



The Ongoing Adventures of
Prof. Charlie Kemp
Faculty Entrepreneur



Metaphorical
Rope

Strictly
Metaphorical

The Ongoing Adventures of
Prof. Charlie Kemp
Faculty Entrepreneur

Conflict of Interest Statement

I own equity in and work for Hello Robot Inc., a company commercializing robotic assistance technologies.



Why aren't people benefitting today?

Real world success depends on a robot that doesn't exist



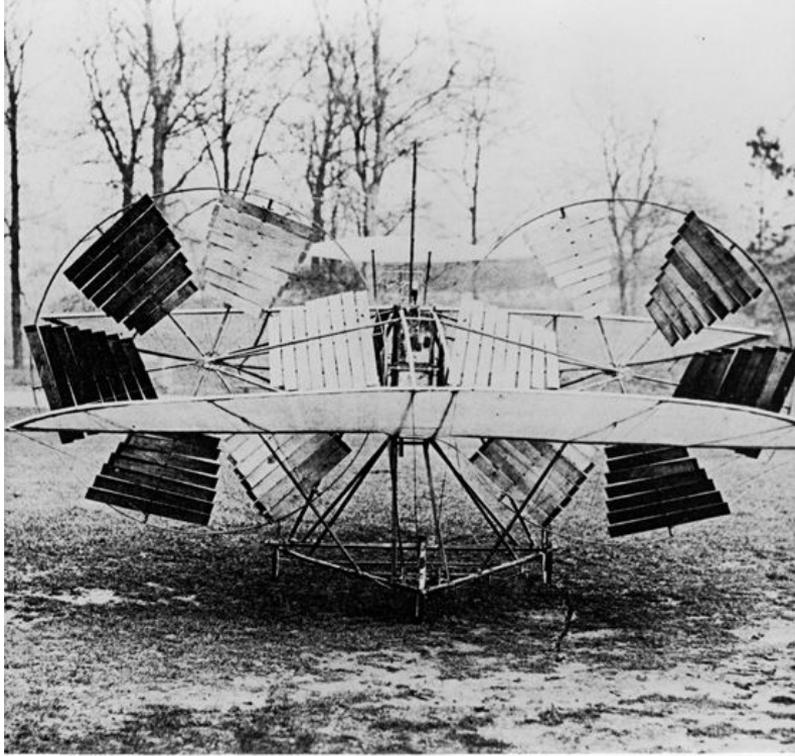
Released in 2010

\$400,000

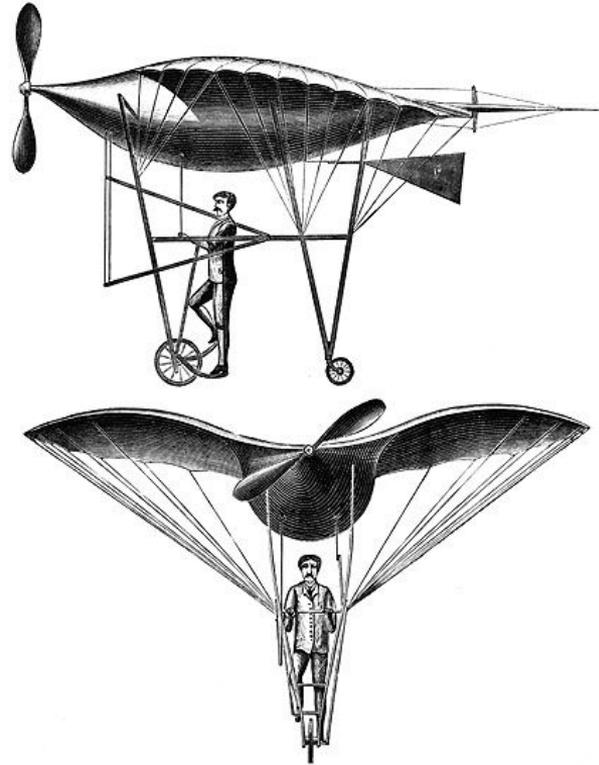
227 kg (~500 lb)

67 cm wide (~2.2 ft)

Mobile manipulators are at an awkward stage



“1875, Thomas Moy’s Aerial Steamer”



“1883, Alexandre Goupil’s sesquiplane”



