• Grew up on working farm
• Love machinery and technology that does hard work people shouldn’t have to do
• Got an MBA from Harvard, then spent 4 years at CNHi working on special projects (including looking at Autonomy companies from a BD perspective)
• Founded Burro to build robots - we build a collaborative robot called Burro
Autonomy is a new market disruption in Agriculture...

...creating new markets that are underserved by existing incumbents
Why now? The perfect storm of tech advances...

- low-cost computer vision
- improving dexterity
- modular software
- low-costGPUS
- low-cost RTK GPS
- Artificial Intelligence
...Mean emerging autonomous platforms can

**Navigate Anywhere**

**Recognize Anything**

**Tackle Dexterity**
Farmers are running out of people

Wages rise on California farms. Americans still don’t want the job

Trump’s immigration crackdown is supposed to help U.S. citizens. For California farmers, it’s worsening a desperate labor shortage.

By Natale Kitroeff and Geoffrey Mohan

March 31, 2017 | Reporting from Modesto, Calif.

20% decline in number of farm workers over past decade

$14 minimum wage in 2021 and 1.5X overtime above 45 hour work week

75% of US crop workers are legal/illegal immigrants, according to the USDA
10% of US crop workers work in $115B field crops

88% work in $64B fruit, vegetable, & nursery crops

Labor costs = 24% of revenue

Labor is #1 challenge

WHERE ARE THE ROBOTS?
Known: In 20 years most labor-intensive areas will be automated

Unknown: How to win in the next 5 years?
We see a way to build a platform, beginning in agriculture

Team experienced in vision-based autonomy, with a background in industry
How to win in the next 5 years

Phase I
“People-Scale” Collaborative Robots
IN MARKET TODAY

Phase II
Crop Data
IN DEVELOPMENT

Phase III
Dexterity
3-5 YEARS

Autonomous Farming
BEGINNING WITH BURRO

- People-scale autonomous platform, built around computer vision
- Used today to help laborers harvest fruit more efficiently
- Features Pop up autonomy™, enabling anyone to operate, packaged in a modular platform designed to enable more autonomy
- 12 cameras on board producing 1TB of images/hour, and an Autonomy stack that fuses computer vision and AI with high precision GPS, to run routes autonomously
One Burro allows **6+ people to harvest up to 48% more fruit/day**, for a **1 month ROI**

<table>
<thead>
<tr>
<th>Labor Cost / Person / Day</th>
<th>People Supported / Burro</th>
<th>Typical Gains</th>
<th>Value / Day / Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>$150</td>
<td>6</td>
<td>30%</td>
<td>$270</td>
</tr>
</tbody>
</table>

*Productivity gains based off of A/B test of Burros vs. non-Burro Crews in various arrangements, in commercial use, through the 2020 harvest season*
Starting in the most labor-intensive US crops

- Burros have been in commercial use in table grapes, and in paid trials in blueberries, caneberries, and nursery crops
- Focused commercially, today, on US table grapes
  - All grown in California; hand harvested May to December
  - $3B revenue yet 50% of revenue goes to labor
  - At a tipping point with labor, driven by California regulation
  - 125K acres in US; harvesting an acre takes 70-man-days
  - US is only <10% of global production

CUSTOMERS

Overtime and Minimum Wage Regulations (California)
Racing into the Market and Towards Scale

**2017-2019**
- Company founded.
- Burros Generation 1 through 5
- 4+ months of paid pilots in 5 industries with 15+ growers.
- Utility patent filed

**2020**
- Receive 60 orders for gen 6 Burros, deliver 33% of them.
- 8 customers run Burros 6 days a week from May to November
- Capture crop data + Design gen 7
- 3.5M raised | team at 13

**2021 [Goal]**
- 25,000+ autonomous miles on Burro Gen 7 with 20+ burros/grower
- Develop crop data as a commercial feature
- Series A | team to 25+

**2022 [Goal]**
- Commercial crop data product
- Expansion into other segments and sales of platform to other autonomy companies
- Develop higher dexterity functionality

**Today**
- 7 generations of hardware
- 8,500+ autonomous miles with 20+ growers
- 15,000+ hours of autonomous operation
- 20 robots run in 2020 by 1000+ people 6 days/week
- 5+ Autonomous miles between intervention
Commercial Traction

• Partnered with the California Table Grape Commission, which represents entire US industry

• 2018 and 2019 – paid pilots over 1000 autonomous miles

• 2020 - Received orders for 60 Burros from 8 table grape growers; delivered 33% of those orders in 2020
  • 20 units ran 7500+ miles in use in 2020, across 8 different grower operations

• Now building re-order board for 2021
  • 24 unit reorder [in negotiation] – $400K+
  • 22 unit reorder [in negotiation] – $375K+
Novel approach to autonomy, past chasm of 80% to 99%+

Vision-based autonomy stack trained over 8500+ miles to travel on farm Patent-pending pop-up autonomy™ is “turn-on-and-go”, allowing anyone to operate Burros without any infrastructure

**Burro Autonomy Performance**

Chasm of 80% to 99%+ performance

- Sell-able (5+ miles / fault)
- Pilot Grade (1 mile / fault)
- Demo Grade (.1 miles / fault)
Niche Market to Collaborative Ag Platform

- Focused first on a niche, with a people-scale robot and flexible foundational autonomy, necessary for many applications
- We’ve had 25+ requests from other autonomy companies seeking to buy our platform – plan to enable this as we grow

*Sources: IDTechEx & Markets and Markets
People-Scale Collaborative Robots, Beginning In Agriculture
### Where Autonomy / Robot can work? **NOTE – Sizes have no relation to size of market**

<table>
<thead>
<tr>
<th>Field Crop – in the ground</th>
<th>Specialty Crop – in the ground</th>
<th>Tree</th>
<th>Vine/Bush</th>
<th>Nursery or Indoor structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn / Soybeans</td>
<td>Others (i.e., wheat, cotton)</td>
<td>Other</td>
<td>Apples</td>
<td>Grapes</td>
</tr>
<tr>
<td>Strawberries</td>
<td>Field vegetables and Greens</td>
<td>Citrus</td>
<td>Citrus</td>
<td>Cranberries &amp; Blueberries</td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
<td>Nuts</td>
<td>Others (i.e., Stone Fruit)</td>
<td>Others (i.e., peppers, cannabis)</td>
</tr>
</tbody>
</table>

#### Key:
- **In development**
- **In trials**
- **First paying customer**
- **2 to 10 Paying customers**
- **Scaling - 10+ customers**

#### Autonomous Movement
- <1000lbs People Scale Platforms (cargo &/or tool-carrier)
- >3000lbs Robotic tractors

#### Data
- Crop Scouting
  - *As a sub-task done - all companies using tons of data*
  - *Includes soil sampling*

#### What Autonomy / Robot does?
- Low dexterity
  - Planting / Seeding / Spraying / Fertilizing
  - Mowing
  - Other (i.e. UV Lighting, moving pots)
- High dexterity
  - Spot Spraying
  - Physical Weed Removal
  - Harvesting / Picking

#### Appendix: Autonomy in Ag Market Map