

ActivityLog - HeatMappers: A Novel Research Data Collection Tool for Logging Activities, Locations and Environment Data

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Introduction

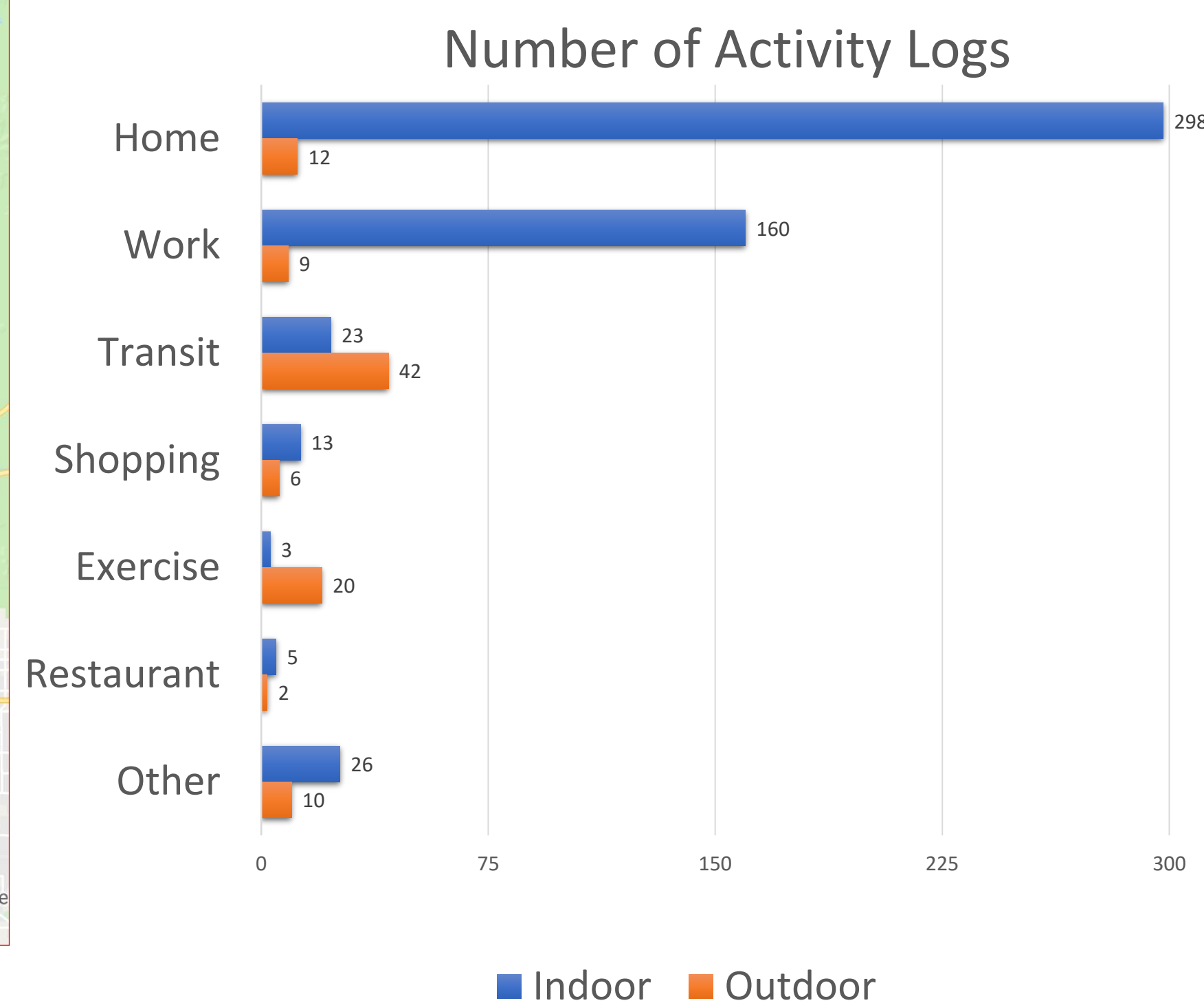
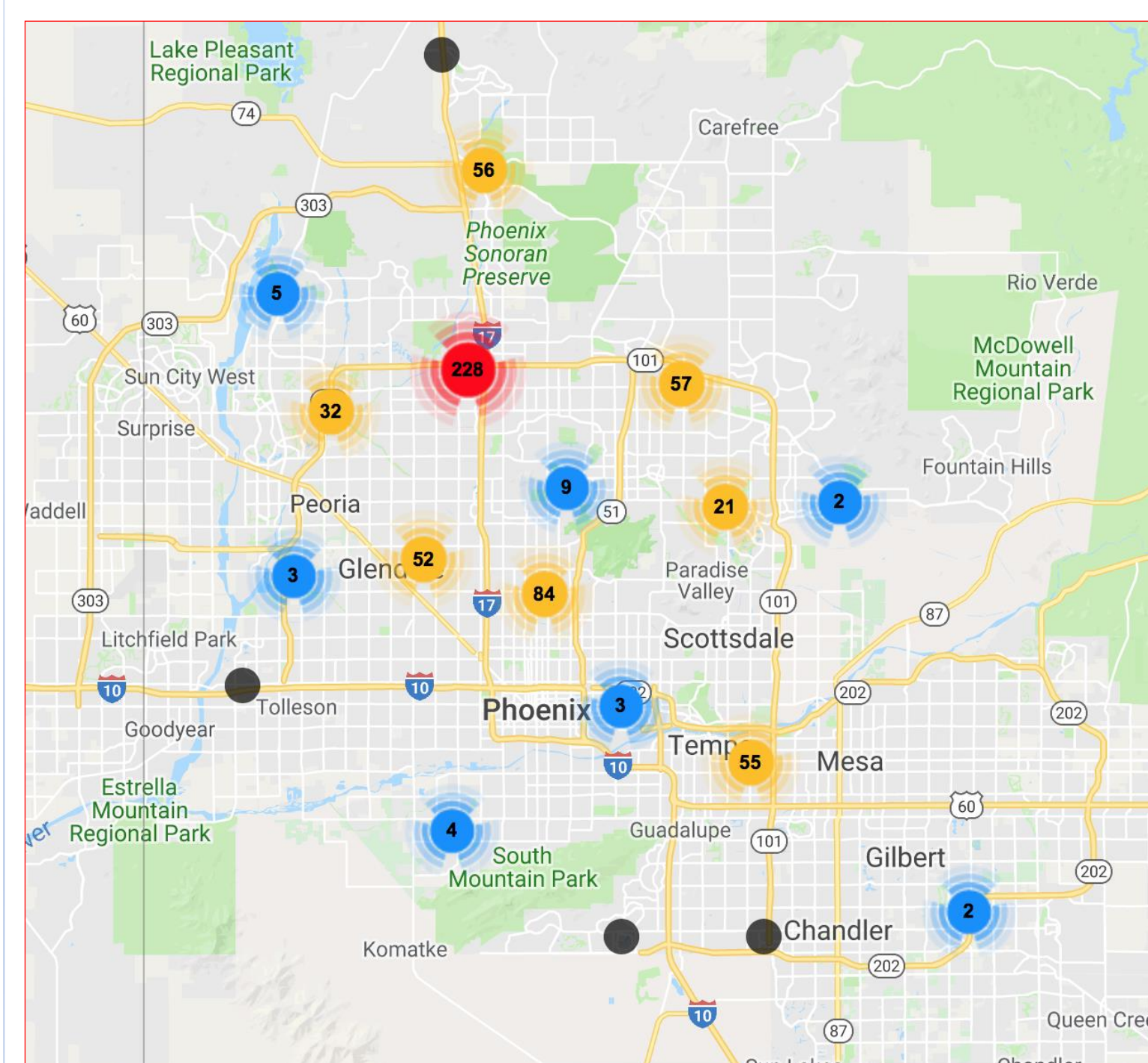
ActivityLog is a general mobile phone application that helps urban climate researchers study spatial-temporal dynamics of people's interaction with urban environment. Data collected through ActivityLog are timestamped, geo-referenced and possibly paired up with temperature and relative humidity data such as Kestrel Drop (a Bluetooth enabled environmental data logger). Specifically, ActivityLog - HeatMapper is designed to support the development of HeatMappers Citizen Science project, which is part of the Knowledge Exchange for Resilience (KER) project launched between ASU and Virginia G. Piper Charitable Trust to understand the heat vulnerable population in Maricopa County, Arizona.

