

ASSISTIVE TECH IN THE KITCHEN

Culinary Gadget Gang

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PROBLEM SPACE

Area of Application: Assistive Technology in the Kitchen

Intended Tasks to Support:

- safe cooking while interacting with hot tools
- lifting, grasping, carrying objects, bending, & stretching
- turning kitchen appliances off and on
- operating kitchen appliances to cook via external device

Target User:

- the elderly

General Design Description:

- standard oven/stove setup incorporates advanced technology, such as sensors, lights, and automation





REQUIREMENTS SUMMARY

Requirements:

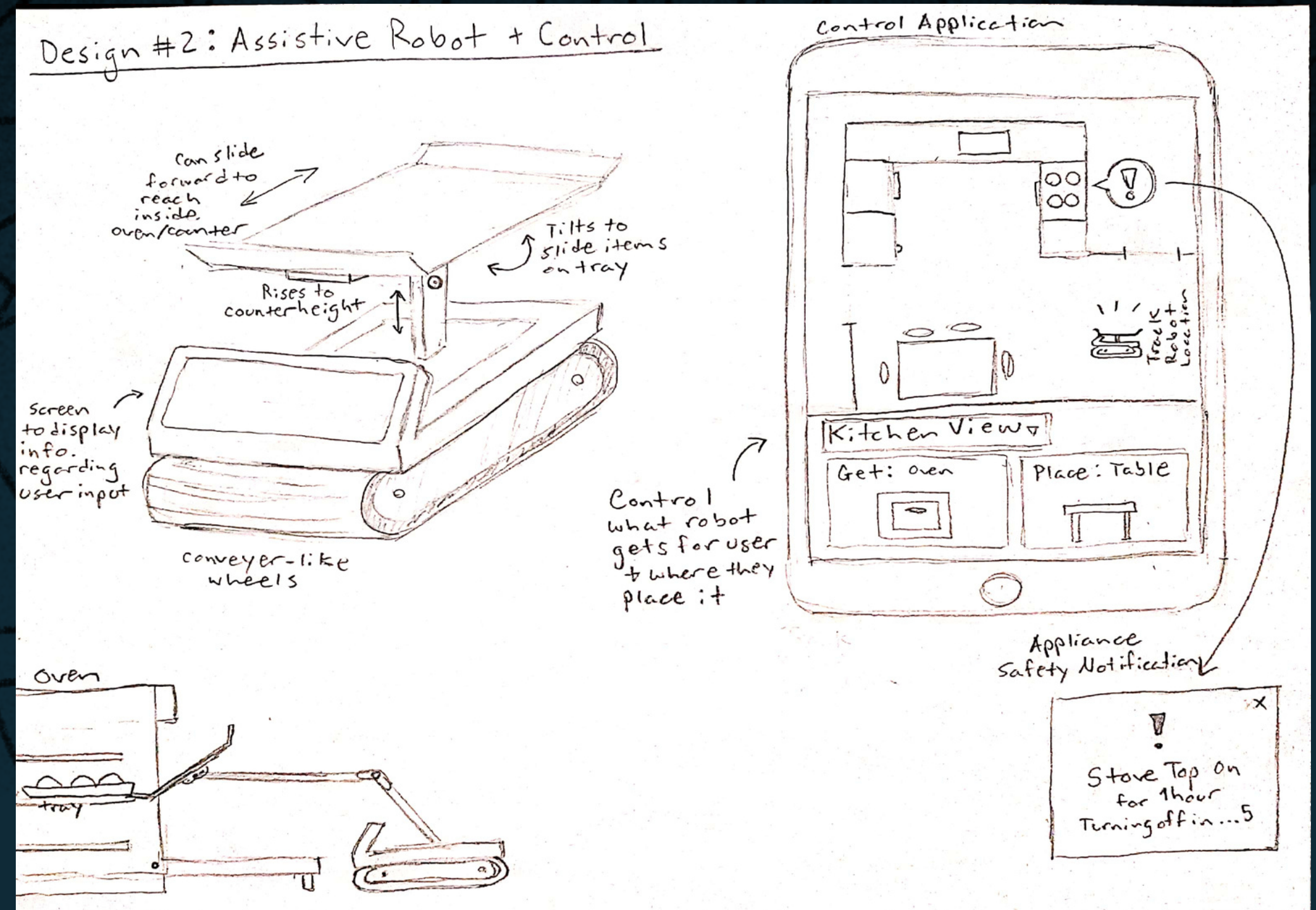
- Easy to use
- Allowing the user to control kitchen devices at a distance using an external application synched to a stove/oven
- Providing reminders to users about how to control kitchen appliances
- Using height adjustments within the design to alleviate physical constraints
- Reducing users' contact to heat during the cooking process



