CENT
Google


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Accra, Greater Accra Region
Google
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LEKMA POLYCLINIC
Lekma Po
NUN
CENT
Google

Blue Light Incubator to be fabricated in and for curing jaundice in Ghana

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Mixer Session Layout