The age of toys & monstrosities

- affordable
- small
- incapable



The age of toys & monstrosities

- affordable
- small
- incapable



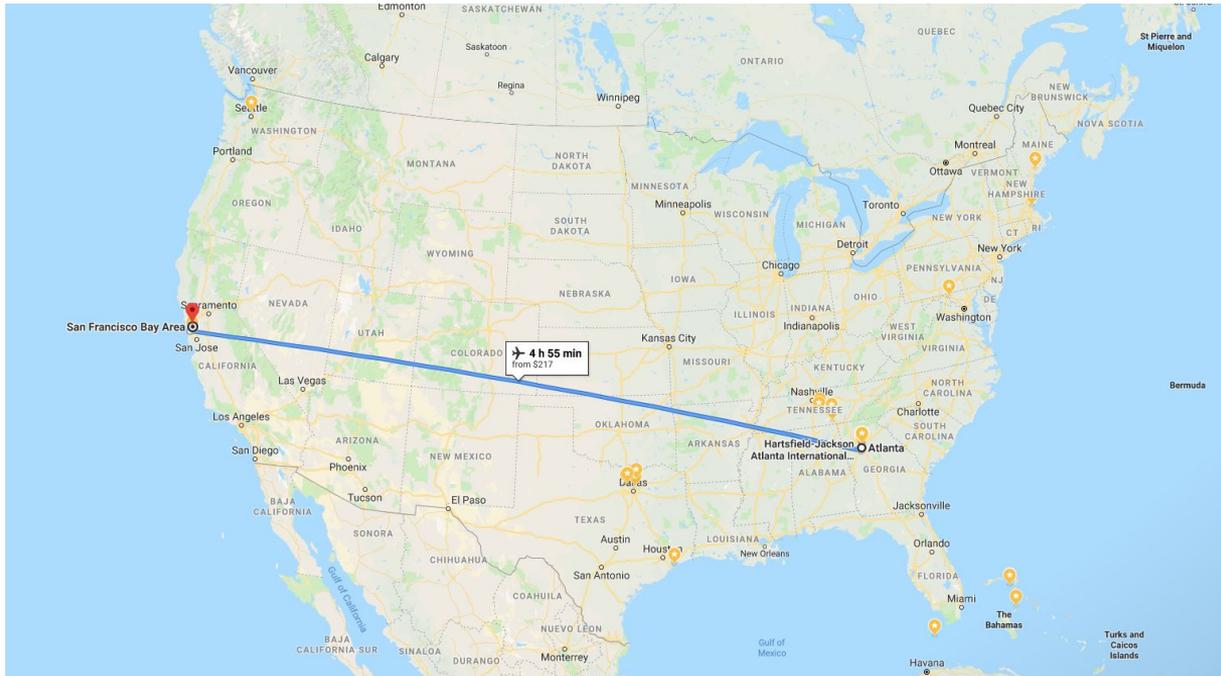
- capable
- large
- heavy
- expensive
- a little scary

The age of toys & monstrosities



The age of toys & monstrosities





**Technical
Inspiration!**

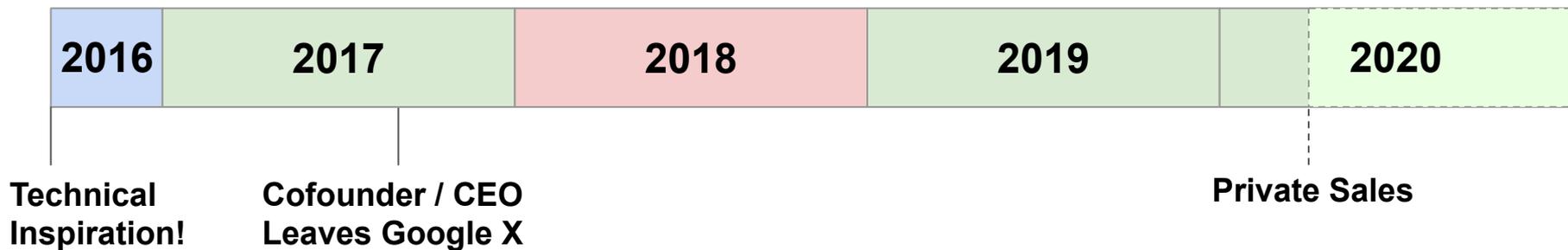
**Bay Area
Roadshow**

Private Sales



Aaron Edsinger, PhD

- World views aligned
- Commitment to a long term vision
- Successful prior collaborations
- Business experience
- Strong technical skills





Technical
Inspiration!

