



# How to Leverage Data to Build Custom Apps

Webinar, 3/23/2022

# Speakers



**Jeff Linnell**  
Founder & CEO  
Formant



**Eugene Demaitre**  
Editor  
Robotics 24/7



# Changing Robotics Landscape



Device channel default view

numeric graph

battery

96% Charge

232.05

132.06

image

image

list.item

json

```

{
  "glossary": {
    "title": "example glossary",
    "GlossDiv": {
      "title": "G",
      "GlossList": {
        "GlossEntry": {
          "id": "Glossary",
          "sort": "Glossary"
        }
      }
    }
  }
}

```

image

transform.tree

localization

localization

MONTHS SPEED 1X SEEK DATA

WED, JULY 24, 2025 12:45:02 am

device.01

battery

45% Charge

53.1V Voltage

3.3A Current

STOP START STOP

CPU 20% MEMORY 10% BATTERY 45% FOCUS 0.00m

TARGET

48 45 243 177

52.674

43.40

Flareport

LOG IN

OVERVIEW

3213 52

184 27





# Formant Live Product Demo

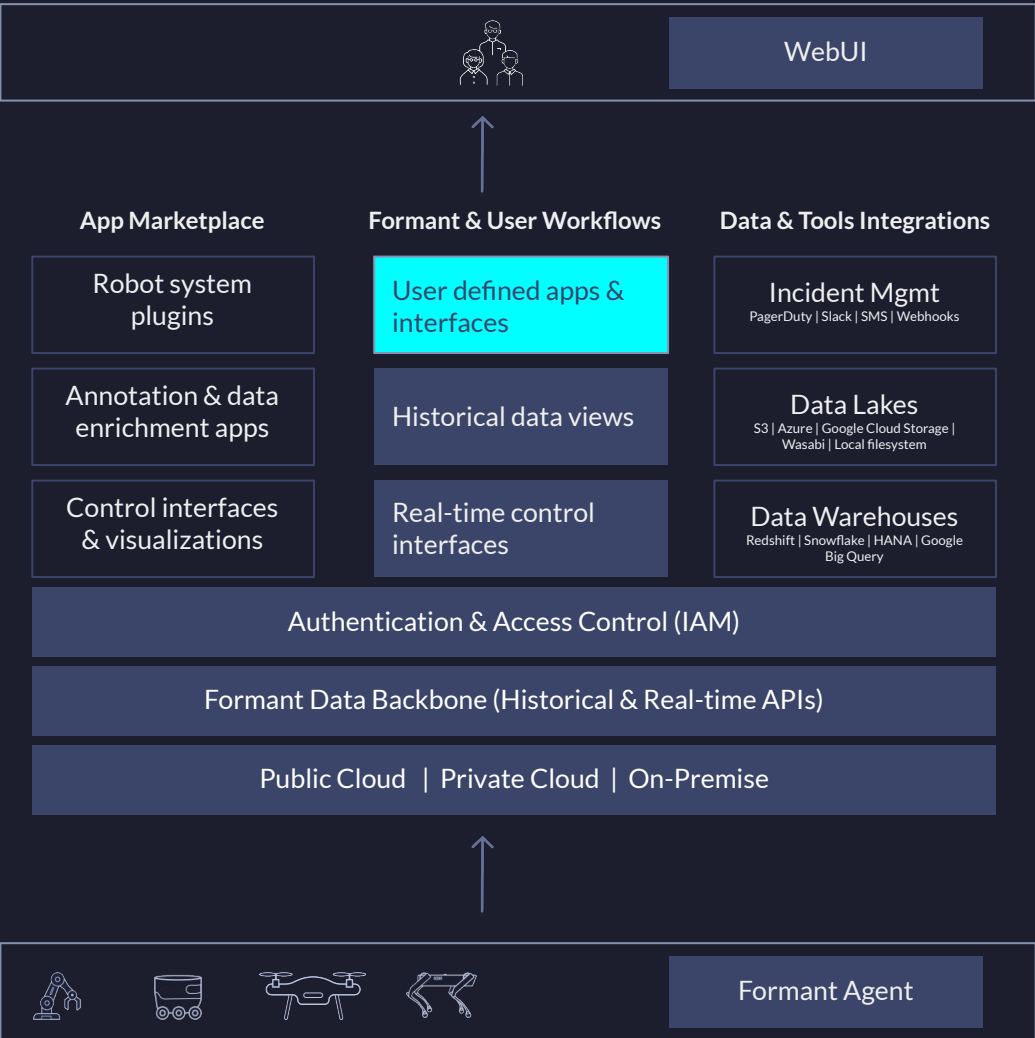
The screenshot displays the Formant Live Product Demo interface, which is a dashboard for monitoring a robot's performance. The interface is divided into several sections:

