

## **Press Release**

### **Cal Poly Students Create Cattle Tracking Service**

*Cal Poly Agriculture and Engineering students develop a new, cost effective livestock sensing platform for rural ranchers in California*

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#### **Summary**

The Cal Poly College of Engineering's 'Engineering Grand Challenge' has helped a group of agriculture and engineering students develop a low-cost and easy to maintain cattle tracking and health monitor solution for remote cattle ranchers. The system is composed of low-cost sensors that track an animal's location and body temperature so ranchers can monitor the cattle throughout the year and during critical moments during the breeding and birthing season. This provides the ranches with the certainty they need to streamline operations, reduce costs, and maximize the economic benefit of their herd.

#### **Opportunity/problem**

Cattle ranchers that utilize expansive, rolling ranchlands often have difficulty keeping track of their herd and individual cattle. Tracking hundreds of cattle across hundreds of acres is a challenge for even the most sophisticated rancher. Lone bulls, pregnant 'mamma' cows, and other cattle that exhibit loner behavior can separate from the herd and move into tree or shrub covered areas making them difficult for ranchers to visually track. This often leads ranchers to lose track of cattle that may need veterinarian treatment or that are needed for mating or birthing purposes which creates operational challenges for the ranch that can lead to economic loss. Traditional cellular sensors and communication networks are expensive to purchase, install, and maintain. They also tend to be overdesigned for cattle monitoring application which can be serviced with low energy and low bandwidth sensors and relay networks. As a part of their senior project, Cal Poly students have developed a platform that mitigates all of these issues.

#### **Approach/Solution**

Using a cost effective, Low Power Wide Area Network (LPWAN) and off the shelf low cost sensors, the students created a system that allows ranchers to apply the tracking technology to each target cow by using a collar that tracks both location and body temperature. The sensor periodically sends individualized data points about each cow back over the LPWAN network via gateway devices back to the internet and the cloud which then populates a visual, map-based dashboard that provides the rancher with easy to consume insights about their herd. The data that is collected and transmitted in small periodic packets is low bandwidth and allows for a battery life of up to two years which considerably reduces the maintenance costs of the hardware. Additionally, LPWAN uses a low frequency, low bandwidth communication protocol which allows for communication distances of up to fifty miles in flat terrain. This allows most ranchers to track their animals over the entirety of their ranch. The Cal Poly student team has also developed a method to quickly and cost effectively design and install a LPWAN solution that can be adapted to a given rancher's property and performance requirements, making this technology scalable through the industry.

The students are also experimenting with artificial intelligence to better predict animal behavior to produce actionable insights that will help ranchers improve their operations and ultimately their profits. Additional development and platform integration opportunities include the implementation of soil moisture and water tank sensors with satellite imagery. This would provide ranchers with a holistic and high fidelity understanding of the health of their rangelands so they can maximize profit while managing their land sustainably. This is important given the recent and ongoing consumer trend of increasing demand for sustainable meat products as well as a rancher's legal requirement to meet the management standards of regulatory agencies like the Bureau of Land Management.

**Leader quote:**

“The students have stumbled on innovative idea that has real market potential, I’m excited to see what the market thinks of this idea.” Said Professor Chris Lupo, the Computer Science department chair.

**Customer Experience**

The installation process is simple and quick and contains only a few steps. Most ranches can be setup in about a month once we determine the customer’s herd size and the geography of their land. Our experts will go out and survey the land to see which towers will best perform given both the environment and the desired number of cattle being tracked. Once the towers are installed and a connection established, a weatherproof collar will be mounted on the cattle containing a battery pack and GPS chip. The collars are durable and the batteries are designed to last through an entire season with easily removable battery packs for rechargeability. In addition, the collars are cheap and readily replaceable or swappable between each other. The customer will then be able to digitally view their cattle on a map along with view a number of other helpful statistics and features through any computer, smartphone, or tablet by securely logging in on our application.

**Customer quote**

*“This new sensor system helps me keep track of my cattle pretty much wherever they are on my property.”* Said Gerald, a 30-year rancher whose family has been ranching their land since 1893. *“I recently had a pregnant Heifer wander off into a shrubbed area that was hard to reach. All I had to do was look at my CowTracker [product name] to see where she was. It sent me a text alert when her body heat spiked so I knew she was in labor. The vet came out and we were able to deliver the calf without losing the Heifer. That translated to money in my pocket.*

## **Customer FAQ (Gerald)**

### **Q: How is it going to help me do my job better?**

A: This will greatly reduce the time it takes you to locate your cattle and will greatly improve the response time for tending to a cow through real-time monitoring and alerts. You will know exactly when a cow begins to show behavioral or bodily signs such as temperature spike that require action to be taken.

### **Q: Do I have to take a class?**

A: You do not have to take a class. The application is intuitive and easy to use. Our tutorial explains every aspect in great detail and keeps things simple.

### **Q: What is the cost to me?**

A: The cost is X amount per tracking collar, Y amount/year for data storage, and Z amount per tower with a 10% annual maintenance fee.

### **Q: Are there privacy concerns?**

A: There are no privacy concerns since all your cattle data will be stored securely in the cloud where only those authorize will have access. Data transmission from cow to cloud will be encrypted in transit and at rest.

### **Q: Can I use this on my own phone? Do I have to use the app?**

A: You will be able to use this from any smartphone, tablet, or computer. The website is optimized for both mobile and desktop viewing. In addition there is a mobile app for convenience that adds additional functionality such as push notifications.

### **Q: Do it work if I don't have high-speed internet to my ranch?**

A: It will work with any internet speed as long as it can connect to the internet.

### **Q: How long will it take to install?**

A: It will take 1-2 days to install the collars and up to 2-4 weeks to install receiver towers depending on your desired land coverage and the geography of the land.

### **Q: What is the benefit of using it?**

A: Ranchers do not have to be physically at the ranch. The system can provide many metrics such as the cattle's location, cow land usage, the body temperature, and humidity all viewable from a computer, tablet or mobile device. With such information, the rancher can save time and always be connected to individual cattle.

### **Q: Who else is using this? Has it saved them money?**

A: Cal Poly has been using it. They earned money by helping mother cow to give birth to baby cow safely after getting notified by the application indicating one of the cows has high body temperature.

### **Q: What happens if the system breaks? Is there a warranty?**

A: There will be 2 year warranty, Refer to our terms and agreement regarding the warranty.

### **Q: What is the cost per animal? Should I put it on my whole heard?**

A: Cost per animal would be around 40 dollars. It would be best to put it on the whole heard.

### **Q: How often is the app updated?**

A: Web application has updates every 2 months or so to improve on security and stability.

### **Q: Do I have to get a permit?**

A: No.