License Agreement
with Georgia Tech

Private Sales

Too late for naive funding,
too early for consumers



Funded by Bosch
Founded 2015
ceased production July 2018



\$73M raised
Founded 2012
sold IP assets Nov 2018



\$182M raised
Founded 2013
bankrupt April 2019



Technical
Inspiration!

Pitching for Venture Capital

Private Sales



Pivot to a longer-term plan starting with a robot for researchers and educators.



Technical Inspiration!

From Venture Capital to Self Funded

Private Sales

Where did I get the money?

- Family traditions

- Education, frugality, and investing
- Example of my grandparents
 - Midwestern farmers and poor coastal workers
 - All went to college ([~1/14 the real-dollar cost of today?](#))
 - After college: The Great Depression then World War II

- My immediate family

- Arrived in Atlanta in 2006 after many years of education
- Saved: careful about house, car, subscriptions, and other expenses
 - Bought house (at peak) that we could pay for with one salary
 - Still in same house, both kids under 10 in the same room
 - I bought my Mom's 2001 Honda Accord for the Blue Book value
 - Still my only car
 - Avoided debt & hidden charges
 - For example: interest, taxes, insurance, utilities & maintenance increase with home size
- Invested: regularly invested using a traditional [asset allocation strategy](#)
 - Scrimped during 2008 financial crisis to put more money into the stock market
 - Don't underestimate the power of [compounding returns](#) (exponential)



Learning has been the best part

Outside of my comfort zone

Insight into real-world challenges

Hands-on

Rejuvenating



What have I learned?

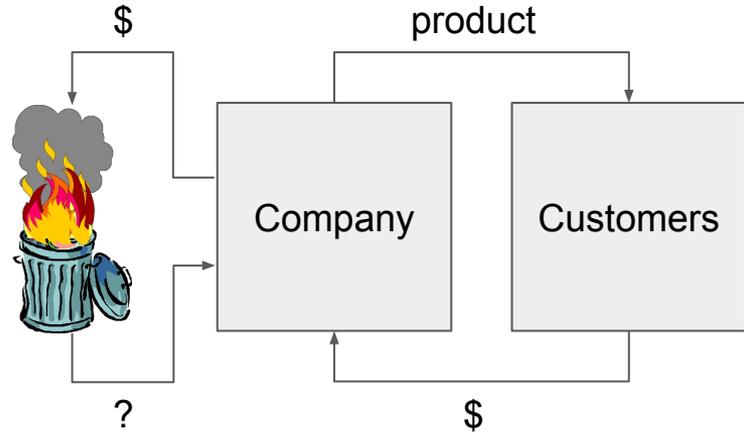
grain of salt: limited success so far

The Basics

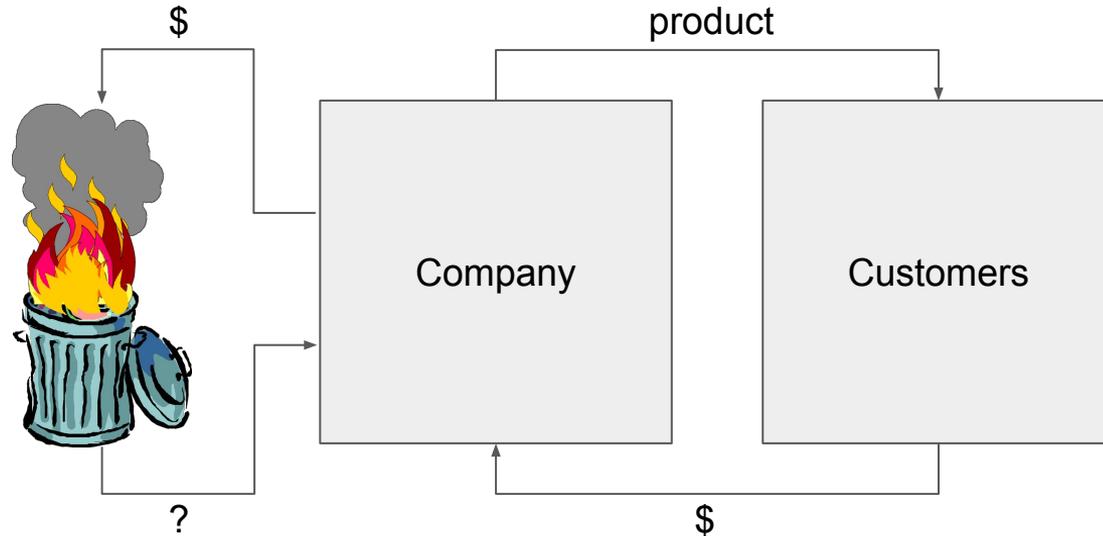
What is the product?