- Top Left:** A video feed from the robot's perspective, labeled "spot.observation.cam". The robot is a yellow and black quadruped robot in a warehouse setting.
- Top Right:** A control panel with a hamburger menu, the text "Formant spot.003 default view", and a notification bell icon with the number "85".
- Middle Row:**
  - bits:** A panel showing the status of various modes: "Vegan", "GF", "Autonomous", and "Manual". Each mode has a corresponding indicator.
  - fsdp.bitset.2:** A panel showing the status of keys: "key.0", "key.1", "key.2", and "key.3".
  - joint.1.position, joint.2.position, joint.3.position:** Three panels showing line graphs of joint positions over time, with a timestamp of "10:00:00 am".
- Bottom Row:**
  - lidar.reduced:** A panel showing a 3D point cloud visualization of the robot's environment.
  - fsdp.numeric.1:** Two panels showing line graphs of numeric data over time, with a timestamp of "10:00:00 am".
  - job.lot:** A panel showing a top-down view of the robot's path in a warehouse.
  - cpature:** A panel showing a first-person view of the robot's camera.
  - connex.field, connex.travel:** Two panels showing scatter plots of connection data over time.
- Bottom Bar:** A navigation bar with "MONTHS", "SPEED 1X", and "SEEK DATA" buttons. A central play button is visible. The bottom right corner shows the date and time: "WED, JULY 26, 2023 12:45:02 am" and a "LIVE" button.

# General vs Custom Functionality

- We spend our efforts on high value **Generalizable** functionality
- We rely on Experts to add functionality whenever possible
- It is critical to make platform extension and modification simple and FAST for roboticists

# Formant Architecture



## Examples (Extensions to Full Applications)

- 1 Electric Sheep: Customization of Formant's modules by customer. Leveraging UX toolkits
- 2 Bitwise Agronomy: Providing a 3rd party service offering within Formant's data platform.
- 3 PickNik: Full custom application embedded along side Formant's standard workflows

Lightweight



Full application



# Example: Electric Sheep Robotics

- Scaling RaaS company looking for application-specific modules for managing customer devices
- Customer-built custom modules built on Formant's infrastructure using pre-built UI components
- What would have taken weeks took hours



# Formant: Standard Modules

spot.green glitch.all

front.video tf state.movement.mode state.battery.status

walk sit stairs pose ptz dancing

unknown missing charging discharging booting

CPU 19% utilization 1.71 load avg. 1 min

Memory 4% utilization 32.3 GB available

Disk 4% utilization 454 GB available

Battery 88% Charged 55 V Voltage -4.02 A Current

Network 1.79 Mbps transmit 0.295 Mbps receive

power.state.json

state.battery.temperature

6:45 pm 6:46 pm 6:47 pm 6:48 pm 6:49 pm 6:50 pm 6:51 pm 6:52 pm 6:53 pm 6:54 pm 6:55 pm 6:56 pm 6:57 pm 6:58 pm 6:59 pm 7:00 pm 7:01 pm 7:02


