

Team 304: AR Training Application

Sponsored by Florida Power & Light

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Team Introduction



Alexis Cross

Technical Specialist



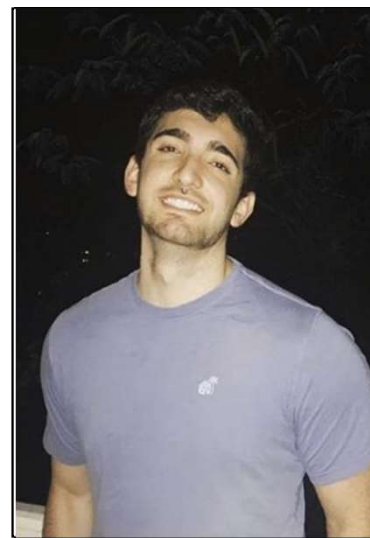
Christopher
Sopeju

Lead Programmer



Kaitlyn Gurtner

Team Leader



Kevin Rodriguez

Lead Designer



Max Urscheler

Test Engineer



Outline

- Project Summary
- Customer Needs & Requirements
- Targets
- Concept Generation
- Concept Selection
- Initial Design Selection
- Bill of Materials
- Summary



Project Summary

Kaitlyn Gurtner



FAMU-FSU Engineering

Project Liaisons

Florida Power & Light

- Genese Augustin
 - Lead Project Manager
 - Smart Grid & Innovation
- Troy Lewis
 - Engineer II
 - Smart Grid & Innovation

Faculty Advisor

- Reginald Perry, Ph.D.



Kaitlyn Gurtner

Objective & Motivation

The objective of this project is to design an iPad application that will virtually train Florida Power & Light (FPL) employees on maintenance and troubleshooting procedures for the Automatic Transformer Switch (ATS).

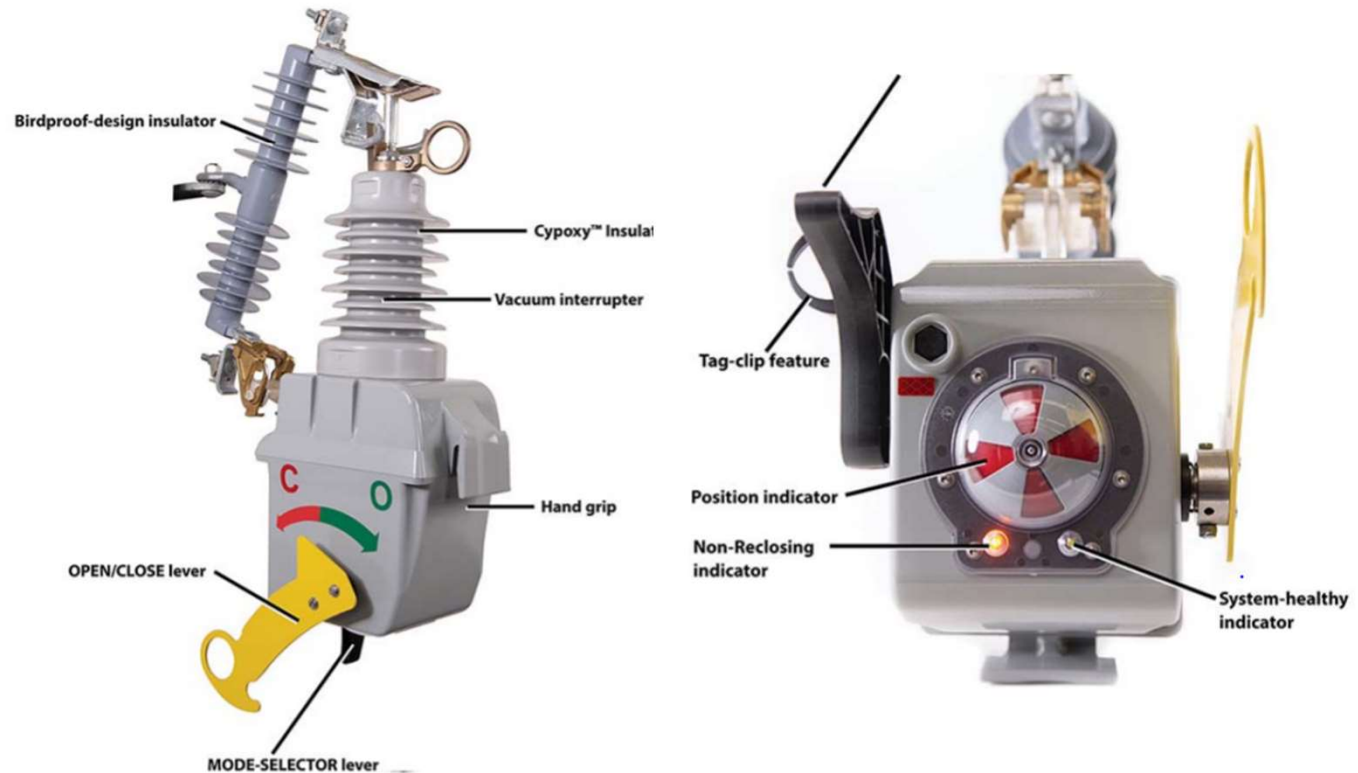
The COVID-19 pandemic is the key motivator in creating this application to provide virtual training, thus limiting potential spread of the disease.

