

Drinke: SmartCup

Business Plan

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Mission Statement

The Drinke SmartCup aims to improve the hydration habits of users by tracking what and how much they drink while providing in-depth analytics and goal-tracking. By leveraging innovative in-cup sensing techniques and cloud-based machine learning, Drinke automatically knows what's in the cup, removing the cumbersome manual process from today's existing hydration-tracking solutions.

Price: \$49.98

Cost: \$12.50 (year 1) \$10.35 (year 5)

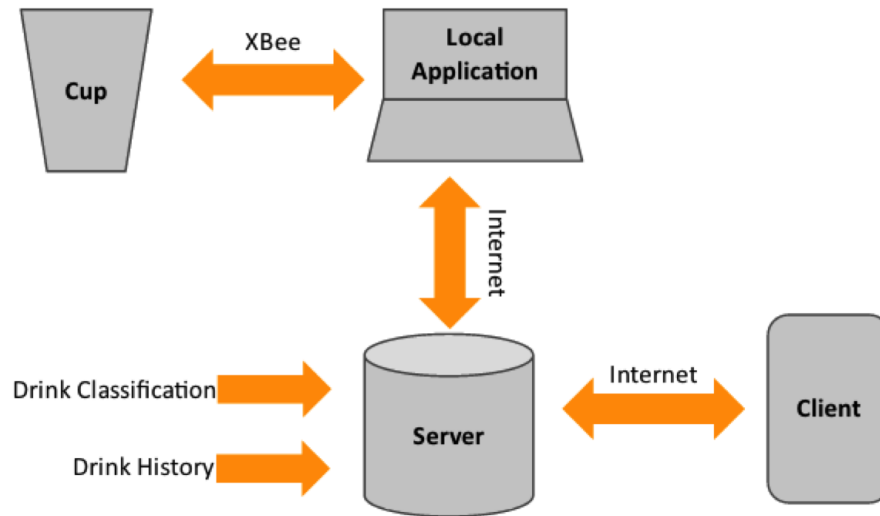


Figure 1: *Overview of system architecture.*

How the Drinke: SmartCup works.

Drinke is a cup and a mobile app that work in tandem to provide users with a fully-automated hydration tracking system. When a user adds a drink to the cup, the cup automatically detects both (a) what drink is in the cup and (b) how much of the drink is in the cup. The cup has a wireless radio in its base, so once the cup is within range of the Drinke syncing dongle, these readings are visible on the cup's onboard LCD screen and via the mobile app. Figure 1 shows the system architecture.

Mobile Application

In the mobile app (Figure 2), a user can set minimum or maximum goals for each beverage, or for beverage ingredients. For example, a user may want to drink a minimum of 64 ounces of water every day, while limiting caffeine intake to 100 milligrams. The home screen of the app tells users how they are doing with respect to their goals. It may say, “No more coffee today!” or “12 oz. from your water goal.” The user can also view his drinking history, complete with graphs. The app will also use native iOS and Android notifications to alert the user when he is nearing or exceeding his goals (Figure 3).

Detection

In order to detect the type of beverage that the user is drinking, we need to collect data from the cup's sensors. Our solution for detection is to have a tricolor LED on one side of the inner, translucent

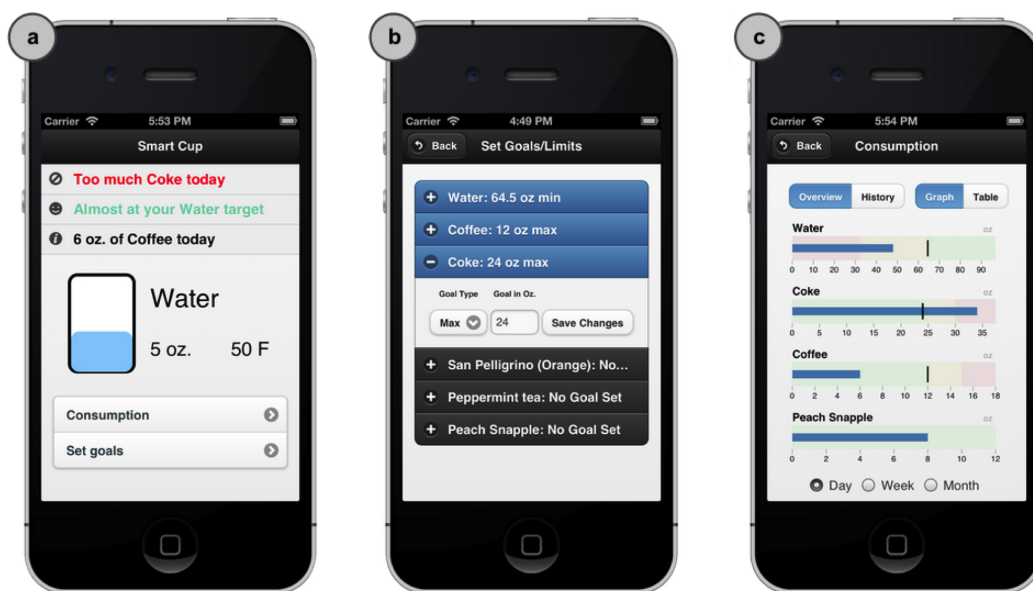


Figure 2: The mobile app has an overview screen for viewing current content and alerts (a), setting goals (b) and reviewing progress towards goals (c).