1 MIN SPEED 1X COMMENTS

Nov 14, 2020 06:53:23 pm LIVE

# Electric Sheep: Custom Modules

Astro Electric Sheep

front.video.1



Mission Status

- On Track
- 80% Completion
- 47min Time Elapse
- 13min Time Remaining
- 50% Battery

ROS Diagnostics

Section	Name	Type	Hz
navigation	/formant/Ingest	std_msgs/Int32	0
	/rosout	rosgraph_msgs/Log	0
Info	/formant/command	std_msgs/String	0
	/tf	unknown	0
	/rosout_agg	rosgraph_msgs/Log	0
	/msa_dummy_data	std_msgs/String	10
	/auto_manual_status	std_msgs/Bool	10

Stack Light Status

Stack Light Status: [Red] [Yellow] [Green]

Maintenance

- Last service: Monday, March 14. Next service: by 3 day(s) ago. Blade sharpening. [Mark Complete](#)
- Last service: Monday, March 14. Next service: by 3 day(s) ago. Oil change. [Mark Complete](#)
- Last service: Monday, March 14. Next service: by 3 day(s) ago. Oil filter change. [Mark Complete](#)
- Last service: Monday, March 14. Next service: by 3 day(s) ago. Air filter. [Mark Complete](#)
- Last service: Monday, March 14. Next service: by 3 day(s) ago. Cleaning / Powerwash. [Mark Complete](#)

Debug

Item	Status
Deadman Handle status	-
Autonomy	-
Blade	-
Left RPM	-

Nodes Online

Nodes

- /formant\_bridge\_node ✓
- /ros\_diagnostics\_collector ✓
- /rosout ✓
- /world\_broadcaster ✓

Home Orientation

20M

Docker Image

9:56:6 am  
V1.4.06\*

[Update](#)

9:47 am 9:48 am 9:49 am 9:50 am 9:51 am 9:52 am 9:53 am 9:54 am 9:55 am 9:56 am 9:57 am 9:58 am 9:59 am 10:00 am 10:01 am 10:02 am 10:03 am 10:04 am 10:05 am

1 MIN SPEED 1X DATA PRESENCE

Mar 22, 2023 09:56:06 am LIVE

# Electric Sheep: Custom Modules

The interface is divided into several panels:

- Debug:** A table with columns 'Item' and 'Status'.

Item	Status
Deadman Handle status	Engaged
Autonomy	Enable
Blade	Engaged
RPM	60
N6 gear shift status	Gear 1
Voltage	60
- Stack Light Status:** Two instances showing a row of three colored circles (purple, grey, green) and another instance showing a row of three colored circles (pink, yellow, green).
- Mission Status:** A vertical stack of progress indicators:
  - On Track (with a green checkmark)
  - 20% Completion (with a blue progress ring)
  - 20min Time Elapse (with a blue progress ring)
  - 80min Time Remaining (with a blue progress ring)
  - 50% Battery (with a blue progress ring)
- Maintenance:** A list of maintenance tasks with their last service date, next service interval, and a 'Mark Complete' button.

Task	Last service	Next service	Action
Blade sharpening	Saturday, March 19	in 3 day(s)	Mark Complete
Oil change	Saturday, March 19	in 3 day(s)	Mark Complete
Oil filter change	Wednesday, March 23	in 5 day(s)	Mark Complete
Air filter	Wednesday, March 23	in 5 day(s)	Mark Complete
Cleaning / Powerwash	Wednesday, March 23	in 5 day(s)	Mark Complete
- Commands:** A row of five buttons: 'Override Sick Safety', 'Reset Sick', 'Switch safety Fields', 'Reset All', and 'Autocalibrate'.



# Electric Sheep: Backend



User Management



Time Series Database



Authentication



Robust Command Queue



Agent ROS Bridge



Realtime / Historic Data pipes

Stack Light Status ...