Kaitlyn Gurtner



Background Information - Automatic Transformer Switch (ATS)

- Ensures the continuous delivery of electrical power
- Manual Operating Lever
- Non-Reclose Lever
- Position Indicator Semaphore
- System Health LED
- Non-Reclosing LED



Kaitlyn Gurtner



ATS Operation - Training Procedures

- Normal In-Service Operation
- Operation During Permanent Fault
- Operation During Temporary Fault
- Non-Reclose Lever Operation
- Manual Open Procedure
- Manual Close
- Troubleshooting



Kaitlyn Gurtner



Customer Needs, Requirements & Targets

Kevin Rodriguez



Customer Needs

Identifier	Need	Source
N1	Train FPL employees on ATS maintenance procedures	Cust.
N2	Conduct training in a virtual manner	Cust.
N3	User-friendly/intuitive	Cust.
N4	Interactive experience	Cust.
N5	Easily distributed among FPL employees	Cust.

Kevin Rodriguez



Customer Requirements

Identifier	Requirement	Need(s) Met
R1	Educate on ATS components and their functions	N1
R2	Educate on ATS maintenance & troubleshooting procedures	N1
R3	Final design is an iPad application	N2, N3, N5
R4	Simulate ATS maintenance & troubleshooting procedures	N1, N2, N3, N4
R5	Assess the user's knowledge & provide feedback	N1, N4
R6	Provide feedback during simulations and assessments	N1, N3, N4
R7	Simulation behaves and appears like real life experience	N1, N3, N4
R8	Allow user to freely interact with ATS	N1, N2, N3, N4
R9	Enable user to request information on ATS components	N1, N2, N3, N4
R10	Demonstrate opening and closing of switch procedures	N1, N2, N3, N4

Kevin Rodriguez



Targets

Metric No.	Need	Metric
1	Inform User of ATS Hazards and Warnings	Binary
2	Inform User on ATS Functionality & Components	Binary
3	Conduct training in a virtual manner	Binary
4	Assess the user's knowledge	Binary
5	Provide feedback during simulations and assessments	Binary
6	Display Virtual model of ATS and allow user to interact with model	Binary
7	Educate and demonstrate Normal In-Service Operation	Binary
8	Simulate Normal In-Service Operation	Binary
9	Educate and demonstrate ATS Operation during Permanent Fault	Binary
10	Simulate ATS Operation during Permanent Fault	Binary
11	Educate and demonstrate ATS Operation during Temporary Fault	Binary

Kevin Rodriguez



Targets Cont.

Metric No.	Need	Metric
12	Simulate ATS Operation during Temporary Fault	Binary
13	Educate and demonstrate Non-Reclose Lever Operation	Binary
14	Simulate Non-Reclose Lever Operation	Binary
15	Educate and demonstrate Manual Open Procedure	Binary
16	Simulate Manual Open Procedure	Binary
17	Educate and demonstrate Visual Open using Operating Ring	Binary
18	Simulate Visual Open using Operating Ring	Binary
19	Educate and demonstrate Manual Close	Binary
20	Simulate Manual Close	Binary
21	Educate and demonstrate user of proper troubleshooting procedures	Binary
22	Simulate troubleshooting procedures	Binary

Kevin Rodriguez



Concept Generation

Alexis Cross



Concept Generation Techniques

- Testing/Assessing
- Instruction Method
- Product Delivery
- User Interface
- 3D Design Software
- Production Method & Development Environments
- Anti-Problem
- Biomimicry



