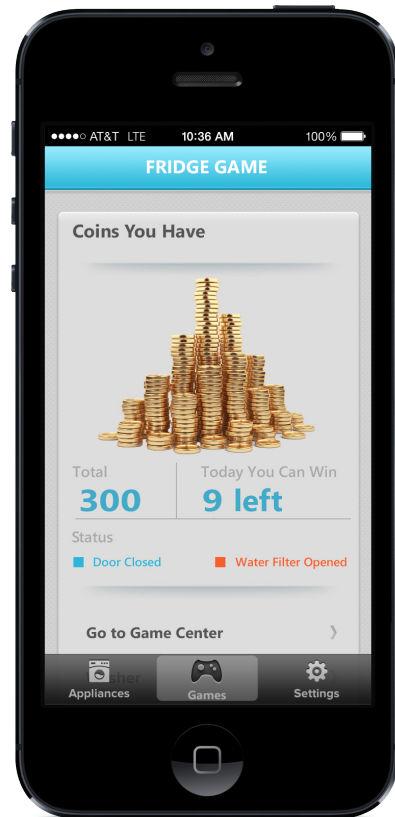


# Whirlpool Fridge Game

Play games, save energy!



Stephanie Louraine and Sijie Yang

November 15, 2013

Indiana University

# Our Assumptions

- Constantly remembering to take energy saving actions is difficult
- Conditioned responses can be established by regular subconscious behaviors and habits
- Appliance use behavior is passed down through generations

# Our Research

## **US Department of Energy:**

In most homes the refrigerator is the second-largest user of electricity (13.7%), right after the air conditioner (16%).

## **Home Energy Magazine:**

The fridge is the most energy-intensive appliance, and door openings account for 7% of fridge energy used.

## **Institute of Food and Agricultural Sciences, University of Florida:**

Poor open/close habits waste 50 to 120kWh a year. In the long run, 50kWh of energy saved could run your dishwasher 20 times and 100kWh could run your washing machine 50 times, that's almost a free load of laundry every week for an entire year.

## **ASHRAE 2010 Refrigeration Handbook:**

It is better to keep the door closed as much as possible instead of leaving it to hang open for more than the short time it takes to load or unload food. Constantly opening and closing a fridge door uses much less electricity than keeping it open for a while.

# Our Insights

- Considerable amount of energy and money can be saved by adopting **proper fridge door opening and closing behaviours** in the long run
- People use refrigerators without constant awareness of energy saving
- In order to save energy, fridge **doors** should remain **open for as short a time as possible**, and should be closed as soon as possible
- Environmental education through family gaming activities can be transferred between generations and **indirectly induce targeted behavioural changes**

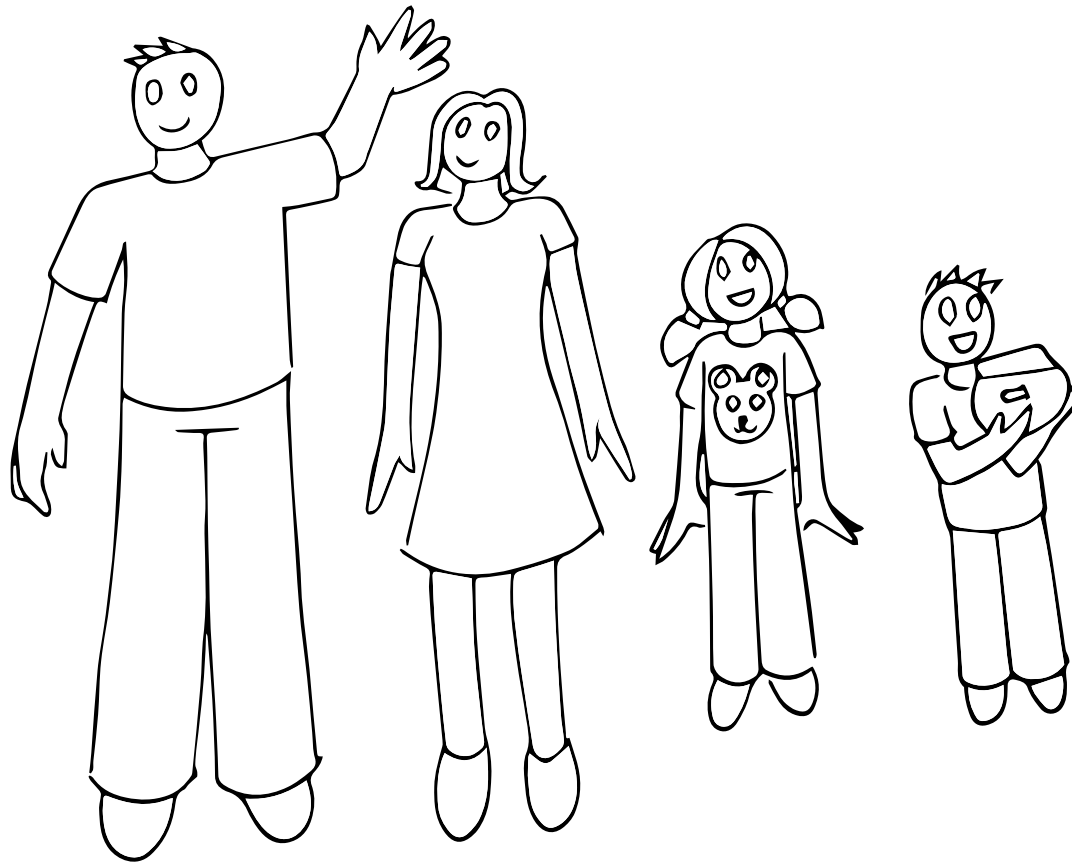
# Our Concept: Fridge Game

**Establishing and maintaining energy saving habits is a lifetime task.** It could be achieved by instilling such consciousness into people's minds through not only rational osmosis, but also emotional appeal. Our intended purpose is helping people **begin to build energy saving awareness as well as good habits during their childhood.** We approach to this goal by engaging all family members into a synergetic gaming experience which encourages them to adopt desirable appliance using behaviors.

We believe that, on a daily basis, both children and their parents who are involved in this participation will have mutual positive influence on each other. As time goes by, based on the emotional connection set up between gaming experience and favourable habits, **energy saving behaviors will become children's conditioned response and emerge as subtle routines in a subconscious way.**

In our concept, we focus on helping children get better refrigerator using habits, especially **saving energy by closing the refrigerator doors as quickly as possible.**

# Scenario



Meet the **Akermans!**

A family of four living in Buffalo, NY.