Stack Light Status



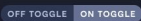
# Front End Component Library

## inputs

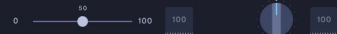
### TOGGLES



### PRESSED TOGGLES



### SLIDERS



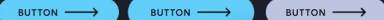
### KNOB



### CHECKBOX

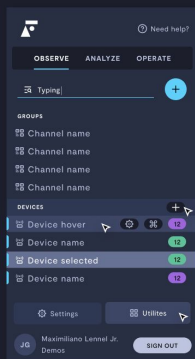
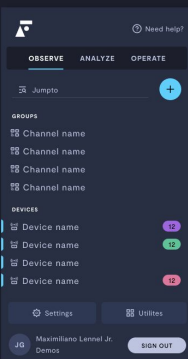


### RADIO BUTTONS

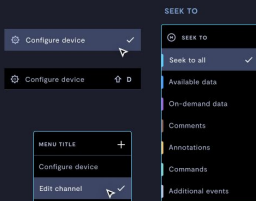
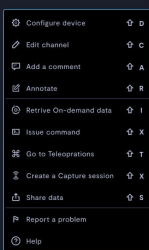


## menus and navigation

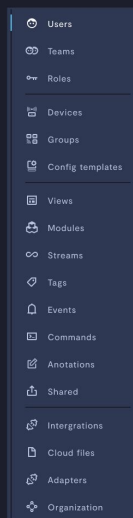
### MENU



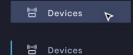
### SUB MENU



### SETTING MENU

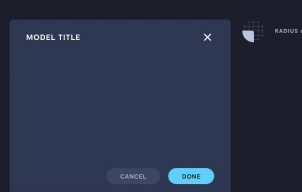


### HOVER AND SELECTED

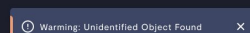


## models and helpers

### MODELS



### EVENT ALERT



### USER PIC



### DETERMINE LOADER



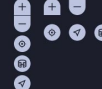
### INDETERMINATE LOADER



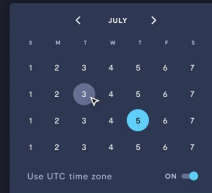
### DEVICE BEACON



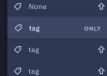
### MAP CONTROLS



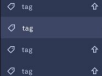
### DATE SELECTOR



### TAG TITLE



### TAG

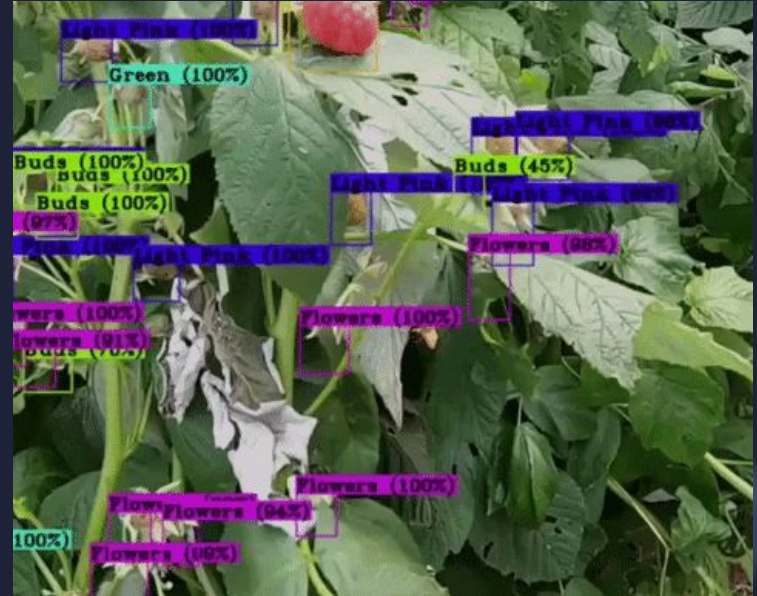


### TOOL TIPS



## Example 2: Bitwise Agronomy

- Agriculture-specific machine learning company focused on precise analytics and actionable insights for grapes and berries
- Partner-developed solution involving seamless data export, analysis, and (re)ingestion.
- Embedded BI tool within Formant to provide contextual analysis to end users.