INITIAL DESIGNS

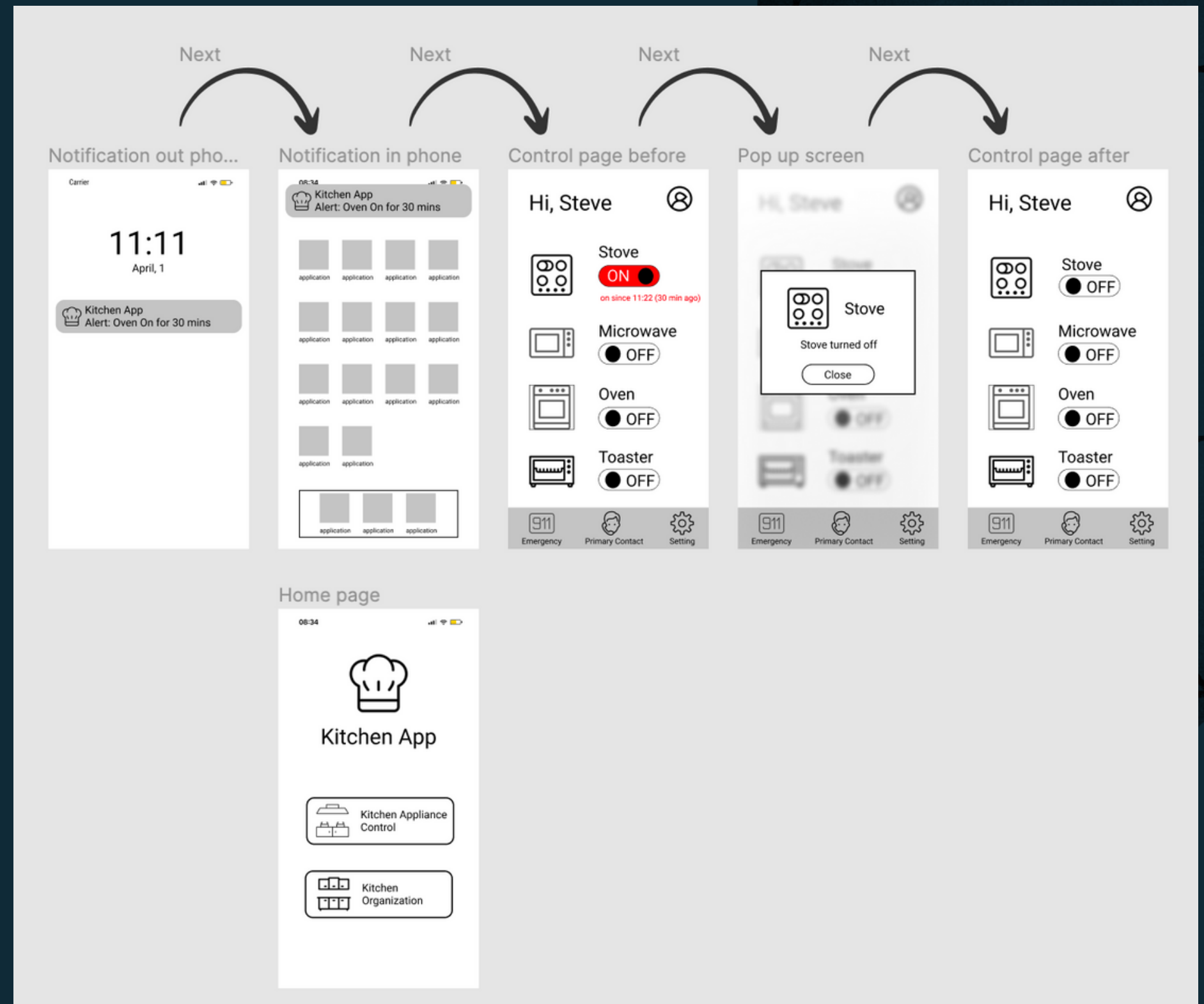
#1: ASSISTIVE ROBOT

- Relieves physical constraints (bending, stretching, lifting, joint pain, and balance issues)
- Lifts and transports items to and from the user's desired locations via separate tablet control
- Control kitchen appliances from distance