# Nate Akerman



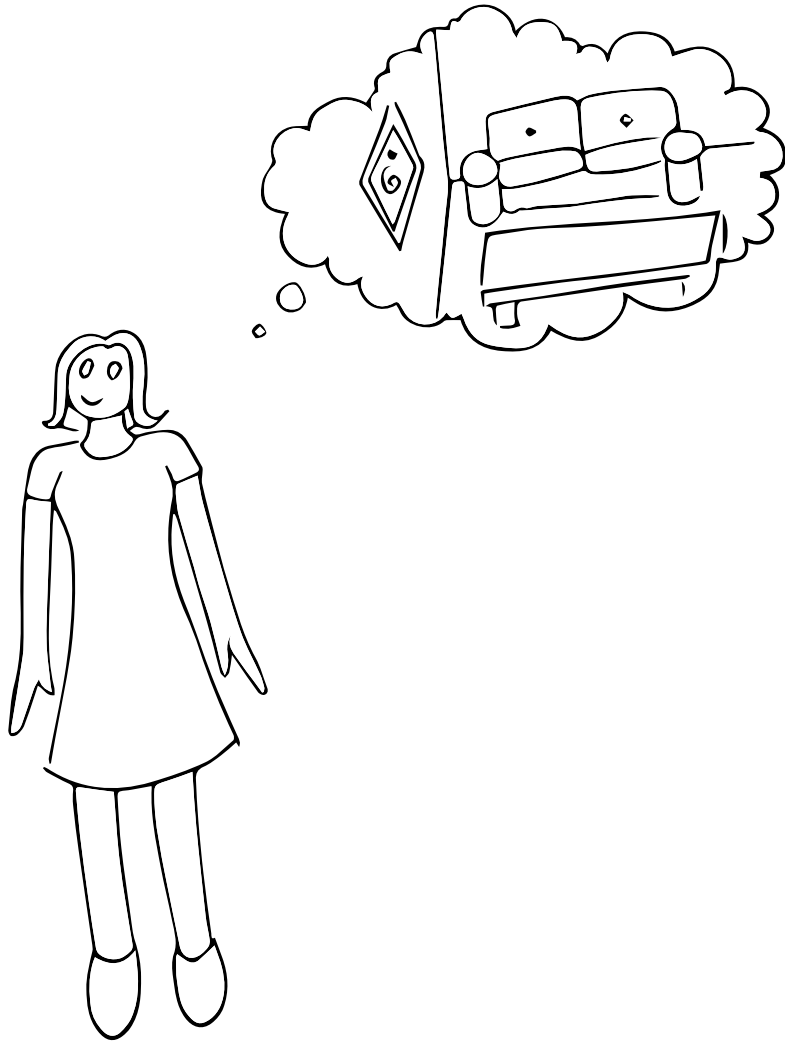
**Age:** 31

**Profession:** Landscaper

**Hobbies:** Oil painting

**Short-term goals:** Hang up  
Christmas decorations on the outside  
of the house

# Patricia Akerman



**Age:** 30

**Profession:** Pediatrician

**Hobbies:** Flute, golfing

**Short-term goals:** Rearrange furniture in the living room



# Elise Akerman



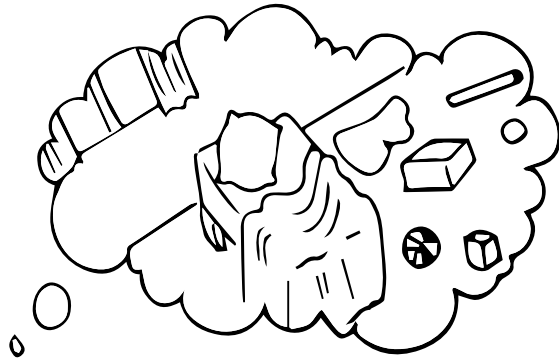
**Age:** 10

**Profession:** Fourth grade student at Frederick Olmstead Elementary

**Hobbies:** Drawing, rollerblading

**Short-term goals:** Convince her parents to get a puppy

# Shawn Akerman



← SHAWN'S  
GOLDFISH,  
"KILLER"

**Age:** 7

**Profession:** First grade student at Frederick Olmstead Elementary

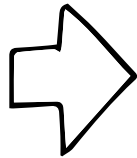
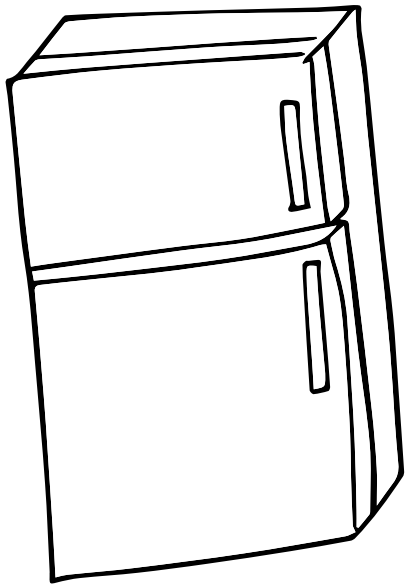
**Hobbies:** Basketball, watching TV

**Short-term goals:** Avoid cleaning his room by any means possible

You can see that the Akermans all have **different things on their minds**, but **energy savings isn't always one of them**.

