

Solo Robotics: Business Plan

Background

According to statistics, 98% of America prefers to cook their own meals. Undoubtedly, for this 98%, the kitchen is a central part of their daily lives. This conjures up images of happy families gathering at the dinner table to eat home-cooked meals, but perhaps this image is misplaced. The largest home-cooking demographic is actually the full-time working man or woman. They cook between 3-6 days every week and spend between 30-60 minutes cooking, and as more working-age people join the workforce, these numbers are likely to drop further. With free time in short supply, fewer people are going to have time to cook. But, the motivation to cook is strong. Most people choose to cook because it's cheaper, and unlike the cost of a restaurant meal which has risen by 2% over the past year, the price of home-cooking has actually dropped.

Herein lies the conflict, people want to cook because it's healthier and cheaper, but simply do not have the time because they're too busy working. That's the problem we aim to solve.

Our Solution: Creating an Ecosystem Around Automating Kitchens

Our solution is to mass produce and sell our custom-designed kitchen automation hardware which integrates into existing kitchens. This hardware will rarely rely on human intervention. When human intervention is required, it will take place in the form of an MTURK-like model with remote users assisting the hardware in return for payment with ERC20 tokens.

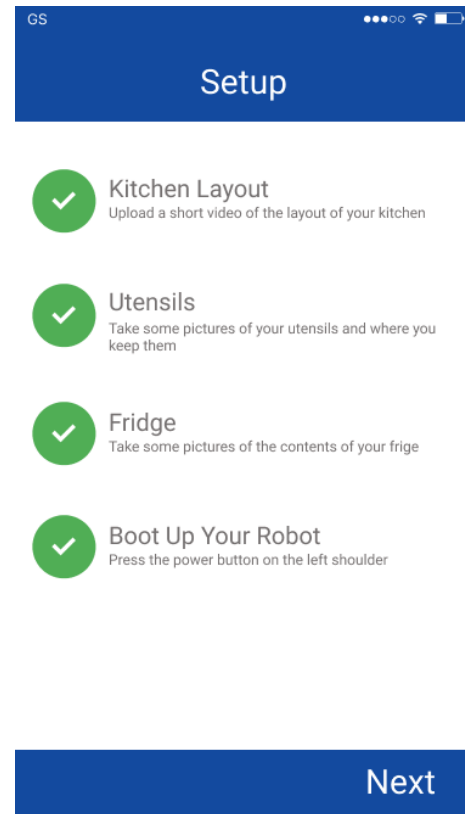
Hardware: The Solo 1



Figure 1: Custom hardware for fully automated cooking

Advances in Artificial intelligence and computer vision have enabled robotics to take great leaps. Robotics technology currently exists to simulate human hands with incredible precision and dexterity. The hardware we have designed and plan on mass producing and manufacturing almost entirely in-house, pictured above, includes two robotic arms capable of utilizing kitchenware like humans do. These arms possess six degrees of freedom and can hence replicate every motion possible with a human hand. Using sophisticated computer vision code,

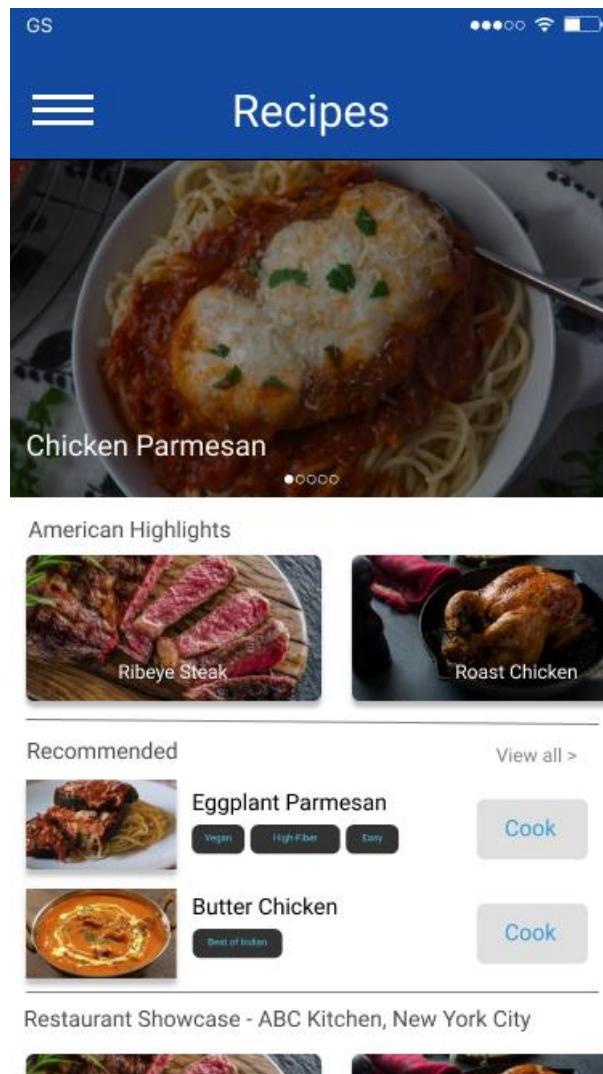
our hardware will be capable of identifying kitchenware and ingredients, and query a database of online recipes to cook meals from scratch, saving the user an estimated 4 hours every week.



The initial set up process, as pictured above, will be minimal, requiring the user to guide the system through the kitchen for analysis by our backend which will tag and keep track of various kitchen items such as ingredients in the fridge, locations of the stove and sink and maintain an inventory of available utensils.