ActivityLog Functionalities

1. It notifies users in a preset hour interval (every two hours, etc.) to take a quick check-in about where they are and what they are doing. Traditionally, researchers use paper-based activity log survey to serve this purpose, which is inconvenient and the paper activity log survey data are mostly messy and difficult to clean up and use
2. It periodically collects users' locations at a certain pre-defined interval. Smart phones use built-in GPS, cellular network and Wi-Fi to determine both outdoor and indoor locations.
3. It can be paired with a Kestrel Drop device to inform users about current temperature, relative humidity and heat stress index, and it also logs environmental data at certain time-interval in the background to pair with location information.
4. It contains a link to HeatMapper survey from Qualtric platform. It reduces the time to clean survey data from paper-based survey and makes it easier for HeatMapper volunteers to find and finish the survey.
5. All collected data (location, time, temperature, relative humidity, heat stress index, human activity) are synced with a cloud database that is able to help researchers to monitor data collection progress in a real-time manner.

Pilot Study

Nine volunteers from American Express at Phoenix participated in a pilot study. Each of them was asked to download the mobile application and carry one Kestrel Drop device for recording temperature. The study period is from August 14 to August 25, 2018. Data collected from this pilot study are presented below. There are 633 total number of activity logs from the app, and all are associated with time and location, and around one third of the logs are also linked with temperature. Figures below are showing the spatial distribution of users' activity logs across the Phoenix Metropolitan Area as well as the breakdown to each activity category.



