

## Robot Farmers Executive Summary

### A. Opportunity

The startup called Robot Farmers aims to address the issue of difficult farm work, the high price of grocery store produce, and worldwide hunger and starvation. Working on a farm can be very challenging. Collecting certain fruits, vegetables, berries, and other produce in a field currently seem to be collected by unlucky humans for minimum wage and less.

Since technology is supposed to make things easier, why not just have robots farm for us? Using solar powered robots capable of making precise movements, collecting many of our currently grown crops — and without damaging the item in the process — could be just around the corner. Solar powered machines, such as humanoid robots (with possibly many arms), would be able to gather crops at a fast rate and place them in containers without damaging the crop. There are a variety of sensors that could be added to the robots' limbs to determine the weight of an object, speed and force of a movement and action, color of an object, and much more.

The economic opportunities involved with solving the mundane farming processes are boundless. Robotic farming machines that specialized in farming would also likely be able to perform a variety of other tasks with a few programming adjustments (such as washing and putting away dishes). Produce farm owners would likely be interested in renting a robot that was able to perform tasks required by human farmers.

Engineers from all fields, researchers, designers, hardware designers, programmers, marketers, lawyers, part assemblers, and many more employees from other diverse backgrounds would be needed to make and positively promote a world class robotics industry.

### B. Product/Service

The product and service would include one or more rentable robots of a variety of sizes and features able to garden and farm many acre fields with minimal supervision and all relatively quickly. An excellently designed robot and its software would likely be patented unless the robots could be supervised enough to possibly maintain the technology as a trade secret.

The product/market fit for a robot with programmable/downloadable task performing capabilities is boundless for any company or individual that wants a physically repetitive task performed.

### C. Financials/Funding

A nice, full size robot that would be capable of performing the tasks I required could possibly be built with parts that exist today for about \$2,000. However, there will always be an endless combination of upgrades, downgrades, modifications, and improvements that could be made to reduce or increase the price per unit and its functionality/capability. The most expensive component would currently be the motors for each of the robot's arm and leg joints. A very cheap prototype could be made for much less than two grand using a bit of creativity. However, a very cheap electric motor will either be too noisy/squeaky/heavy/bulky/energy inefficient/jerky/inaccurate and much more. Designing a brushless electric motor that minimizes the weight, size, and power consumption while maximizing the precise movement capabilities would likely increase the initial build time and cost of the unit. However, advancements with such a motor would also likely be highly profitable if patented.

A very inexpensive/basic initial program could be created for the robot to perform exactly one task with decent precision. More time and programming would be needed to create a very nice

program that would be able to smoothly control the robots movements and provide more precision with each of its tasks.

Grants such as those from the Big Bang Business Competition and volunteers would likely be the main source of funding for this startup until at least one unit was operational.

Back in 2012, according to the USDA ( <https://usda.library.cornell.edu/concern/publications/8s45q876k?locale=en> ) California harvested 38,500 acres of strawberries, with a yield per acre ratio of 72000 pounds per acre, equating to a total production of 2.77 billion pounds of strawberries produced in a year. Strawberries are currently harvested by hand, and the news portrays many issues surrounding the topic of California's strawberry picking workforce, pay conditions, and health hazard conditions due to pesticides, herbicides, insecticides, etc.

#### D. Implementation

The vision is to create specialized robots capable of assisting American farm owners and workers with the tiring and monotonous farming practices, such as picking strawberries. A major goal and effect of this idea is to reduce to price of healthy farm-fresh fruits, vegetables, and berries for the average American, to reduce food related illnesses (such as E. coli incidents that occur when workers gather crops without washing their hands after using the restroom), and hopefully soon, eliminate hunger and starvation worldwide.

Allowing the robots to operate in a field away from human workers would minimize risk of accidental injury to employees, the robots, and the crops.

#### E. Team

Professional engineering ethics will take priority over any business interests. Second to ethics would be that this company must try to hire as many Americans as possible, with highly competitive salaries and benefits. The robotic units would need to be constantly reengineered and upgraded with high quality, long lasting components that would allow the robots to work in a variety of conditions for very extended periods of time.

With financial resources, more can be done much faster. Large prototypes can be built, a variety of electric motors can be purchased and tested as joints, and other students, volunteers, professors, and employees can be brought together to convert this startup into America's next greatest company.