

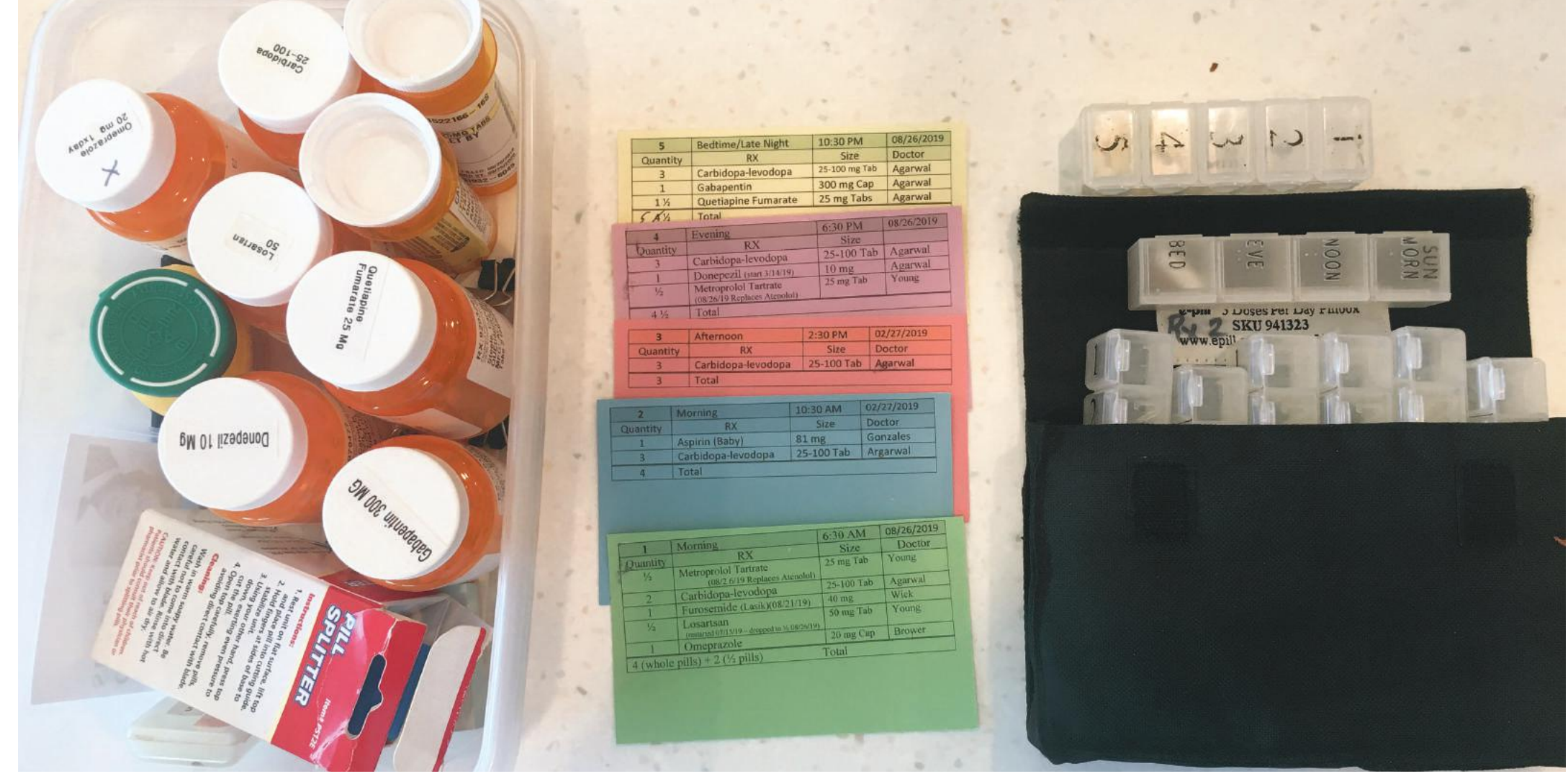
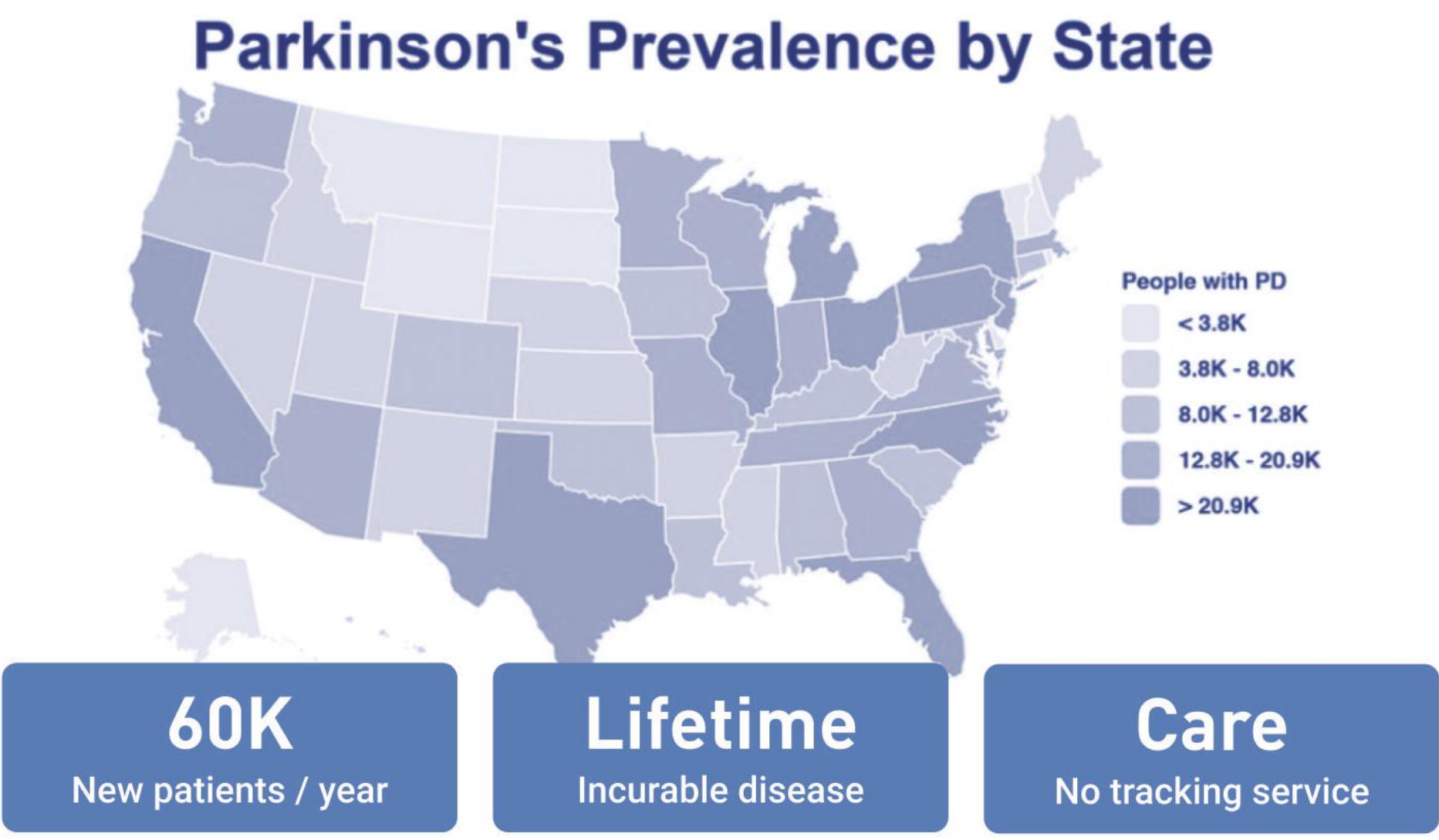
UniBand