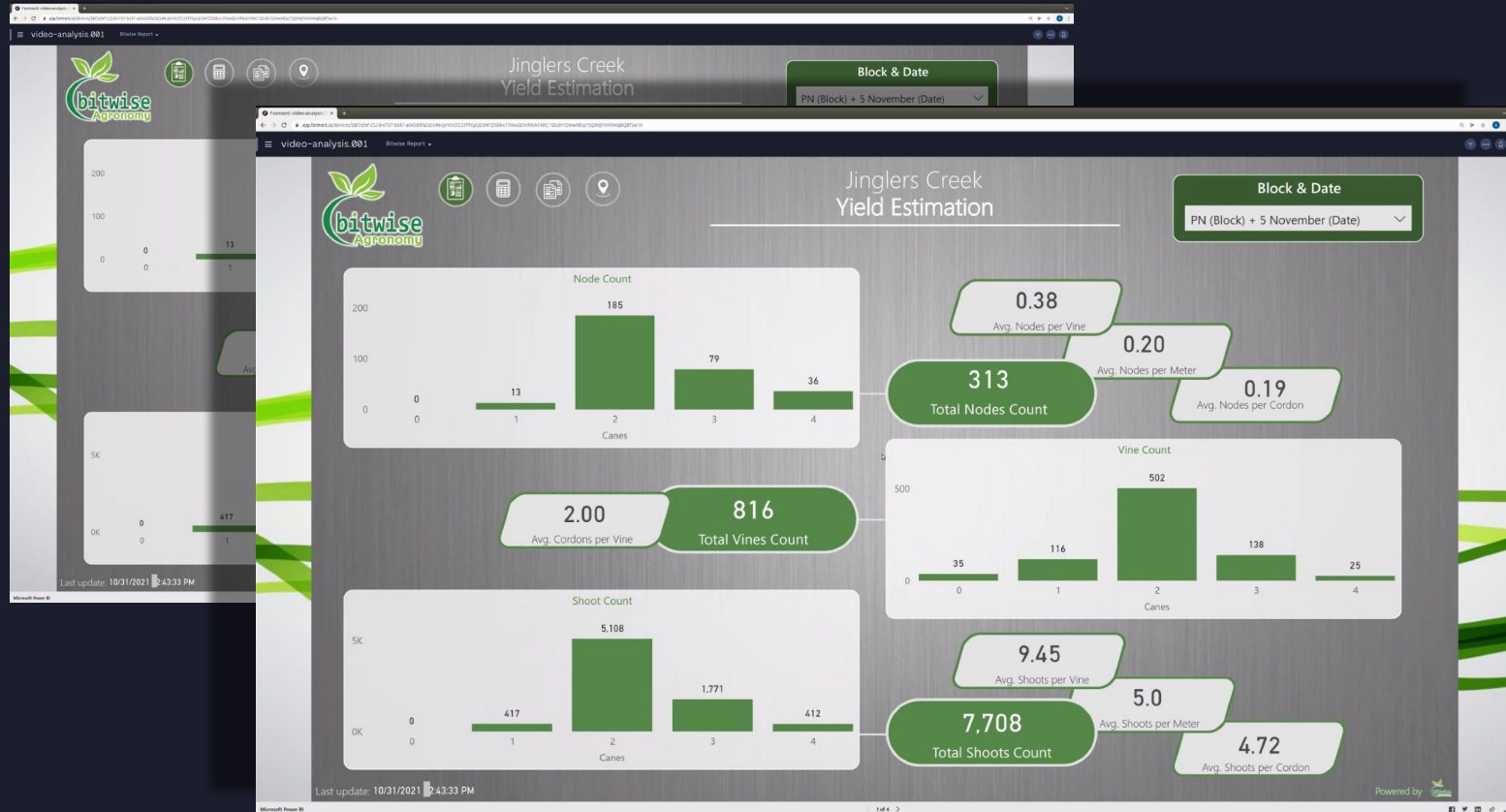


# Bitwise: Telemetry Processing



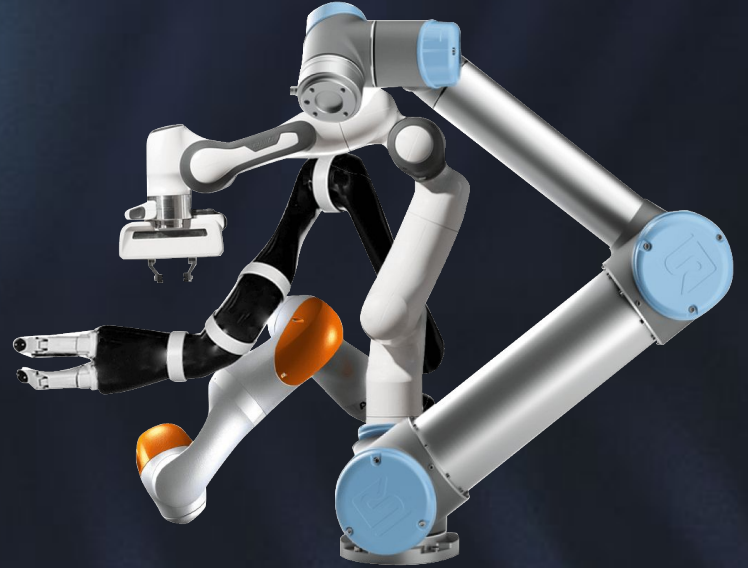


# Bitwise: Embedded BI Tool

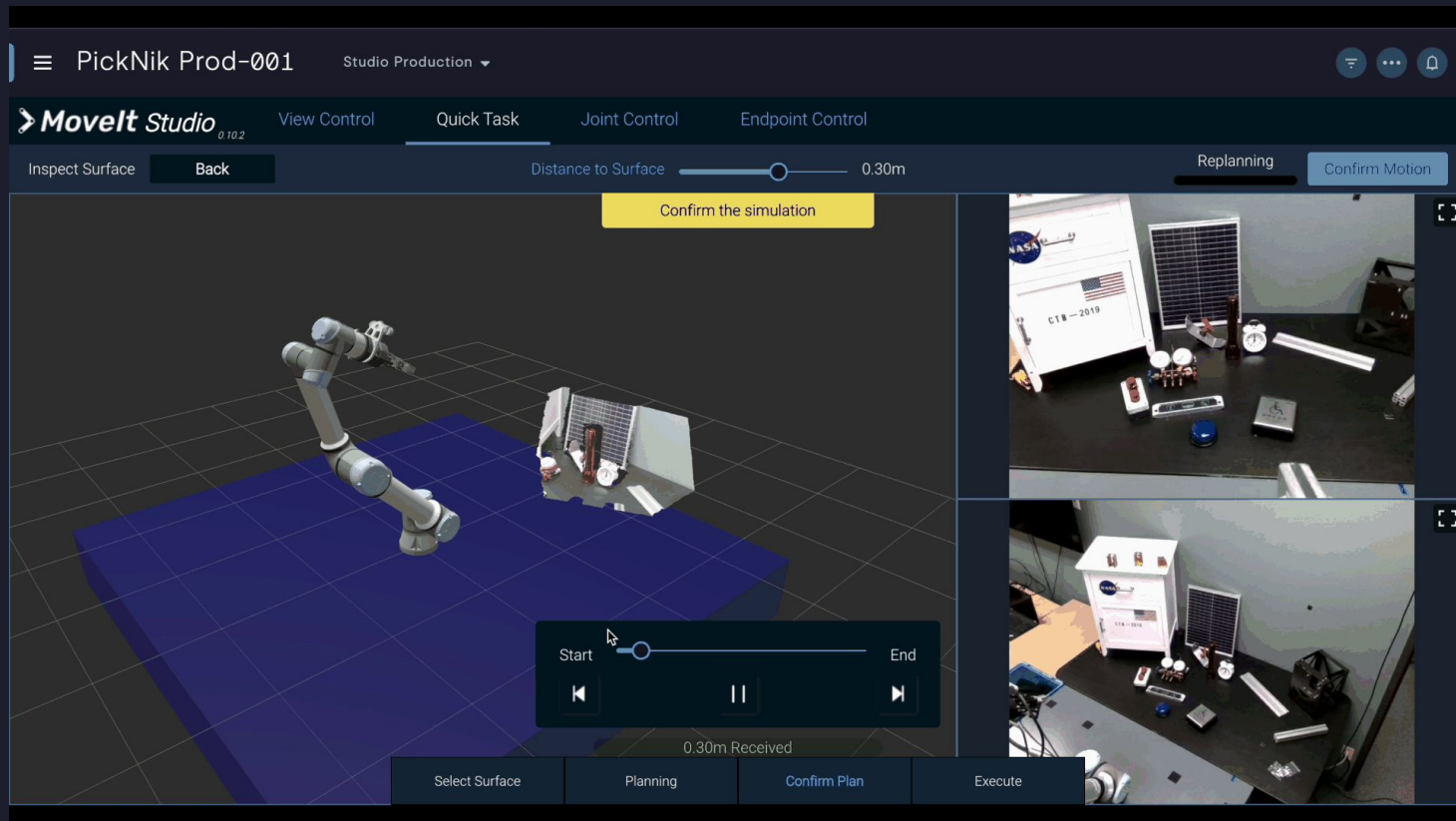


# Example 3: PickNik

- Industry leading open source robot arm IK Solver (MoveIt)
- Entire application built inside Formant leveraging backend services and realtime connections
- Collaborative go-to-market via Formant's marketplace



# PickNik: Complete Application in Formant



## PickNik: Complete Application in Formant





# Recap: Three cases of platform extension



## Electric Sheep: Component Level

- Components built with formant services and SDK's
- Heavy utilization of UX Library
- Very rapid development

## Bitwise Agronomy: Hybrid extension

- Using formant as data pipes to THEIR service
- Using Formant for authentication, user management and presentation layer
- Greatly expanding their core offering by providing Formant's mission lookback

## PickNik: Full Application Level

- A fully customized frontend application for advanced manipulation
- Heavy utilization of realtime data channels
- Enterprise grade security and functionality out of the box

# Thank You!



*Learn more and get a demo at [formant.io](https://formant.io).*

**Q&A**

# Further Reading

## Featured Customers/Partners

- [Electric Sheep Robotics](#)
- [Bitwise Agronomy](#)
- [PickNik Robotics](#)

