pow-eARth: Augmented-Reality Power Grid Overlay for Real-Time Emergency Response

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SENIOR DESIGN EXPO

Abstract

After a natural disaster such as a hurricane, it takes a considerable amount of time for power to return. And until power is restored, daily life cannot resume under usual conditions. We aim to help expedite the restoration process of bringing power utilities back online. Our proposed solution is to overlay a grid of electrical facility information leveraging augmented reality (AR) technology. This will allow FPL emergency crews to more efficiently revive power after a natural disaster.

Introduction

AR allows for the immersion of a virtual environment into the real world, allowing the user to interact with his environment beyond what is capable physically.

Our project explored two possible solutions: an outdoor life-size walkthrough and an indoor interactive map. Because the circumstances made the indoor solution a better course of action, we will highlight our design of the indoor version but still mention the conclusions we drew from exploring the outdoor version.
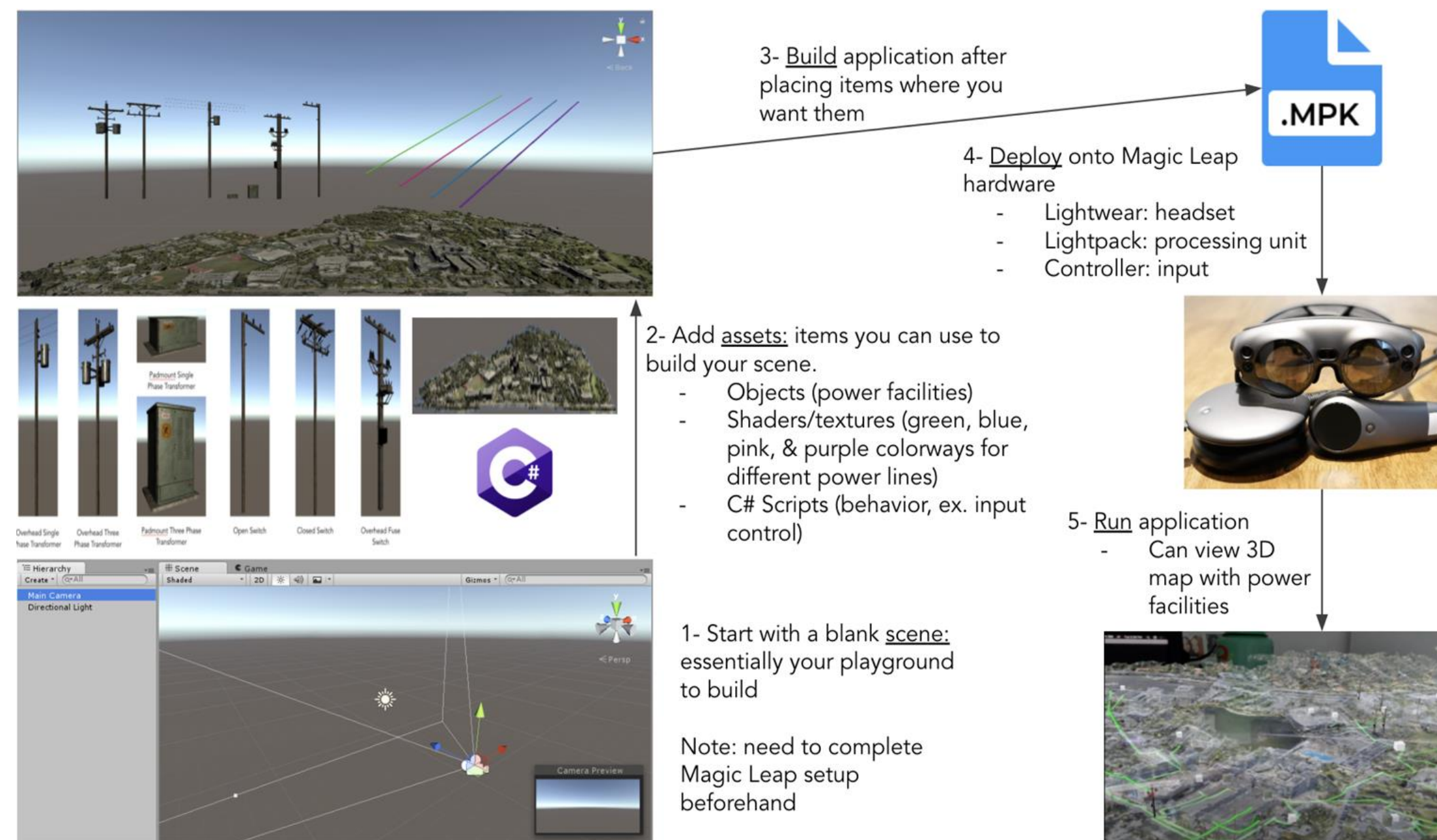
The introductory step was to familiarize ourselves with the electrical grid of the University of Miami campus, provided by FPL.
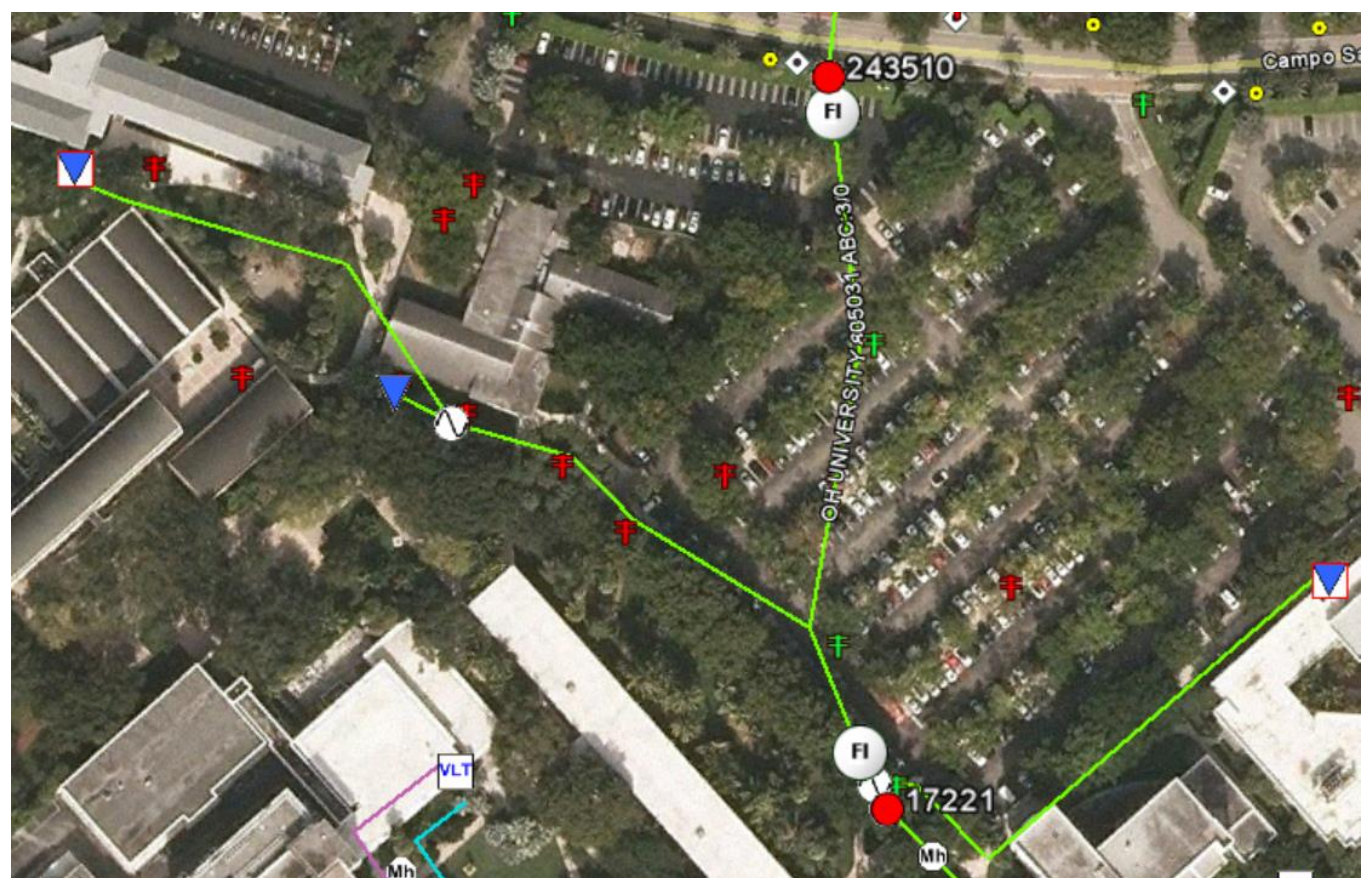
- This is a glimpse of an overhead portion of transformers and switches