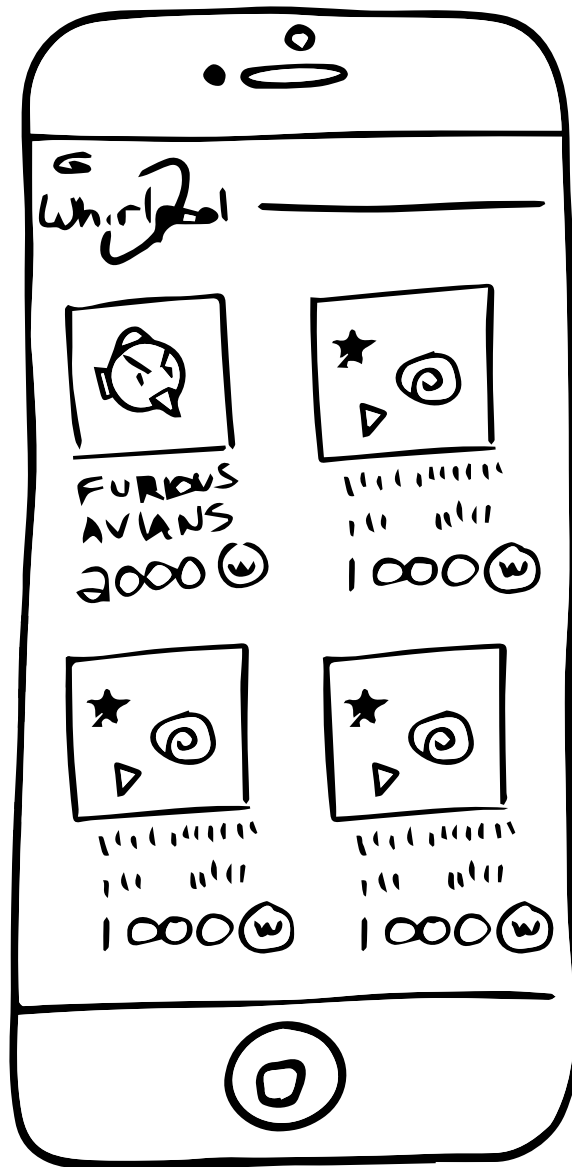
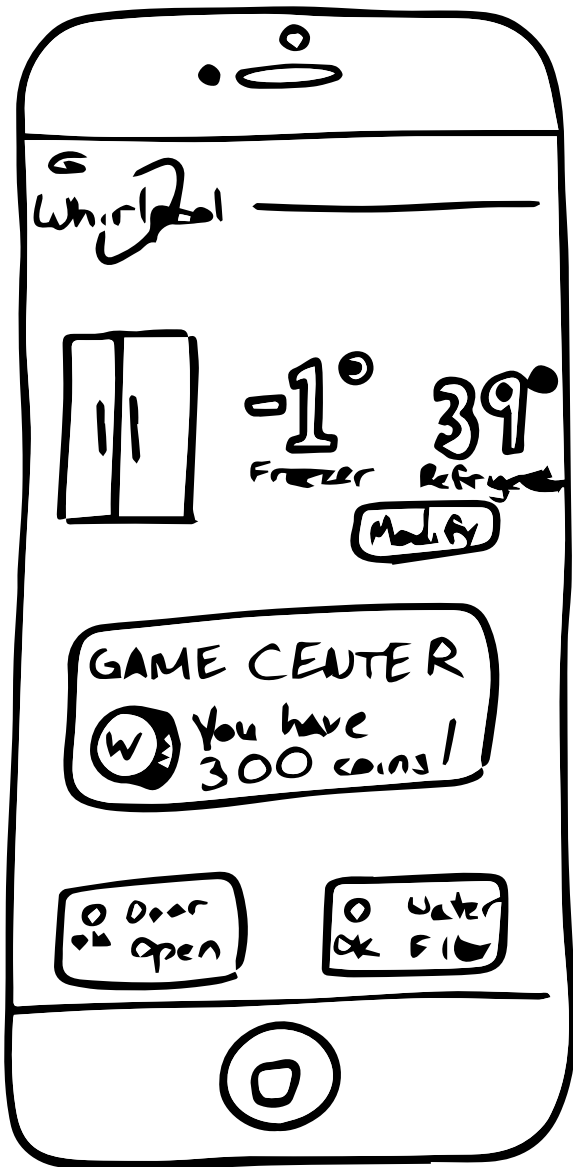
Our design can help **reward energy-saving behavior** without necessarily putting energy savings at the forefront of the Akermans' minds.

Here's how the family gets started:

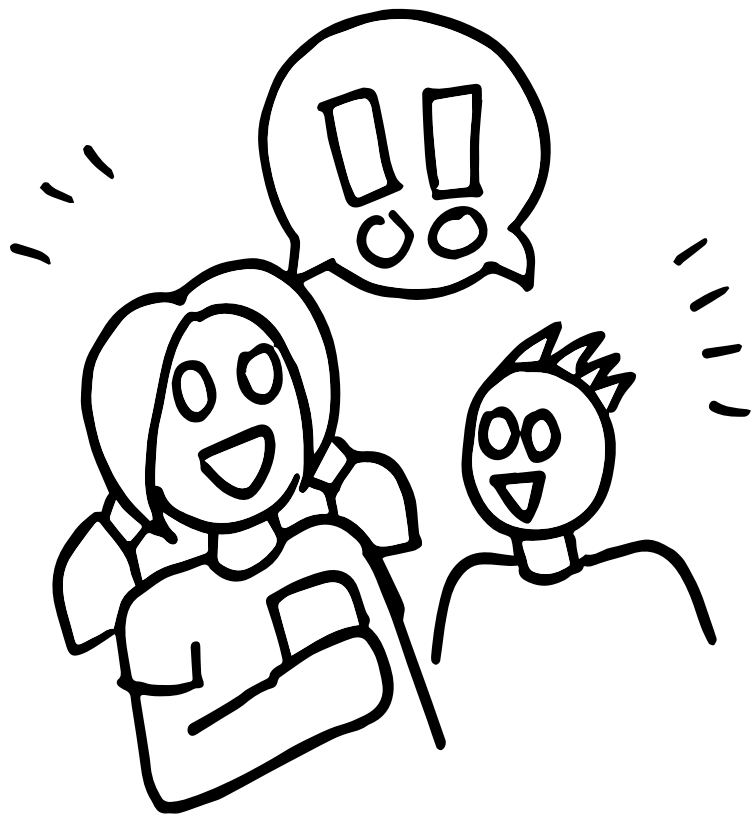


The Akermans have to replace an old, malfunctioning fridge.

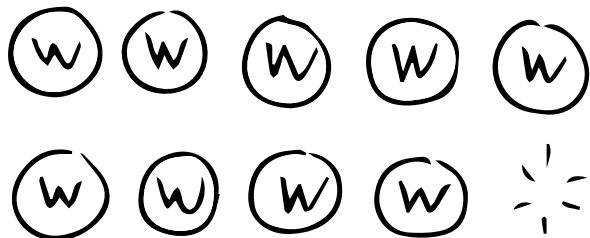
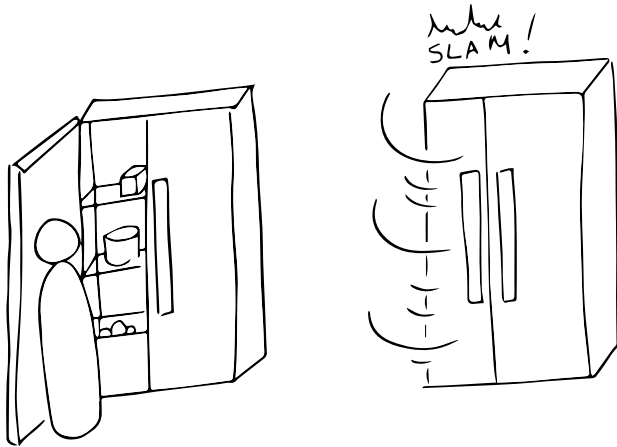
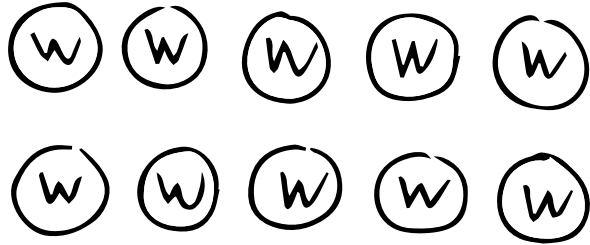
They become interested in exploring eco friendly solutions, so they purchase the Whirlpool Smart Fridge.



Nate and Patricia explore the Smart app on their iPhone and, along with many other features in the app, they notice a game center.



They show Elise and Shawn, who become excited about the possibility of buying fun games!