cup, and a photoresistor on the other side. By cycling through multiple colors of the LED, we can generate a feature vector from the photoresistor readings. Each drink will have a distinct “signature” vector (see Figure 4). This feature vector is uploaded to the Drinke cloud, where a support vector machine (SVM) classifier is used to determine the type of drink. Leveraging the SVM allows our classification to be robust to noise. We collect dozens of readings per drink, returning the predicted drink as the drink with the highest probability over all the readings.

The Drinke SmartCup will ship with some basic drink models in the SVM classifier, but in order to tailor the experience to each user and achieve robust classification, the cup will feature a training mode where a user fills the cup with a drink, creates a new drink type in the mobile app, and opts to train on that drink. This process is opaque to the user, who does not need to understand the inner workings of our sensing and classification model.

Volume

The Drinke SmartCup uses a force-sensitive resistor on its base to determine the quantity of the beverage in the cup. This process is a simple linear interpolation based on the analog reading from the resistor and default readings for “empty” and “full.”

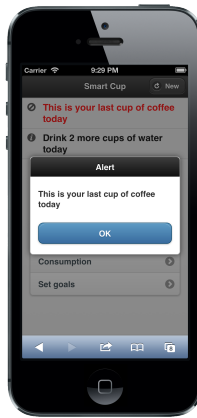


Figure 3: Example of a goal-based alert.

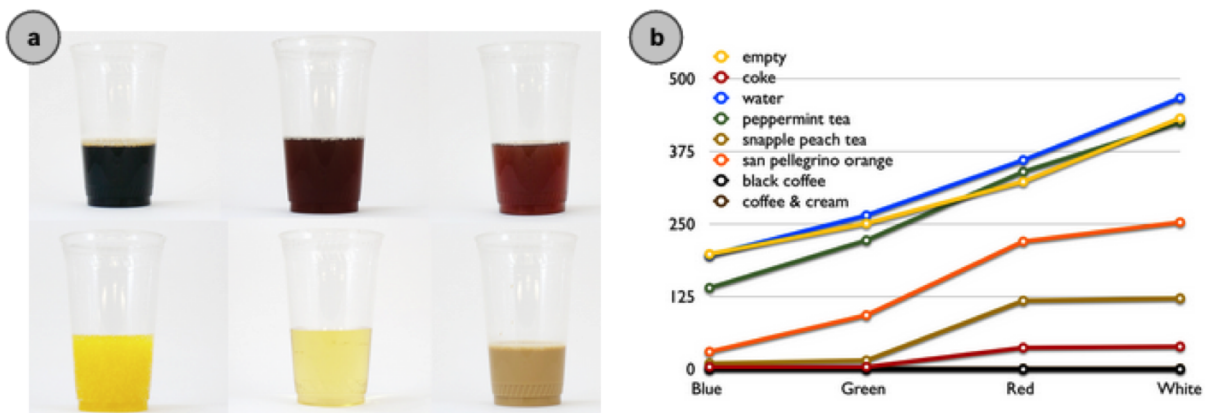


Figure 4: The appearance of 6 sample liquids under bright light (a) and the light sensor voltage reading for each LED color and liquid type (b).

Temperature

The cup also has a temperature sensor. Temperature readings are displayed both on the cup and in the app. The app can, for example, alert the user when their coffee is getting too cold. Although not built into current prototype, the temperature can also be used to help categorize the beverage in the cup. Some teas, for example, can resemble apple juice. Since tea will generally be served hot and apple juice cold, the temperature reading could help distinguish these beverage types.

Intended Market

The primary target market for Drinke are young professionals. Because these users are focused on work, they can easily forget to drink enough water or monitor their caffeine intake. This demographic

also has the highest smartphone ownership rate; all things considered, this audience is a well-suited target for Drinke.

We estimate “young professionals” to be between the ages of 20-44 and hold “white collar” jobs. The Bureau of Labor Statistics estimates that 93.65% of members of this age range are employed, and of all of the jobs held in the US, 35.3% of these jobs fall into the category of MBSA (Management, Business, Science, Art) i.e. white collar jobs. We estimate the number of young professionals to be around 37 million.