Design Methodology

- Start with blank scene: space to build your 3D environment
- Create your assets: power lines, transformers, fuses, switches ...
- Build your environment: give each object positional and behavioral traits
- Deploy: port application onto Magic Leap device

3- Build application after placing items where you want them

4- Deploy onto Magic Leap hardware
- Lightwear: headset
- Lightpack: processing unit
- Controller: input

2- Add assets: items you can use to build your scene.
- Objects (power facilities)
- Shaders/textures (green, blue, pink, & purple colorways for different power lines)
- C# Scripts (behavior, ex. input control)

5- Run application
- Can view 3D map with power facilities

1- Start with a blank scene: essentially your playground to build

Note: need to complete Magic Leap setup beforehand

Results

- Ability to toggle between opaque and transparent map, depending on desired view. Can also toggle between which power line you want to view. Green one is shown here.

Conclusion

- We believe AR provides useful solutions to problems that benefit from visual or environmental cues
  - Allows you to use more of your senses
- Magic Leap is not yet suited for outdoor use: too sensitive to light and thus could not render properly
  - If the technology becomes more stable, it can prove to be the future of computing
- We believe our project can act as a stable base for future projects to build upon as AR technology continues to improve

Acknowledgments

References

Developer Portal: Magic Leap. (n.d.). Retrieved from https://developer.magicleap.com/en-us/learn/guides/developer-portal

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