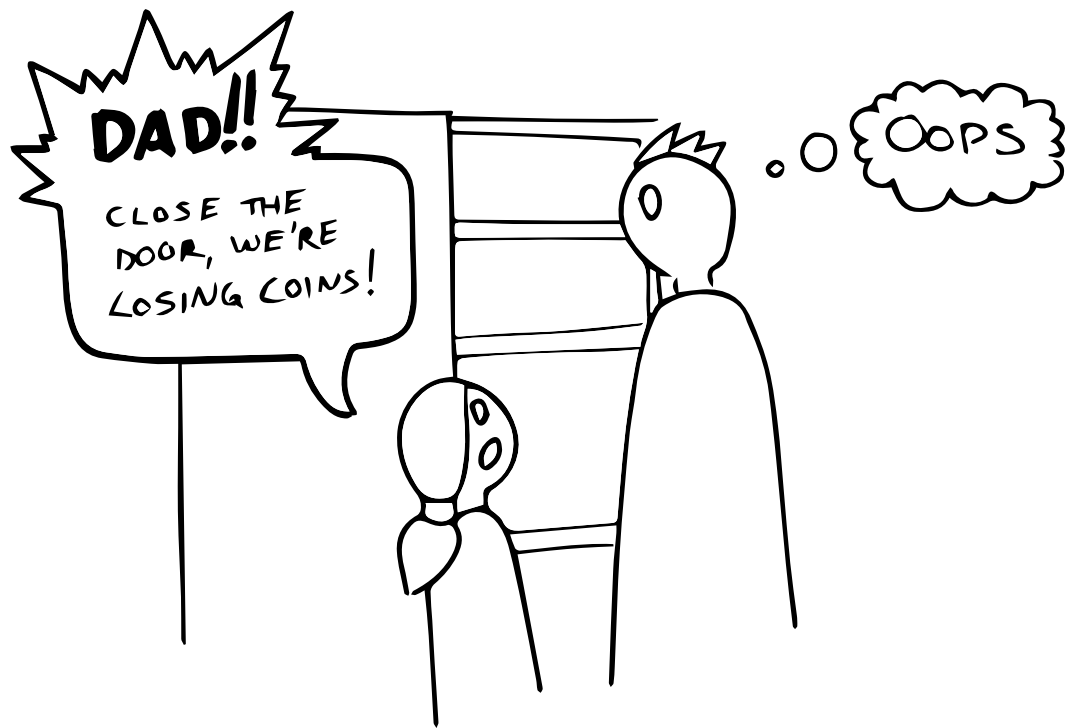


Nate and Patricia tell the kids how the game center's currency works:

The family gets 10 virtual coins a day.

When you open the fridge, close the door again within 8 seconds or else you'll lose a coin.

You could even lose all 10 coins in one day if you're not careful!



Elise and Shawn take this very seriously.





I'D  
BETTER  
CLOSE  
THE  
DOOR

Pretty soon, even Nate and Patricia are getting into the game.



Eventually, the Akermans are able to save up enough coins to buy the game they want from the Game Center!

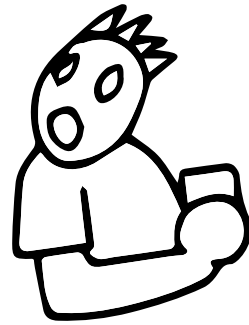


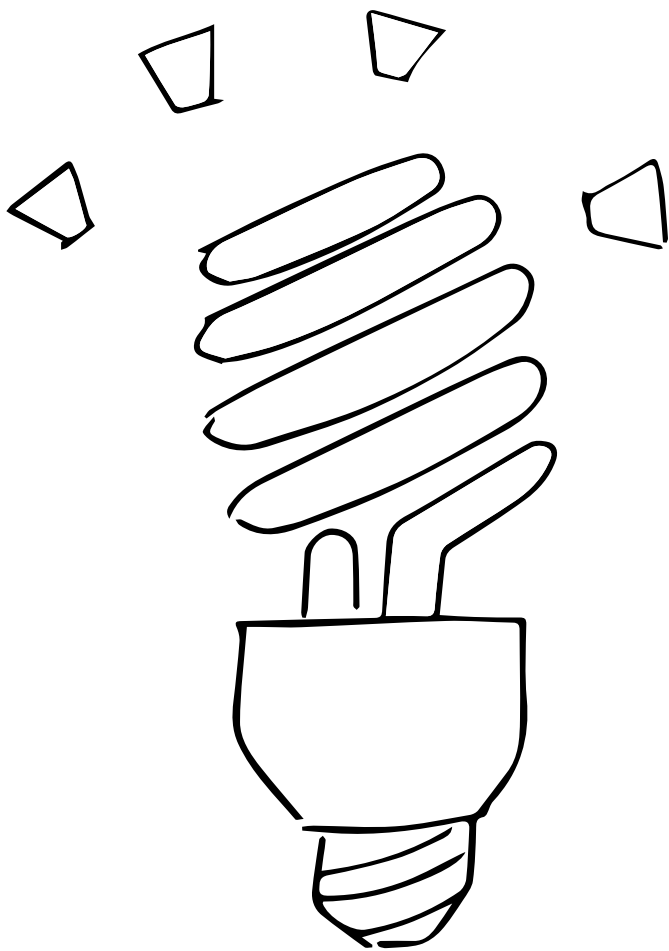
Elise and Shawn choose a game about destroying pigs with some ill-tempered birds.

LET  
ME  
PLAY!

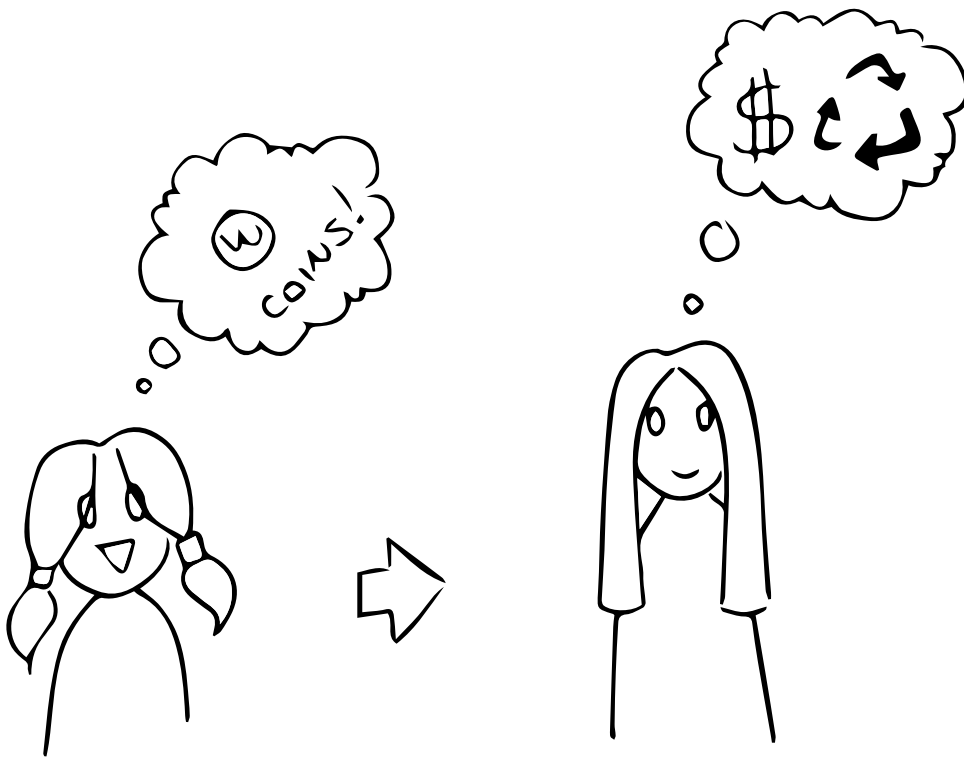


IT'S  
MY  
TURN





The Akermans are on their way to better energy saving habits!