Because the utility of our product hinges on a tracking app, users with smart phones will be more inclined to buy the device. Users in this age range represent the largest percentage of smartphone owners at around 58-66%, and smartphone ownership has increased from 29% to 55% of Americans in the last two years. If this increase in smartphone ownership continues, our current estimate of **22 million target users** will likely increase over the next 5 years.

User Group Scenarios

Drinke’s target users are health-conscious people who would like to keep a better record of the beverages they’re consuming. These could be people who are keeping to a diet, those who want to track their water consumption, monitor caffeine and sugar intake, or just general data lovers. In particular, Drinke is targeting young professionals who spend a long time at their desk, reusing a single cup throughout the day. They are focused on their work and often forget to drink water. When they do drink, it is often caffeine- or sugary-heavy drinks. These users need to be able to (1) see a log of what they’re drinking, (2) easily spot trends over time, and (3) see alerts and reminders about their goals.

Scenario 1

Bob is constantly finding himself dehydrated, but he doesn’t think that he’s not drinking enough fluids. It turns out that Bob is drinking a lot of caffeine, which actually dehydrates him. Drinke gives Bob a simple way to track the different fluids that he’s drinking, alerting him, for example, that he is drinking too much caffeine.

Scenario 2

Alice’s doctor tells her to drink 4 liters of water every day, so Alice has started to buy bottled water to easily measure her intake. Drinke provides an eco-friendly solution that allows Alice to track her consumption requirements automatically with a web/mobile app. A software-only solution would

require Alice to manually log all intake, which clearly wouldn't work if she was already buying bottles because she couldn't take the time to record her intake.

Manufacturing Product Costs

Production cost formula

Costs and price point for Drinke were calculated using the following formula:

$$\text{Product Cost} = (D + T)/N + (M + L + P) + O/N$$

where

D = Design and development costs

T = Tooling costs

N = Number of devices sold over the life of the product

M = Material costs per product

L = Labor costs per product for operating machines, assembly, and packaging

P = Production costs per product

O = Overhead costs (rental space, computers, telephone, electricity)

Most likely case product costs

Table 1 shows the most likely case product costs.

Design and development costs

Design and development costs are estimated to be \$180,000.00 for the initial run. Subsequent maintenance costs for future runs are estimated to be \$12,000.00. These estimates assume a billable hourly rate of \$75.00, and that it will take 160 man-hours to complete the physical cup design and 2,240 man-hours to complete all electronic, server, and UI design. Also, not shown in the table above, but seen in the 5 year profit model table below, \$6,000 are allocated to general maintenance and bug fixes during non-development years. This accounts for 80 man-hours worth of time to perform any needed tasks.

	Metal Travel Cup	Drinke cup	Drinke electronics	Drinke Total	Drinke after DD
Cost range	(\$9-\$20 on amazon)				
Avg cost	\$14.00	\$14.82	\$35.16	\$49.98	\$41.40
product cost	\$3.50				
Product Cost	\$3.10	\$3.70	\$8.79	\$12.50	\$10.35
<i>D</i>		\$12,000	\$168,000	\$180,000	\$12,000
<i>T</i>	\$22,400	\$37,400	\$37,400	\$74,800	\$37,400
<i>N</i>	100,000	100,000	100,000	100,000	100,000
<i>M</i>	\$1.979	\$2.079	\$6.28	\$8.36	\$8.57
<i>L</i>	\$0.10	\$0.20	\$0.07	\$0.27	\$0.27
<i>P</i>	\$0.44	\$0.85	\$0.11	\$0.96	\$0.96
<i>O</i>	\$36,000	\$8,307.69	\$27,692.31	\$36,000	\$6,000

Table 1: Most likely case product costs. Notes:

1. Cup estimates based on: <http://www.custompartnet.com/>
2. Material for cup are assumed to be Stainless Steel and HDPE Plastic
3. Electronics estimate based on PCB calculator from Lady Ada
4. Electronic parts based on cheaper temperature sensor and radio
5. Future costs based on minor upkeep development costs, 10% increase in metal and plastic costs, and assumes a decrease in the cost to retool
6. All overhead costs account for only the dev time
7. Development times reflect work after our initial prototype

Tooling costs

Tooling costs are estimated to be \$74,800.00. Estimate based from estimates produced by <http://www.custompartnet.com/>.

Material costs

Material costs for Drinke are estimated to be \$8.36 per unit. These costs include material for the cup itself, stainless steel and polypropylene plastic (\$2.079), and for all electronic components and sensors (\$6.28). New radio transmitters and receivers and temperature sensors will need to be found and developed around. Zigbee radios appear to be significantly more expensive than other types/protocols, and increasing the development time a few weeks to accommodate a cheaper radio made financial sense without impacting the end product.