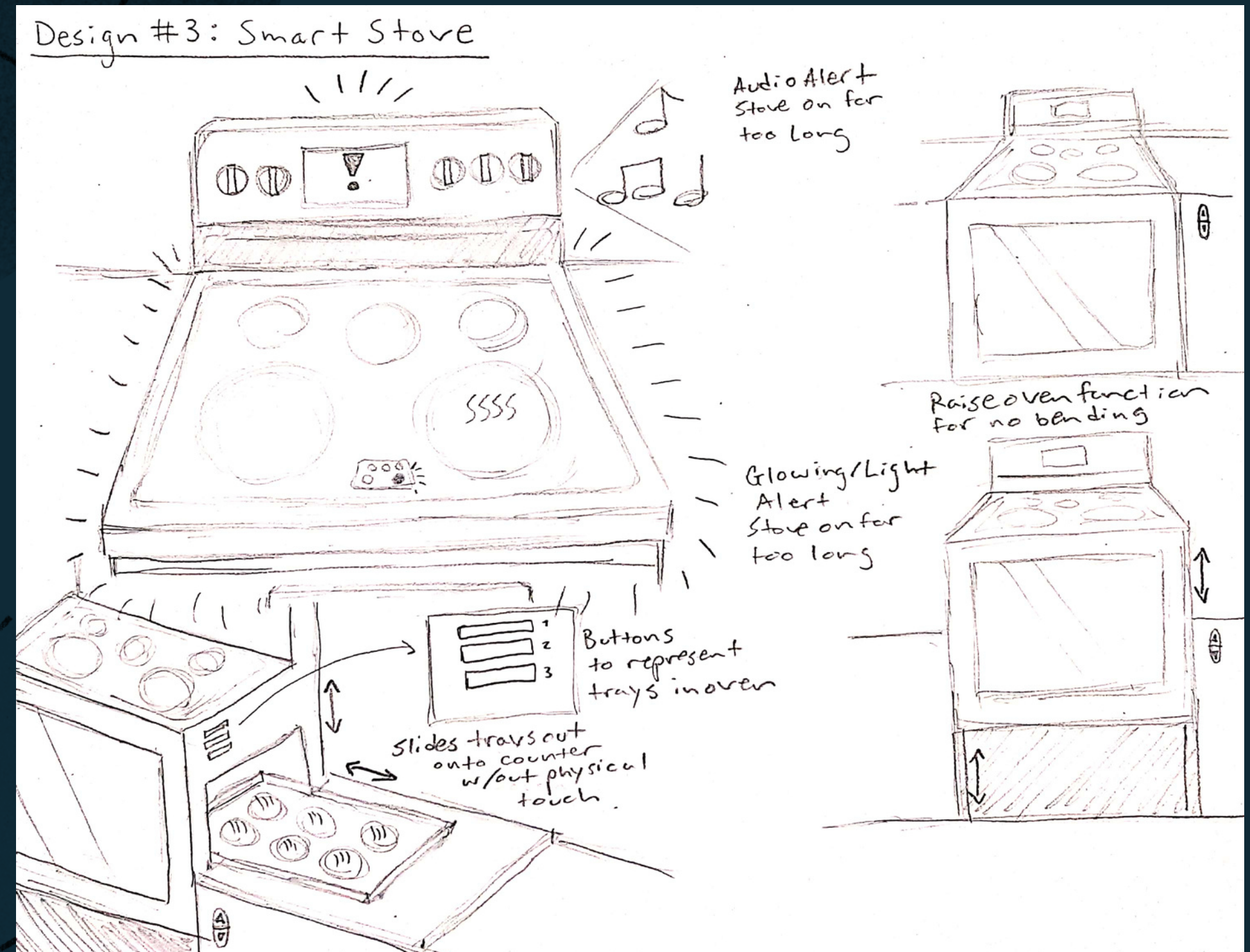
#2: MOBILE APP

- Allows control of kitchen appliances from a distance
- Addresses safety issues regarding memory lapses
- Notifies cook and caregiver regarding kitchen appliance status
- Addresses kitchen organization and ingredient tracking



#3: SMART STOVE

- Focus on stove top/oven safety and convenience
- Safety reminders regarding stovetop burner operation
- Automatically turns off after a predetermined duration
- Adjustable height to deter bending
- Automatically dispenses and intakes trays to decrease lifting/grasping issues and burns



FINAL DIGITAL PROTOTYPE



Smart Stove Kitchen App



UI Changes & Improvements

- Add a 3D view of the user's kitchen layout in the kitchen organization component of the app
- Add the ability for the user to adjust a burner's temperature and oven settings
- Add the ability for the user to adjust the stove's height in the app

FINAL PHYSICAL PROTOTYPE



Physical Changes & Improvements

- Change the placement of the burner control knobs
- Change the placement of the stove's height adjustment buttons





EVALUATION RESULTS

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Procedure

- Pre-test interview
 - Cooking and smart technology experience
- Tasks
 - 2 groups: 2 users for Smart Stove and 2 users for control
 - Both organize kitchen, make tea on stove, and make pizza in oven
- NASA-TLX
- Post-test interview
 - Question: what would you have done differently?
 - 2 interpretations: what should be changed about the stove and how the user could do the task differently