As the kids grow up into teens and adults, their needs and interest in energy savings are likely to change. Our concept is not likely to be sustainable for the entire life of an individual.

Nevertheless, these kinds of small changes in behavior starting at an early age have the potential to instill habits that can last for life and create slow change in society.

# Future Strategies

## **Facilitate the persistence of people's energy saving awareness established in their childhood**

Since it is a slow change process, we also thought about the self identity transition from a child to a teenager or an adult. People may become less interested in playing games when they become more mature and start concerning about saving money on appliances. In order to sustain the good habits they built when they were kids, we provide a future strategy for encouraging young adults to preserve and enhance energy saving behaviors.

Within the context of Internet of Things and current available technology, we came up with another app concept which can be integrated with existing SMART iOS app. It displays real-time energy use data gathered by Whirlpool smart appliances, along with estimated total savings in the next following 5 years. This concept is based on the research conducted by EnergySawy, which verified the effectiveness of their Home Energy Score design with US Department of Energy by:

- **Personalizing language they used in their design**
- **Estimating energy savings over multiple years**
- **Simplifying the results**

A strategy which incorporates the three insights above can be helpful for maintaining energy saving behaviors.

# Thank You!

UX team at Whirlpool  
Professor Marty Siegel  
Chung-Ching Huang

# Sources

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<http://www.quora.com/Which-uses-more-energy-a-refrigerator-door-opened-twice-or-kept-open-for-a-minute>

<http://www.thedailygreen.com/going-green/tips/refrigerator-door-wastes-energy>

<http://iopscience.iop.org/1748-9326/8/1/015016/article>

<http://www.energysavvy.com/blog/2011/03/25/three-ways-to-make-energy-efficiency-emotional/>



# *Appendix: Our Process*

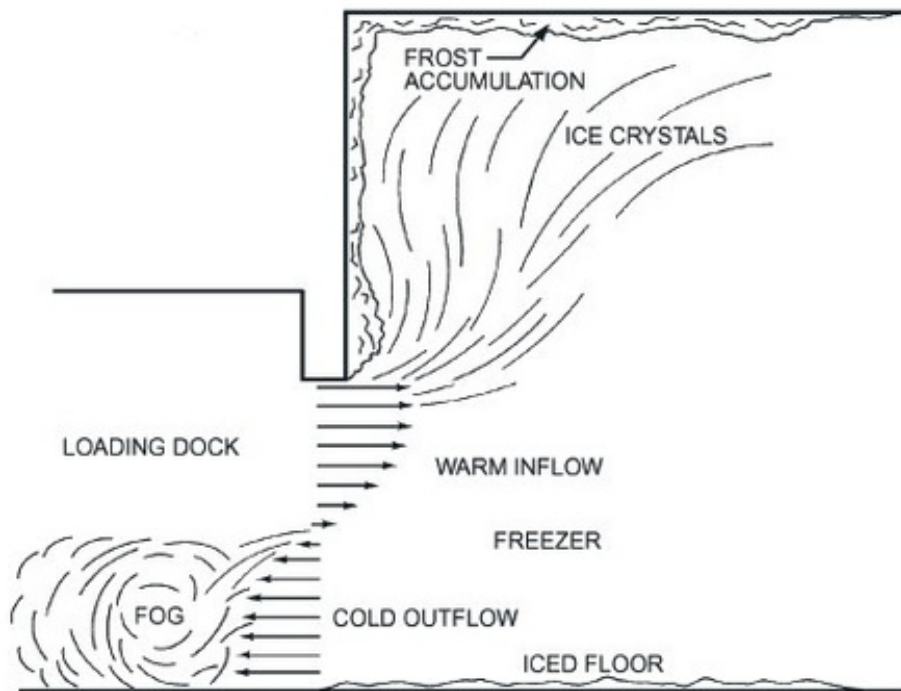
# Initial Research

The fridge is the most energy-intensive appliance, and door openings account for 7% of fridge energy used.

<http://www.thedailygreen.com/going-green/tips/refrigerator-door-wastes-energy>

Making decisions before opening the fridge door helps save energy by saving time.

<http://www.quora.com/James-Ferguson-3/answers/Energy-Efficiency>



**Fig. 3** Flowing Cold and Warm Air Masses for Typical Open Freezer Doors

Keeping the refrigerator door open for only a short period at a time will save more energy. If you keep the door hanging open, all the cool air will escape.

But if you close the door quickly, the cool air will stay inside. This saves energy!

Image and third insight from:  
<http://www.quora.com/Which-uses-more-energy-a-refrigerator-door-opened-twice-or-kept-open-for-a-minute>

# *Initial Research*



We also tested the trial version of the Smart app to see what functionality is currently available, and how the app works.

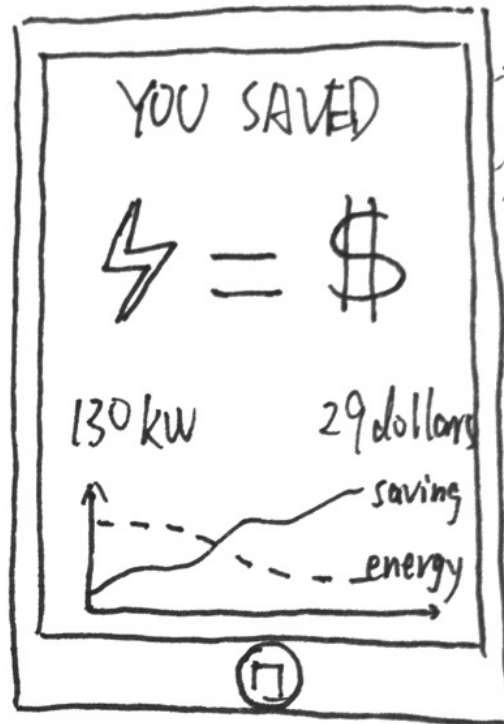
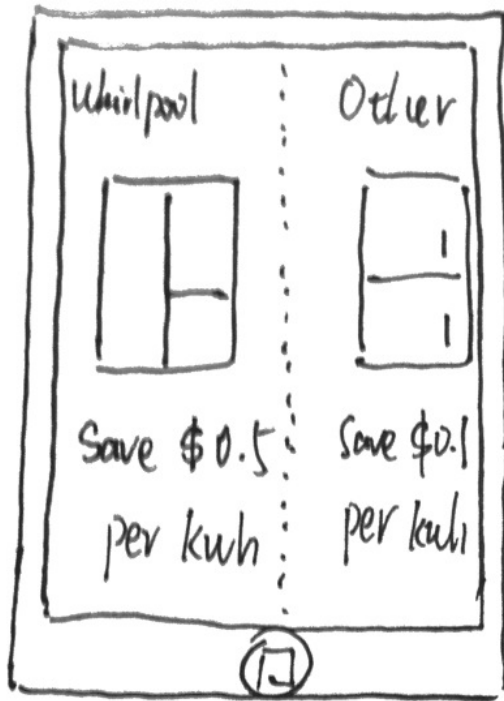
# *Exploratory Concepts*

Following are 6 sketches showing initial concepts within the space of energy saving.