Who are the customers?

Can you make the math work?

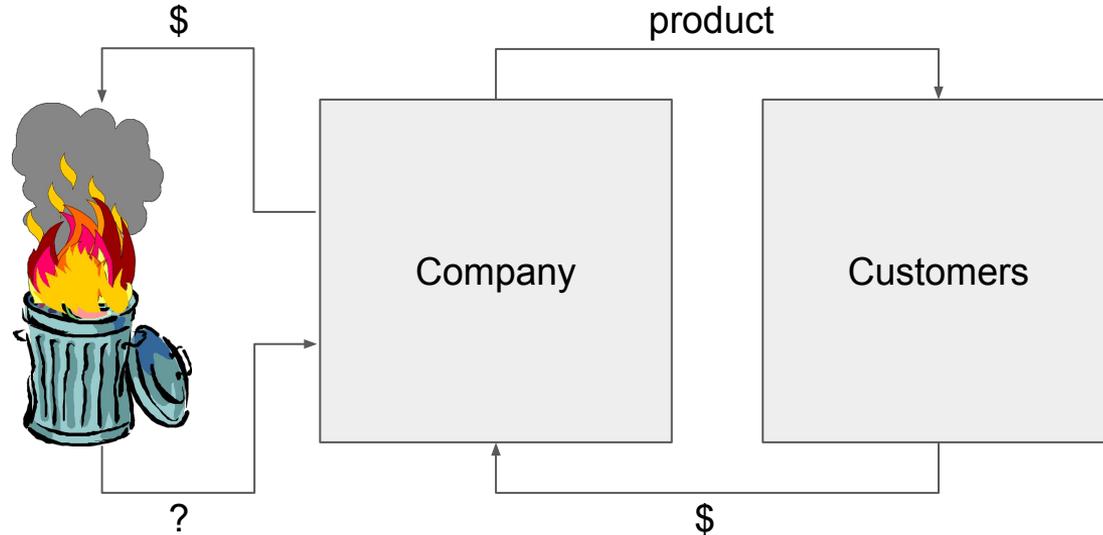


A Simple Model of Success



$$\int_0^T \$_{burned}(t) < \int_0^T \$_{from_customers}(t)$$

A Simple Model of Success



$$reward = \int_0^T (\$_{from_customers}(t) - \$_{burned}(t))$$

A Pattern of Failure

- An exciting robot video!
- Amazing media exposure!
- High customer expectations
- A long wait
- A failure to deliver
- Dissolution of the company



Easy to make a robot video that overpromises

- Easy to fool people
 - Non-experts
 - It's hard to be skeptical
 - We all want to believe!
 - Easy to trick yourself
- Desire to impress people
 - Investors
 - The public
- Investor pressure
 - Want to see demand is there
 - Rarely understand the technology
- Forget how hard the real world is
 - Believe your own press
 - Confuse press with sales
 - Confuse investment with sales
 - We'll figure it out later!



Hard to make a real robot that delivers

- The real world is unforgiving
- “Hardware is hard.”
- Hardware is not software
- Once it’s shipped, you can’t afford to have it come back.
- Inventory costs money, takes time, and entails risk.
- Details really matter
 - Many components need to work
 - 50 parts that have 99% yield
 - 39% chance of failure!
 - $(0.99)^{50} = 0.61$
 - A single USB 3 cable can kill a robot!



Kimberly Wright
@kimberlywright1

Thank you @MistyRobotics...loving the updates and cannot wait to meet Misty! ❤️👍



MISTYROBOTICS[...]