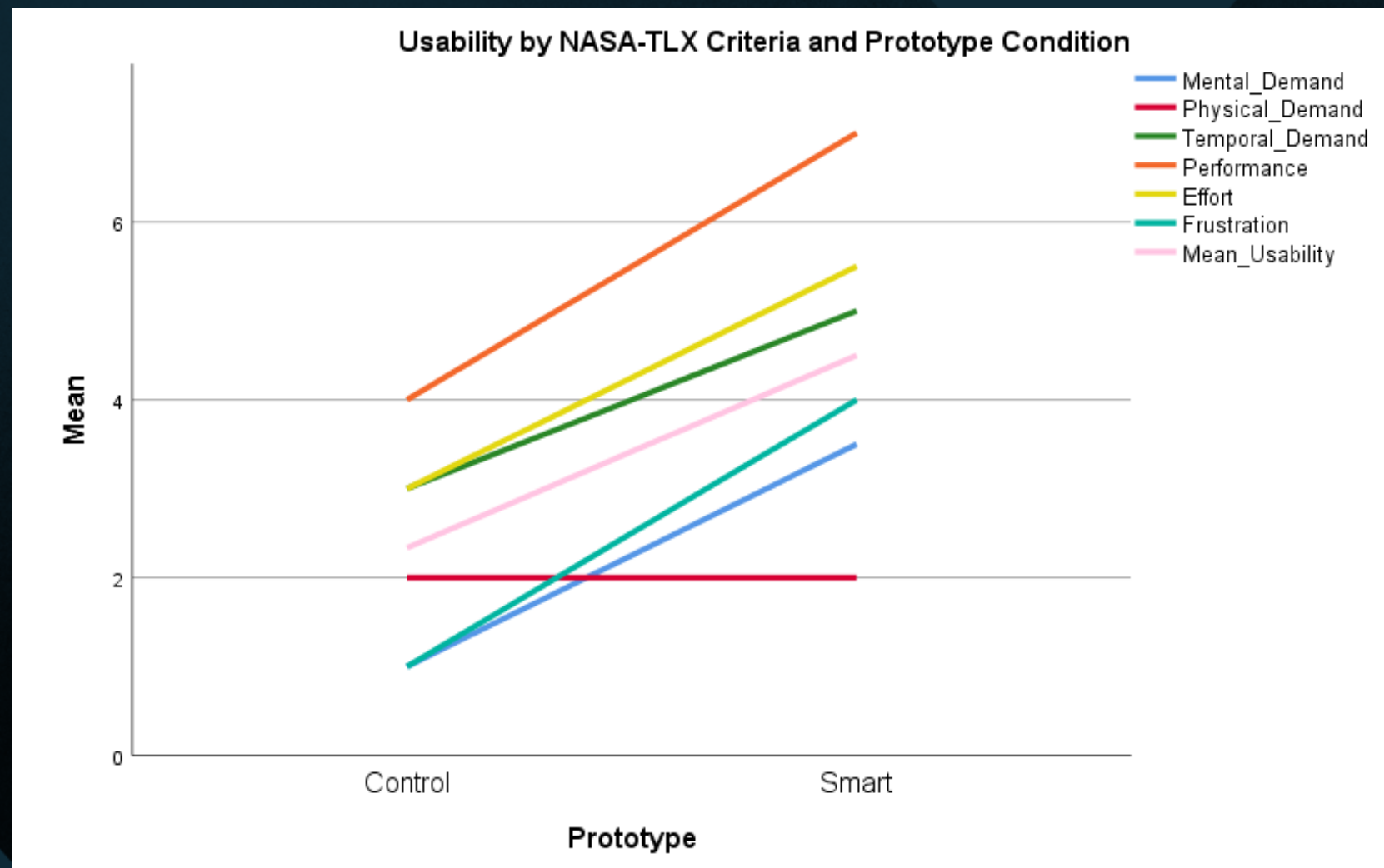
EVALUATION RESULTS

Observational Data

- When using the Smart Stove, bending down was less frequent
- Kitchen organization part of the app helped users to spend less time looking for ingredients
 - The numbering of cabinets can be improved
- Users did forget their stove was on during the distraction task
 - The notification from the app helped a User and a control group User was reminded their stove was on

EVALUATION RESULTS

NASA- TLX Analysis



One-Way ANOVA for NASA-TLX						
		Sum of Squares	df	Mean Square	F	Sig.
Mental_Demand	Between Groups	6.250	1	6.250	2.778	.238
	Within Groups	4.500	2	2.250		
	Total	10.750	3			
Physical_Demand	Between Groups	.000	1	.000	.000	1.000
	Within Groups	4.000	2	2.000		
	Total	4.000	3			
Temporal_Demand	Between Groups	4.000	1	4.000	.444	.574
	Within Groups	18.000	2	9.000		
	Total	22.000	3			
Performance	Between Groups	9.000	1	9.000	4.500	.168
	Within Groups	4.000	2	2.000		
	Total	13.000	3			
Effort	Between Groups	12.250	1	12.250	3.769	.192
	Within Groups	6.500	2	3.250		
	Total	18.750	3			
Frustration	Between Groups	9.000	1	9.000	1.000	.423
	Within Groups	18.000	2	9.000		
	Total	27.000	3			
Mean_Usability	Between Groups	4.694	1	4.694	2.600	.248
	Within Groups	3.611	2	1.806		
	Total	8.306	3			

EVALUATION RESULTS

Difference between observational data and heuristic evaluation

- 2 methods of evaluation
 - Smart Stove heuristic evaluation based on the experience with the appliance
 - New appliance, learning to use
 - Control heuristic evaluation based on the tasks themselves
 - Mundane tasks performed regularly
- We would ultimately say the prototype shows potential based on observational data

LESSONS LEARNED

- Good design prioritizes ease of use and is produced when the designer keeps the user at the forefront his/her mind.
- The importance of having multiple perspectives on a team inform a project/design
- If we were to start over again,
 - Potential Change in Project:
 - Interview Guides could include a formal survey about what type of technologies a formal survey regarding what types of technologies/devices users are most interested in, prefer working with the most, are most comfortable with, and find most interesting and easiest to use to inform which design we settled on.
 - Potential Change in Process:
 - When creating the physical prototype, maybe plan out how to construct each of the features before starting/have a back-up plan



THANK YOU!

Any questions?