ActivityLog User Interface

Activity Logging with Time and Location

List and Map of Activity Logs

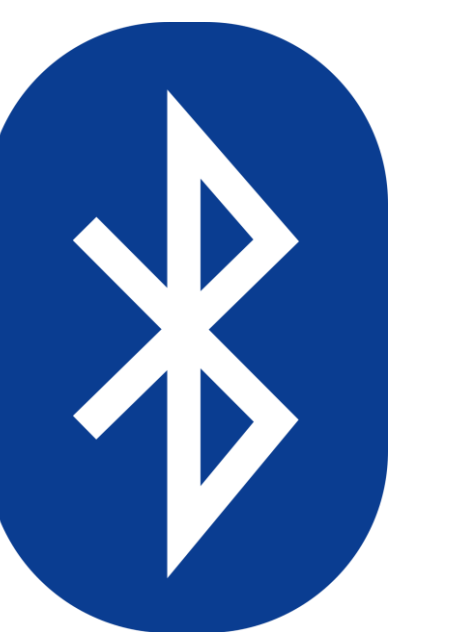
Temperature Read-in from Drop Device

Background Temperature Recording

Bluetooth Low Energy

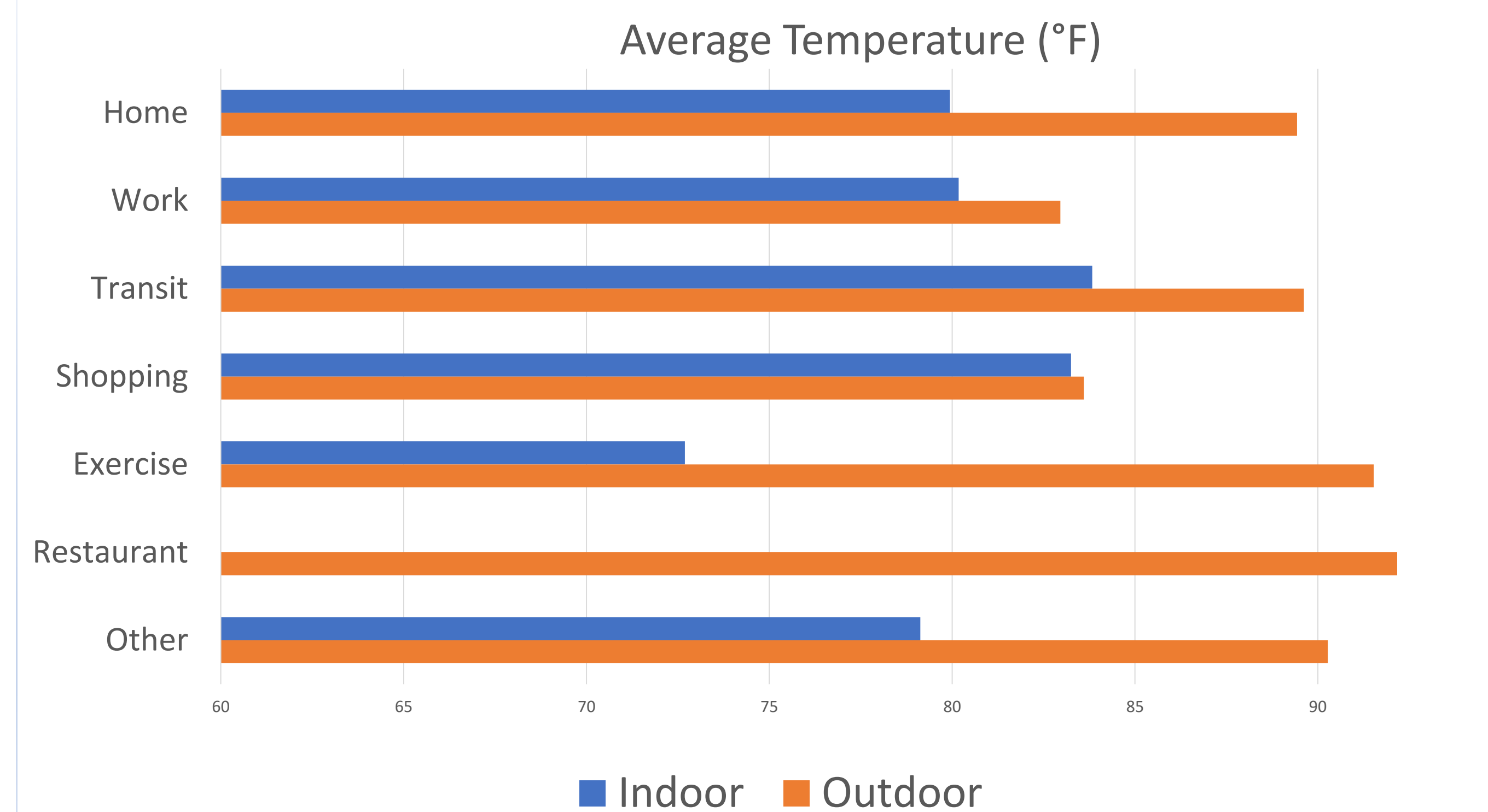


user	activity	lat	lon	time	date	notes	temperature	humidity	rh
USBz2MUwBM	Indoor - Home	32.239998	-110.954138	15:51	07/26	Zip Li	72.680000	39.970000	70.880000
USBz2MUwBM	Indoor - Home	32.240019	-110.954125	16:00	07/26		72.950000	40.470000	71.060000
F6Spp4x1GB	Indoor - Home	32.240062	-110.953940	17:47	07/26		83.822000	37.440000	82.400000
F6Spp4x1GB	Indoor - Home	32.240028	-110.954124	17:57	07/26		82.274000	37.460000	80.420000
F6Spp4x1GB	Indoor - Home	32.240043	-110.954114	18:00	07/26		82.094000	38.150000	80.240000
F6Spp4x1GB	Indoor - Home	32.240000	-110.954084	20:00	07/26		81.806000	37.840000	79.700000
F6Spp4x1GB	Indoor - Home	32.240070	-110.954096	08:03	07/27		70.214000	40.160000	68.360000
F6Spp4x1GB	Outdoor - Restaurants	32.231561	-110.958139	12:47	07/27		102.254000	32.070000	110.480000
q7HlUgHqWZ	Outdoor - Transit	32.235557	-110.952438	16:47	07/27		100.652000	27.980000	104.360000
q7HlUgHqWZ	Indoor - Home	32.239949	-110.954069	16:57	07/27		97.880000	35.960000	104.720000



Pilot Study

Figure below is showing average temperature logged regarding each activity and whether was taken place indoor or outdoor.



Acknowledgement

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The conclusions, views and opinions expressed in this presentation are those of the authors and do not necessarily reflect the official policy or position of the Virginia G. Piper Charitable Trust.

App Downloads