Alexis Cross



Concept Table

Production Method	IDE	3D Modeling Software	Delivery Method	Screen Design	Assessments
Unity	JetBrains Rider Unity Editor	AutoCAD	iPad App	Home/Menu Screen	Multiple Choice
Unreal Engine	Visual Studio	Maya	Android App	Test Statistics Screen	Matching
Google App Engine	Atom	Fusion 360	iPhone App	Splash Screen	Scenario Based
GameMaker	XCode	SketchUp		Separate Apps per Function	Fill In the Blank

Alexis Cross



Medium Fidelity Concepts

Production Method	IDE	3D Modeling Software	Delivery Method	Screen Design	Assessments
Unity	JetBrains Rider Unity Editor	AutoCAD	iPad App	Home/Menu Screen	Multiple Choice
Unreal Engine	Visual Studio	Maya	Android App	Test Statistics Screen	Matching
Google App Engine	Atom	Fusion 360	iPhone App	Splash Screen	Scenario Based
GameMaker	XCode	SketchUp		Separate Apps per Function	Fill In the Blank

Alexis Cross



High Fidelity Concepts

Production Method	IDE	3D Modeling Software	Delivery Method	Screen Design	Assessments
Unity	JetBrains Rider Unity Editor	AutoCAD	iPad App	Home/Menu Screen	Multiple Choice
Unreal Engine	Visual Studio	Maya	Android App	Test Statistics Screen	Matching
Google App Engine	Atom	Fusion 360	iPhone App	Splash Screen	Scenario Based
GameMaker	XCode	SketchUp		Separate Apps per Function	Fill In the Blank

Alexis Cross



Design Options

- **Design 1:** Unity, JetBrains Rider IDE, Maya, iPad App, Home/Menu Screen, Multiple Choice
- **Design 2:** Unity, JetBrains Rider IDE, AutoCAD, iPad App, Home/Menu Screen, Scenario Based
- **Design 3:** Unreal Engine, JetBrains Rider IDE, AutoCAD, iPad App, Separate Apps per Function, Multiple Choice
- **Design 4:** Unreal Engine, JetBrains Rider IDE, Maya, iPad App, Separate Apps per Function, Scenario Based
- **Design 5:** Unity, Visual Studio, Maya, iPad App, Home/Menu Screen, Multiple Choice

Alexis Cross



Concept Selection

Christopher Sopeju



Pugh Chart

	Design 1	Design 2	Design 3	Design 4	Design 5
Cost (1)	0	0	-1	0	+1
Ease of Use (1)	+1	0	-1	0	+1
Module (3)	+1	-1	-1	+1	0
Versatility (4)	+1	+1	+1	0	+1
Implementation (5)	+1	+1	+1	+1	0
Sum	13	6	4	8	6

Christopher Sopeju



Pairwise Comparison

	Cost	Ease of Use	Module	Versatility	Implementation	Geo Weight	Norm Weight
Cost	1	1	2	3	4	2.88	0.344
Ease of Use	1	1	2	3	4	2.88	0.344
Module	1/2	1/2	1	2	3	1.91	0.228
Versatility	1/3	1/3	1/2	1	2	0.48	0.057
Implementation	1/4	1/4	1/3	1/2	1	0.22	0.027
Sum	3.083	3.083	5.83	9.5	14	8.37	1

Christopher Sopeju



Analytical Hierarchy Process

	Design 1	Design 2	Design 3	Design 4	Design 5	Criteria Weight
Cost (1)	0	0	-1	0	+1	0.344
Ease of Use (1)	+1	0	-1	0	+1	0.344
Module (3)	+1	-1	-1	+1	0	0.228
Versatility (4)	+1	+1	+1	0	+1	0.057
Implementation (5)	+1	+1	+1	+1	-1	0.027
Sum	1.391	-0.321	-0.093	0.819	0.781	1

Christopher Sopeju



Final Selection

- Production Method: Unity
- IDE: JetBrains Rider
- 3D Modeling: Maya
- Delivery Method: iPad Application
- Screen Design: Home/Menu
- Assessments: Multiple Choice & Scenario Based



Christopher Sopeju



Bill of Materials

Max Urscheler



Bill of Materials

- Unity Game Engine* (\$1,800/yr)
- JetBrains Rider for Unity* (\$139/yr)
- Autodesk Maya* (\$1,620/yr)
- iPad Air (\$729.00 + tax)
- Sanitation Wipes (\$4.32)



Max Urscheler



Summary

- iPad Training Application
- Focus: ATS Maintenance
- Satisfy Customer Needs, Requirements & Targets
- Implement Derived Concept



Max Urscheler



Questions?