We focused our ideation on the **refrigerator** due to its high energy usage compared with other appliances.

# Concept 1

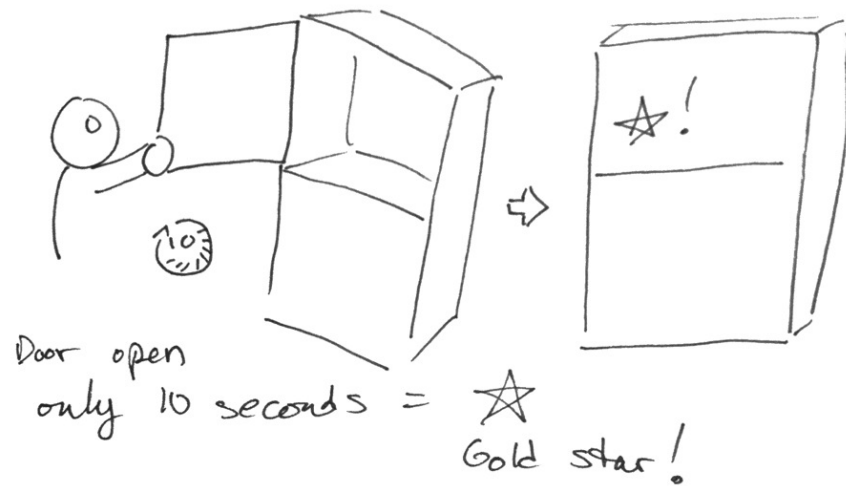
## Appliance Comparison



A way to compare your fridge's electricity use with that of other appliances.

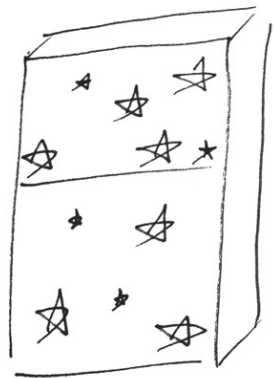
# Concept 2

## Gold Star Fridge



Get a gold star as a reward every time you behave in a way that saves energy!

This is particularly fun for children, who like getting rewards for their good behavior.

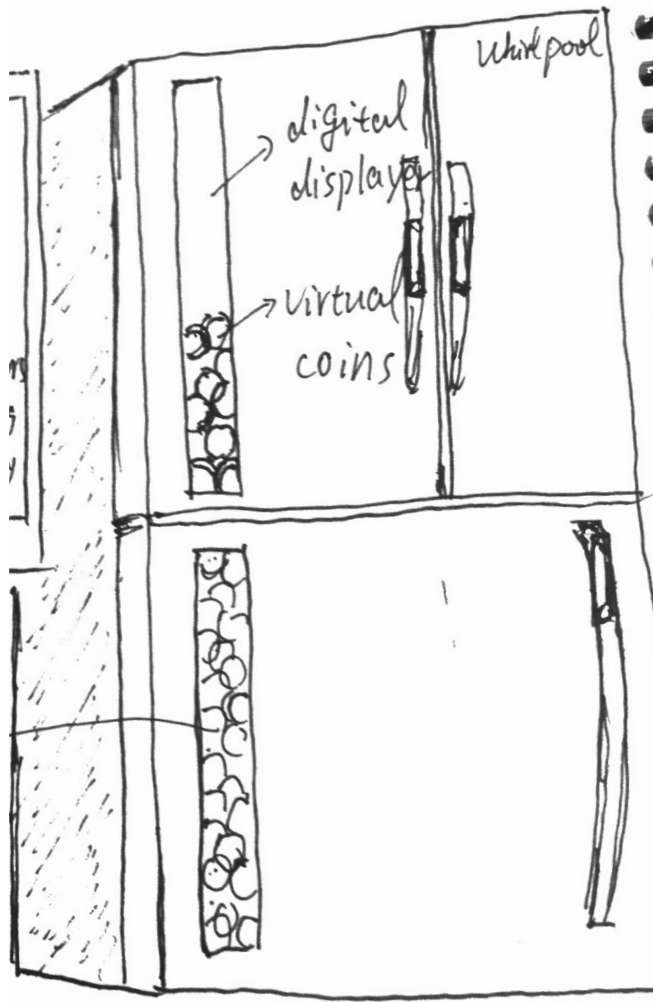


[whole family can use!]

change habits  
w/ rewards

# Concept 3

## Virtual Coin Fridge



A digital ink display on your fridge shows how much money you have saved using good energy saving habits.

This helps you track your good energy saving behaviors by viewing energy savings in a monetary way.

# Concept 4

## Yelling Fridge



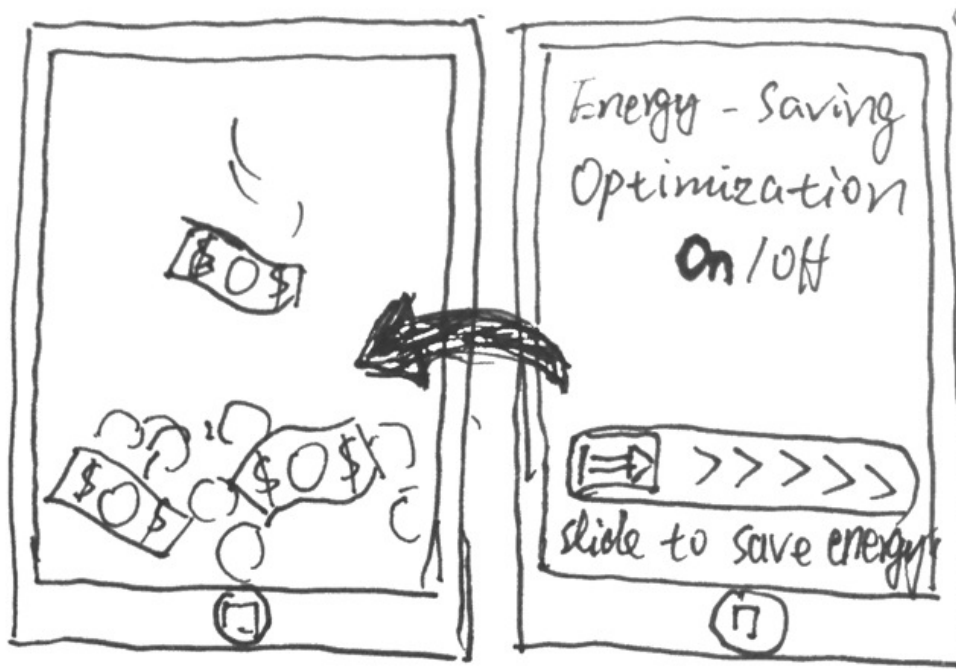
If you've left the door of the fridge open too long, your fridge starts to yell warnings at you, or make a lot of noise to remind you to close it.