We assume that raw material costs will increase between our first run and second run, and the estimates reflect this. At the same time, we estimate that some electronic components will drop in price, while others may increase as they become obsolete and/or new replacement parts are substituted. These changes would result in a wash for the electronic costs.

Labor costs

Drinke will be produced in China or the Philippines to save production costs. Estimates assume a salary of \$2.00 an hour (well above the Chinese minimum wage).

Production costs

Production costs are estimated to be \$0.96 per unit. This price is estimated based on estimates produced from <http://www.custompartnet.com/>.

Overhead costs

Overhead costs, estimated to be \$0.36 per unit, account for providing facilities only during development times. It also accounts for the purchase of computers and other equipment necessary for design and development. Future run costs assume the corporation already has all the necessary equipment and therefor only accounts for facility space.

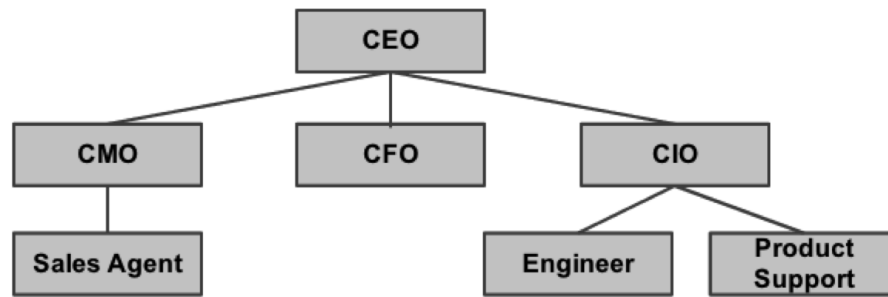


Figure 5: *The corporate structure of Drinke.*

Operational costs

The marketing costs were approximated at 13% of sales as suggested by Magrab (1997). These costs cover all advertising costs and salary for the CMO and sales agent. These costs run approximately \$260,000 during our first run of production.

We also estimated running costs at 8% of sales as suggested by Magrab (1997) in order to cover legal fees, equipment costs, and other services. These costs run approximately \$160,000 during our first run of production.

We expect to incur additional development costs for improvements on our prototype. These development costs will be highest at the beginning of our operation and decrease over time. They include estimated funds needed for testing our product and performing minor design iterations.

Structure of the Corporation

Figure 5 shows the structure of our corporation.

Competitive Landscape

There are several iOS/Android applications that offer users the ability to track their beverage consumption, but all of them require manual data entry. These products have demonstrated (with varying levels of success) how to create visualizations of beverage consumption. A similar cup product, The Smart Mug, allows users to heat up their beverages, but does not provide any tracking/logging functionality. Drinke's value comes from the automated data collection of beverage types and consumption. This will provide an end-to-end consumption-tracking experience for the user.

		Year				
		2013	2014	2015	2016	2017
		$j = 1$	2	3	4	5
A	Sale Price	19.992	19.992	19.992	19.992	19.992
B	Number of units sold	10,000	30,000	30,000	30,000	25,000
C	Net Sales	\$199,920	\$599,760	\$599,760	\$599,760	\$499,800
D	Cumulative net sales	\$199,920	\$599,760	\$1,199,520	\$1,799,280	\$2,299,080
E	Unit cost (target)	\$12.50	\$12.50	\$12.50	\$12.50	\$10.35
F	Cost of product sold	\$125,000	\$375,000	\$375,000	\$375,000	\$258,750
G	Gross Margin (\$)	\$74,920	\$224,760	\$224,760	\$224,760	\$241,050
H	% gross margin	37.47%	37.47%	37.47%	37.47%	48.23%
I	Development cost	\$180,000	\$6,000	\$6,000	\$12,000	\$6,000
J	Marketing (13% net sale)	\$25,990	\$77,969	\$77,969	\$77,969	\$64,974
K	Other (8% of net sale)	\$15,994	\$47,981	\$47,981	\$47,981	\$39,984
L	Total Operating Expense	\$221,983	\$131,950	\$131,950	\$137,950	\$110,958
M	Pretax profit	-\$147,063	\$92,810	\$92,810	\$86,810	\$130,092
N	% profit	-73.56%	15.47%	15.47%	14.47%	26.03%
O	Cumulative profit	-\$147,063	-\$54,253	\$38,558	\$125,368	\$255,460

Table 2: 5-year most likely scenario for Drinke: SmartCup profits.

Profit Model Spreadsheet

Table 2 shows the 5-year most likely scenario for Drinke.