The Ecosystem

Along with the hardware, we also plan on building a curated database of recipes for our hardware to utilize. This database will be made available to users using a freemium model, wherein most recipes are free, but we will allow restaurants and food companies to sell premium recipes on our platform. Users can then purchase these recipes to use whenever they like, like purchasing a song on iTunes.



Additionally, we also plan on selling meal-kits from partnered restaurants, wherein upscale restaurants can sell meal-kits for some of the dishes on their menu, giving users a 'taste' of what the restaurants offerings are. We plan on building a meal-kit store into our smartphone app, allowing users to purchase these kits at various price points. These kits will also be optimized for use with our hardware, requiring no additional ingredients and no additional effort. Our hardware makes our solution truly unique and effortless, differentiating us from services like Blue Apron.

Our goal is to make our service the quickest and easiest way for users to bring restaurant meals into their own home. By partnering with restaurants, we aim to bring their ingredients and recipes into a user's home. We plan on incentivizing these partnerships by allowing restaurants to keep most of the revenue attained from the sale of their recipes and meal-kits on our platform. This not only gives restaurants an additional source of revenue but also provides them with an organic form of advertising, allowing users to 'try' a restaurant before deciding to visit. While it may seem like we are detracting from a users' need to physically visit restaurants, we contend that we are doing the opposite. Ambience, and the chef's cooking are chief reasons

patrons visit restaurants, and we aim to replace neither. We merely wish to give users a sneak peak into their favorite chefs' cooking.

Human Intervention

We recognize that every kitchen is different, and that Computer vision may be unable to locate and identify every utensil or ingredient required to cook a meal even after the user has set up the hardware correctly. So, we plan on implementing a blockchain-based solution where other users can sign up to solve the hardware's problems for it in exchange for cryptocurrency payments. For instance, say our hardware in one kitchen cannot find a steak-knife. It will send a picture of where it thinks the steak knife is, along with the query to a network of users who will 'answer' the hardware's question (similar to CAPCHA on websites) in return for payment in the form of ERC20 tokens. These tokens will be tradeable, and hopefully will be supported by major cryptocurrency exchanges where they can be exchanged for USD or other cryptocurrencies.

The Cost

Given the complexity of our hardware solution and the cost of robotic equipment that currently exists with the required level of dexterity and sophistication, we estimate the hardware to cost between \$4000 and \$6000. We understand that this may seem like a large one-time investment, but our target market consists of upper-middle class working individuals who value their time, and recognize that it is better spent in places other than the kitchen. The demographic we are targeting is the 22-40 year age-group with income levels above \$80,000/year. According to 2016 US Census data, the median income of the age-group we are target is between \$64,000-\$74,000 per year, and approximately 40 million people fall in this group. Using this data, we estimate our TAM to be at least 30-40% of this demographic.

Also, as we can achieve economies of scale and streamline our design and manufacturing process, we aim to bring costs down and expand our target market.

How Funding Brings Us Closer to our Goal

Initially, we would commit financing towards constructing a prototype of the Solo 1. This would involve purchasing two Universal Robotics UR3 arms (\$25,000 each) and two Brunel Robot Hands (\$2,000 each) for a total of \$54,000. This would start us on the path to determining how to construct and manufacture our own robotic arms and hands custom tuned to our needs. We expect an additional \$10,000 dollars to be spent on acquiring welding equipment and computers with high performance GPUs to run our computer vision code.

Note From the Co-Founder – Shivank Doshi

I want to specify the premise of this project. With the way current technology is heading humanity's transition to fully autonomous personal robots in the home might happen in this next decade or so, an autonomous robot in the kitchen maybe in the next five years.

But with the advent of the internet this process can be accelerated by maybe a year or two. This is not very significant, I agree but it is to a new company starting out.

I think with the perspective we're introducing which is to use Human assistance is a very innovative model to accelerate not only the process of personal robotics but also make room for a company that is just starting out. I agree there is only a first movers advantage attached to this

idea but the point of this essay is to address only that. This will not only help us create a human-robot symbiosis, which later in the evolution of the robot will be incredibly valuable because we are indeed trying to accomplish what we call a "personal robot," one that understands you.

I also agree I might be underestimating the timeline we actually reach market by a significant amount, but I can say with certainty that I am not overly optimistic about the timeline I've set for a fully autonomous robot to come into market.

Therefore, the subtlety in the argument isn't that when will a fully autonomous robot come into market but rather how can we be the first ones?

The reason I am making this argument is because I need to address our competitors, such as Midea and SoftBank and perhaps Moley Robotics.

I also agree that while this may seem like a cheap and frivolous hack it will help our service get some breathing space in the robotics industry, in order for us to be fully functional while competing against our titanic adversaries

Technical Specifications:

Total Weight: 60-70 kg
Size (W x D x H): 20 In x 28 In x 65 In

Power Source: 100-240 VAC, 50-60Hz
Power Consumption: Min 700W Max 1000W

Materials: Aluminum, Plastics, Steel, Rubber
Ambient Temperature Range: 0-50*
Noise: Comparatively noiseless

Payload: 3 kg

Total Payload: 6 kg

Movements

Left Arm, Right Arm:	Joint ranges:	Speed:
Base	±360°	± 180°/Sec
Shoulder	±360°	± 180°/Sec
Elbow	±360°	± 180°/Sec
Wrist 1	±360°	± 360°/Sec
Wrist 2	±360°	± 360°/Sec
Wrist 3	±360°	± 360°/Sec

Typical tool: 1 m/Sec. / 39.4 in/Sec
Reach: 500 mm / 19.7 in

T mount: ±360°, Infinite rotation on end joint
Fork Lift: Free Lift, Speed (TBD)

Chassis:

Number of Wheels: 3
Number of axles: 2
Drive: 2 Wheel