## Formant

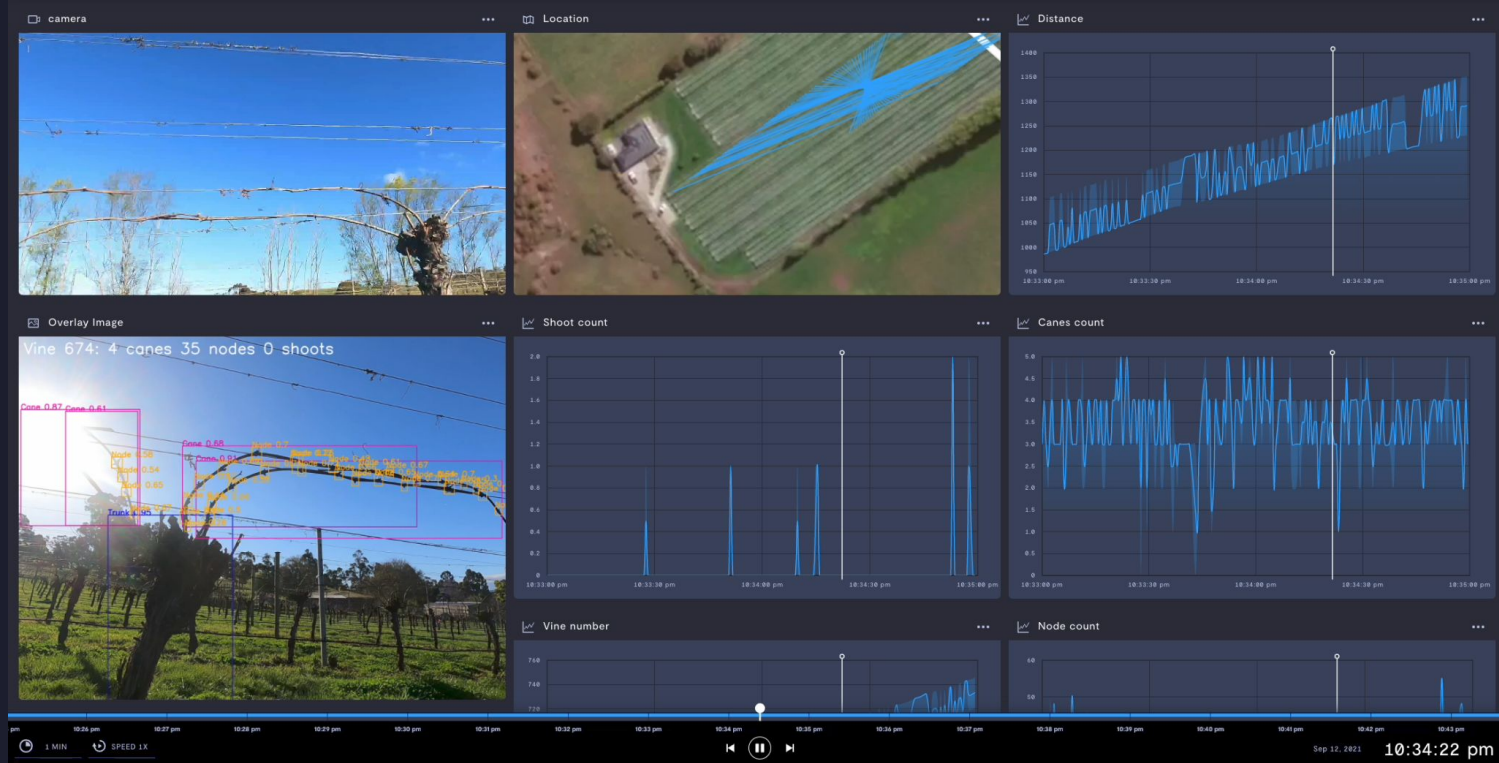
- [Get Started](#)
- [Formant Docs](#)
- [Formant on GitHub](#)





# Appendix

# Bitwise: Telemetry Processing



# PickNik: Complete Application in Formant

The screenshot displays the Movelt Studio interface for a robotic application named "PickNik Prod-001". The interface is organized into several sections:

- Header:** Shows the application name "PickNik Prod-001" and the environment "Studio Production".
- Navigation:** Includes a "Push Button" and a "Back" button on the left, and a "Confirm Plan" button on the right.
- Main View:** A large 3D visualization of a robotic arm in a simulated environment. A yellow banner at the top of this view reads "Confirm the motion to execute".
- Control Panel:** Located at the bottom, it features a "Start" button, a progress slider, and an "End" button. Below the slider are play, pause, and stop icons.
- Bottom Bar:** A sequence of buttons: "Select Button", "Plan", "Confirm Plan" (highlighted in blue), and "Execute".
- Right Panel:** Two camera views of the physical environment. The top view shows a top-down perspective of a table with a blue robot and a "PROBE" label. The bottom view shows a side-angle perspective of the robot and a control panel.

# PickNik: Complete Application in Formant

MoveIt Studio

View Control Quick Tasks Endpoint Control Joint Control

Click on the image to select the object you want to pick

Confirm Cancel

/wrist\_mounted\_camera/color/image\_raw

/scene\_camera/color/image\_raw

Pick Object

Quick Task: Move To Pose

Open Behavior Tree