

Towards Automated Thermal Profiling of Buildings at Scale Using Unmanned Aerial Vehicles and 3D-Reconstruction

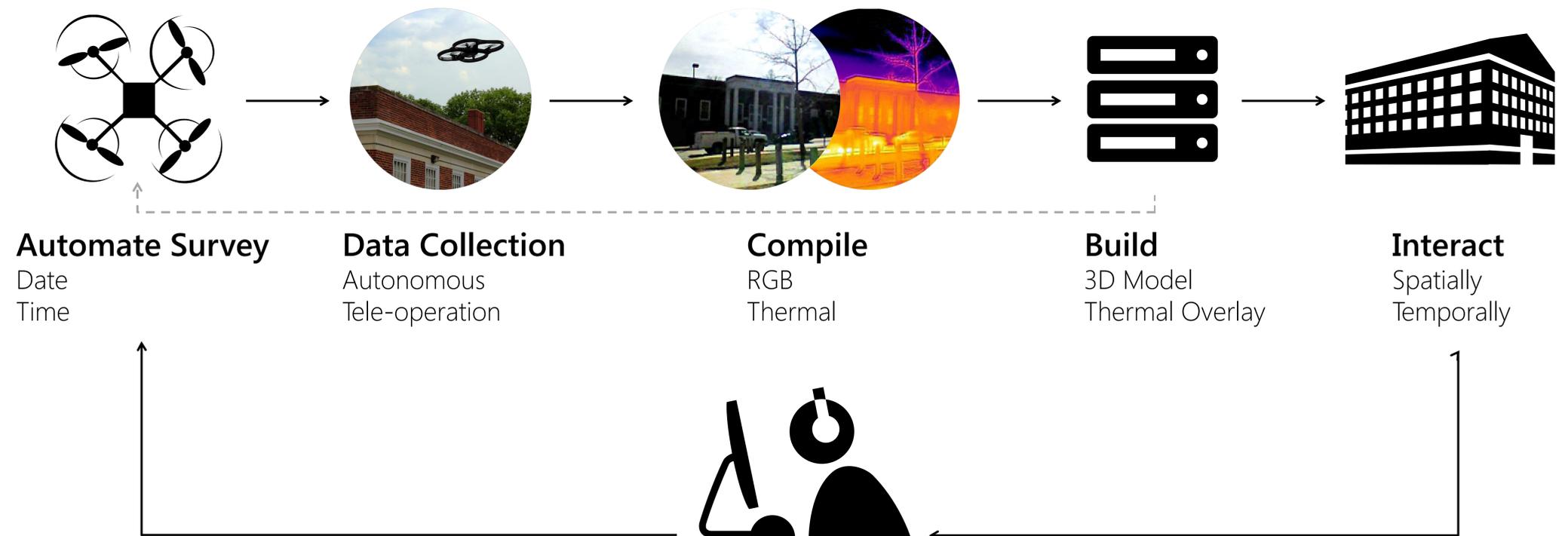
Motivation

Governments are increasingly focused on building renovations due to increases in energy demand and climate change. To inform efficiency improvements, energy audits are often performed with thermal cameras that can detect poor insulation and air leakage; however, data collection is labor intensive and does not offer comprehensive views of buildings.

Preliminary Study

Feasibility of the system was tested by performing data collection with an Unmanned Aerial Vehicle (UAV). We processed the data with automated scripts and an SfM reconstruction tool. We then used this tool to produce reconstructions from data collected using a handheld thermal camera and we overlay the resulting construction with thermal information.

System Overview



Results

The reconstruction (left) was generated from the UAV data collection. The thermal overlay (right) was generated from the handheld data collection. Our experience performing data collection and these results are used to inform our design, goals, and future work.



1500 images, collected in 0.5 hours, and processed in 18.0 hours



500 images, collected in 3.5 hours, and processed in 7.0 hours

Future Work

TECHNICAL: Integrate UAV and thermal camera with automation of command & control.
FORMATIVE: Explore practices of practitioners through formative interviews and design probes.