The Uniband project helps patients with Parkinson's disease acquire aggregated insights that combine their tremor intensity changes with medication intake, diet, and physical activities.



Problem

Every year, roughly 60,000 Americans are newly diagnosed with Parkinson's. As our generation gets older and lives longer, more people are at risk of getting Parkinson's disease since aging is the biggest risk factor for developing PD. It requires perpetual care and management for patients and their families since the disease has no cure. However, there is no sustainable service or product that allows individuals with PD and their doctors to consistently track their progress over time and give a clear understanding of their progress changes. The problem that we want to address is the lack of objective and continuous data that represents the progression of Parkinson's and how it is affected over time by daily factors such as medication intake, diet, sleep and physical activity.



An example of the complexity of medication management

Solution

The team developed a tremor tracking device and a companion mobile app that shows PD progress over time with different medication, diets, and activities reported by users. Users simply wear a wristband which tracks their tremor and take notes of their medication, activities and diets via the app. The tremor intensity analysis pipeline is comprised of the following steps: 1) Our wristband implements a tremor identification algorithm to distinguish tremors from regular activities, when a tremor is detected, the wristband will log the data to internal storage. 2) The data is uploaded to our cloud while the wristband is charged. 3) Once the cloud receives the data, FFT (Fast Fourier Transform), PSD (Power Spectral Density), and moving average model methods are applied to the data to produce tremor intensity values. As a result, our solution provides an insightful data report of tremor intensity changes to individuals with PD and their doctors to aid their understanding of the disease.



Process/Approach

The team started broadly researching Parkinson's disease and reached out to PD support groups to hear their real stories and pain points. Interviewing 25 individuals with PD and 3 doctors gave us a better understanding of their situations and helped us to identify a specific problem that we addressed in our project. To dig into the problem, we conducted a survey with 50 participants - all of whom have PD. The results of this survey informed our system requirements moving forward. Based on the requirements, we built our first prototype, and it was tested and evaluated by 6 individuals with PD. This evaluation encouraged us to refine our system requirements and to build a second prototype. We continued this agile refinement process until we reached our final high fidelity prototype. We ended up with 18 system requirements and 3 rounds of testing and evaluation sessions with 8 participants.