Though similar functionality exists already in the Smart app, this is harder for the whole family to ignore!



# Concept 5

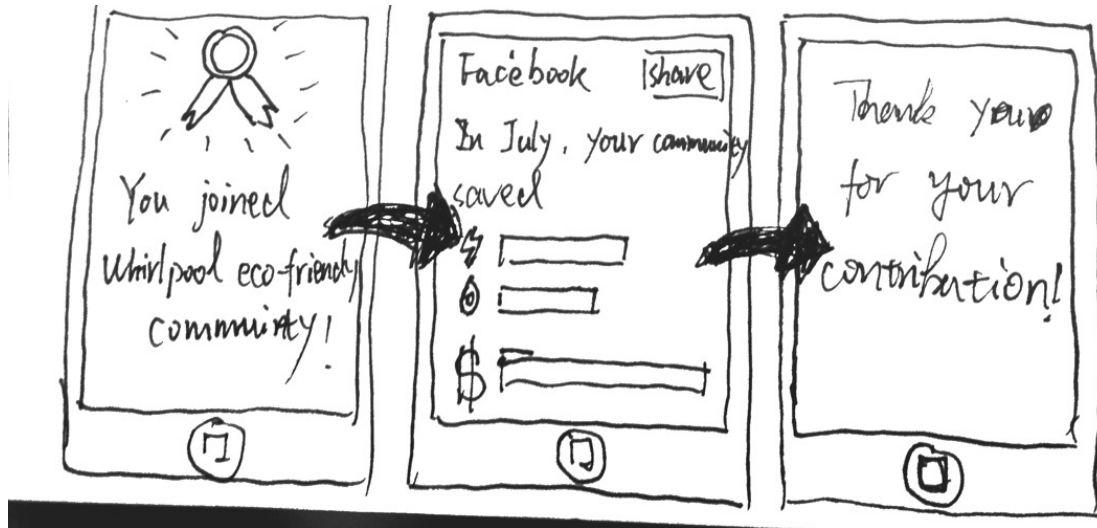
## One-Swipe Power Saver



Instead of burying the energy saving options within the app, this is a one-touch option to either turn off or on energy-saving options on the appliance.

# Concept 6

A Smart Social Network



A social network of people with Smart appliances to share their energy savings.

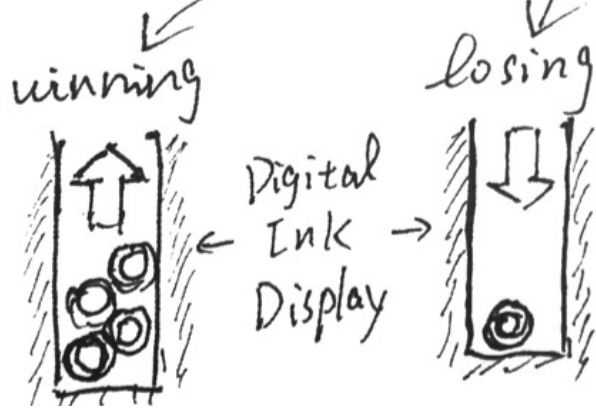
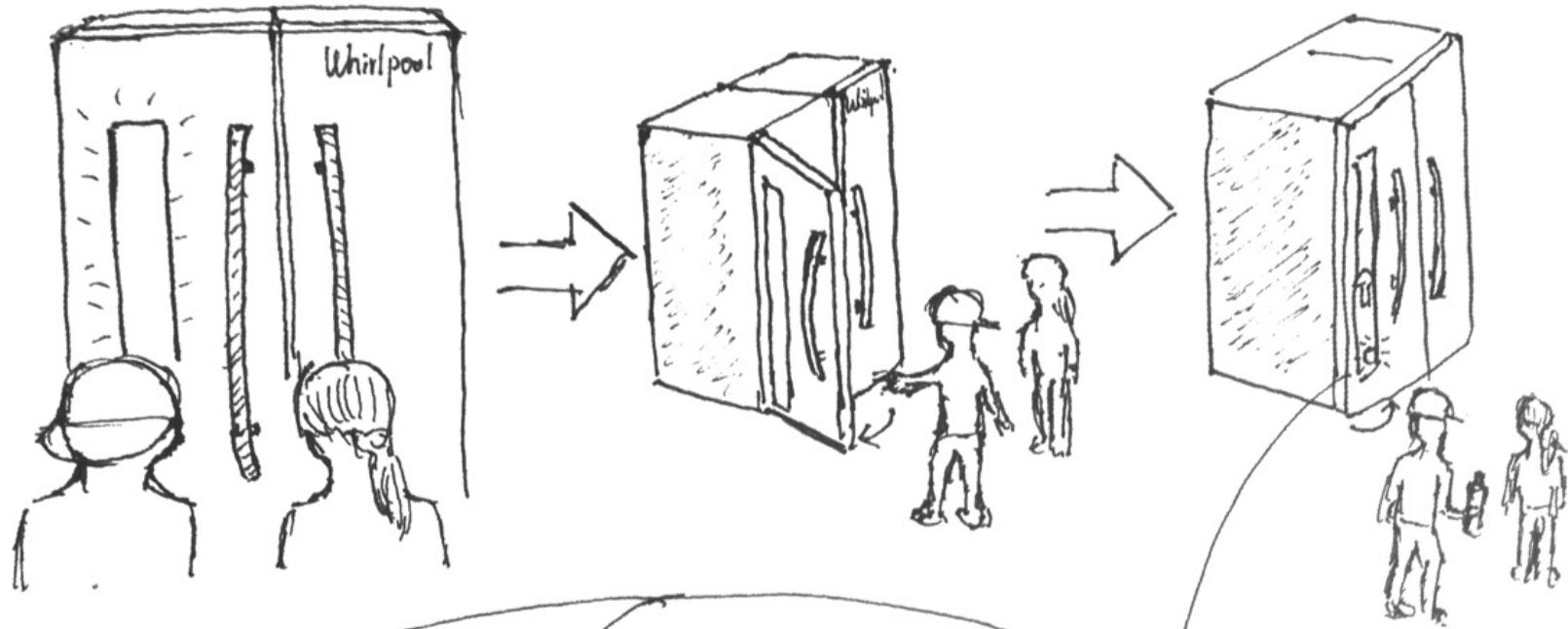
# *Synthesis of Ideas*

We decided to focus our design on **games** to engage both children and adults in energy-saving behaviors.