Happy holidays, Kimberly!

We'd like to be sending you a robot right now, but as you've read in recent updates, Misty II is delayed until next year. To express our thanks for your continuing to accompany us on the journey to a personal robot in every home and office, we're sending these small tokens of appreciation as we close out the year.

Warm wishes,
Ian and the entire Misty team

Crowdfunding for robots!

Crowdfunding for robots!
It's a trap!

Crowdfunding for robots!
You will fail your best customers.

Robots for consumers!

Robots for consumers!
It's a trap!

Robots for consumers!

High standards & low margins will kill you.

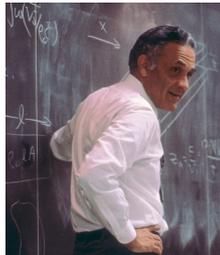
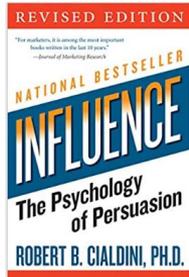
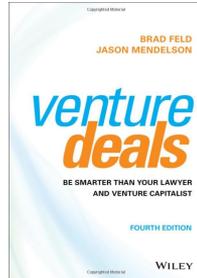
Simple startup advice!

Simple startup advice!
It's a trap!

Simple startup advice!
There are many roads to success.



Learning Resources I've Found Valuable



- [Shark Tank](#)
- [How I Built This with Guy Raz](#)
- [Venture Deals](#)
 - by Brad Feldman and Jason Mendelson
- [Influence: The Psychology of Persuasion](#)
 - by Robert B. Cialdini
- [The late Prof. Amar Bose](#)
 - I took his class in the fall of 1994, and still think of it often.
 - <https://teachingexcellence.mit.edu/category/inspiring-teachers/amar-g-bose-6-312-acoustics>

Last Advice for Now

- Work hard to understand people's motivations, including your own.
 - Are your interests aligned?
 - Can you work together to achieve something that is mutually rewarding?
 - Be creative in looking for win-win solutions.
- Don't make decisions based on sunk costs.
 - Given the current state of things, what can you do?
 - Is there a creative way forward?
 - Replan and improvise to get somewhere worthwhile.
- Look for deeper truth.
 - Work hard to be honest with yourself and others.
 - Beware of crowds.
 - Make your own assessments about what really matters.

Examples of Inspirational Entrepreneurs in Robotics for Whom I am Thankful

- Prof. Rod Brooks
- Dr. Aaron Edsinger
- Dr. Travis Deyle
- Dr. Advait Jain
- Dr. Hai Nguyen
- Prof. Ayanna Howard
- Prof. Cynthia Breazeal
- Dr. Steve Cousins
- Prof. Andrea Thomaz
- Dr. Vivian Chu
- Prof. Maja Mataric

Additional Thanks

- Dr. Aaron Edsinger
- Blaine Matulevich
- Prof. Melissa Kemp
- Prof. Susan Margulies
- Vincent Dureau
- Henry Evans
- Jane Evans
- My parents
- My grandparents
- The supportive faculty and staff at Georgia Tech

Questions?

Other Discussion Points

- Iteration has great value
 - Look for ways to iterate
 - Set up feedback loops (e.g., customers <-> product)
- Think about your competitive advantage
 - <https://hbr.org/2019/10/what-the-lean-startup-method-gets-right-and-wrong>
- Don't underestimate the value of maintaining control of your company
- Make sure you understand venture capital (VC) before taking it
 - Very good for some situations
 - Very bad for others
- Keys to success (often noted by others)
 - Talk with customers early and often
 - Solve a real need your customers have
 - If they're super excited, it solves a real problem they have, and they want one right now for a price you can deliver, you're in very good shape!
 - Nothing beats profitable sales
- It's very hard to create a new business that compensates as well as a job with an existing business.

Other Learning Resources

less influential for me personally, but worthwhile

- [Paul Graham's Essays](#)
- [Hacker News \(especially the comments\)](#)
- [The Lean Startup by Eric Ries](#)
- [Masters of Scale with Reid Hoffman](#)
- [The Startup Owner's Manual by Steve Blank and Bob Dorf](#)
- [Business Model Generation by Alexander Osterwalder & Yves Pigneur](#)