Our final direction was inspired by the ideas of **rewards** for energy-saving behavior and involving **children** in good energy-saving behaviors from an early age.

We considered the idea of social networking, but dropped it because we realized access to social networks is restricted by age, and our idea focuses on children younger than 13.

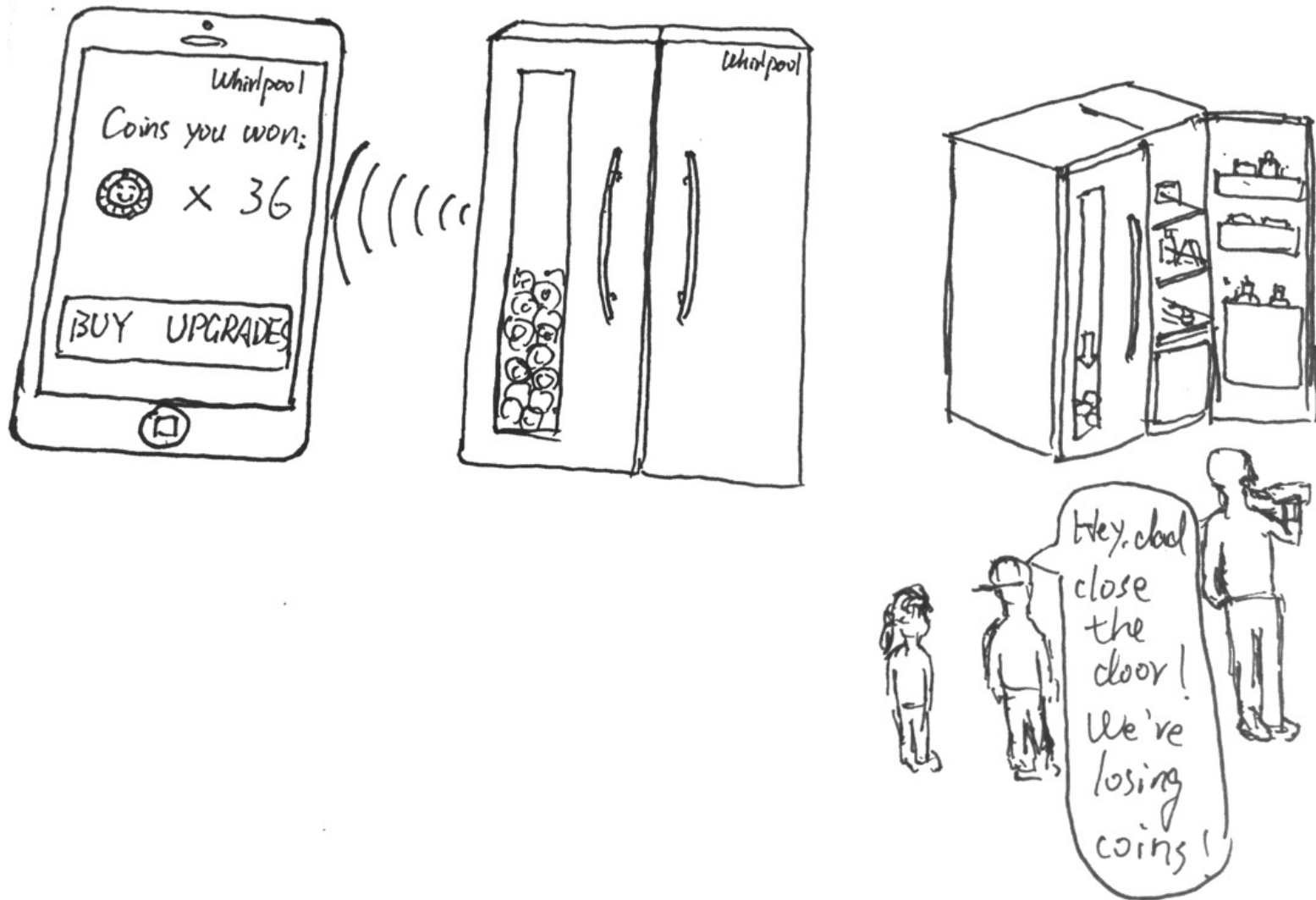
# Early Sketches: Fridge Game



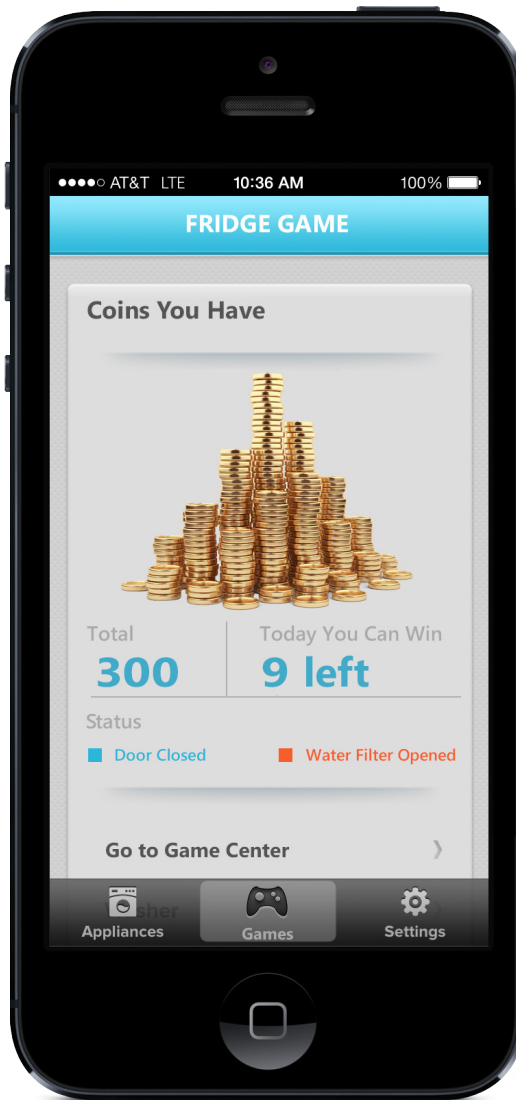
Open and close  
fridge doors in  
3-5 seconds,  
people can win  
one coin!

If people keep  
the doors open  
more than 6 sec  
they will lose  
one coin

# Early Sketches: Fridge Game



# Mockup: Visualizing Fridge Game



# Earning Coins

## Criteria

1 hour - open 30 seconds or less = 1 coin

1 hour - open over 30 seconds = no coin

We considered how users could earn coins. Our first thought was, every time the fridge is opened for less than X seconds, you get a coin.

We realized this could be abused by users who just stand there, opening and closing their door, to earn coin after coin.

We then changed it to a set amount of coins given per day, with coins subtracted for energy-inefficient behavior.