



# Accessible Autonomous Vehicle In City of Angeles



**Bill Tsuei, CPA, PMP, CSM**  
Director of Information Technology

**access**



# Access Services – Los Angeles

Access Services, a CA state legislated public entity, is the Los Angeles County Consolidated Transportation Services Agency (“CTSA”) and administers the Los Angeles County Coordinated Paratransit Plan (“Plan”) on behalf of the County’s 46 public fixed route operators (i.e., bus and rail). Based on the Americans with Disabilities Act of 1990, Access is offering next day services on demand curb-to-curb shared ride services to our riders.

## Reference Statistics:

- 868 agency owned vehicles + 2000+ contracting vehicles
- Service area over 1,950 square miles.
- 3.7 million trips per year (approximately 14,000 trip on weekday)
- 163,000+ qualified ADA riders
- Annual budget of \$268 million USD
- 2<sup>nd</sup> largest independent public paratransit agency
- Top 30 public transit agency in US
- Funding sources
  - Proposition C State Sales Tax
  - Measure M State Sales Tax
  - Federal 5310 grants
  - Fare box revenue

**access**





# AAV Pilot Overview

Access AAV project focus on seniors and ADA Riders with practicality and accessibility in mind. Three focus areas:

1. Purpose-Built Accessible Autonomous Vehicle
2. Human Machine Interfaces (HMI)
3. Operational Safety

**access**



# Purpose-Built AAV

- FTA Transit Bus Automation Strategic Partnership
- Partnered with Lilee Systems in San Jose & Sunset Vans in Corona, California
- AAV was built in October 2021
- Vehicle is FMVSS, ADA, Buy America Compliance and Altoona tested
- Vehicle roadshows/demonstrations:
  - October 2021: CalAct Fall Conference
  - November 2021: APTA EXPO
  - January 2022: CES
  - February 2022: Los Angeles Regional Demo
  - March 2023: Rancho Las Amigos National Rehabilitation Center



access



# Vehicle In Progress Photos



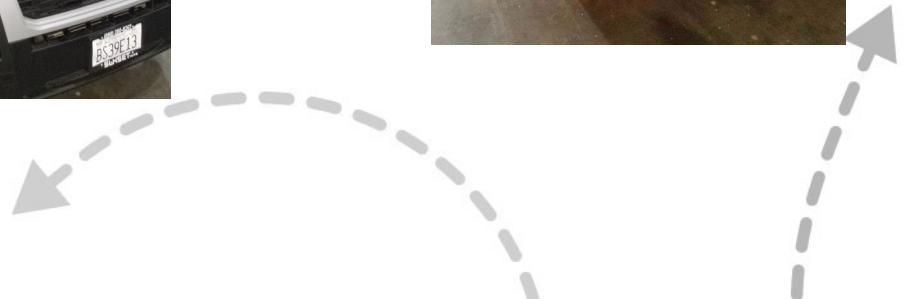
access



# Vehicle Photos



access



# Vehicle Photos



access



# AAV - HMI

- Partnered with Lilee Systems in San Jose, CA, IT Curves in Gaithersburg, MD
- In-vehicle Hardware: BLE Beacon, WiFi, GPS, HD Cameras, Display & Voice Communication
- Rider Software: Account Based Smart Mobile App based on WMR launched in 2016

## Major Functions:

- Mobile Ticket/eWallet
- Trip Planner
- Mobile Reservation
- Wayside guidance
- Driver Communication

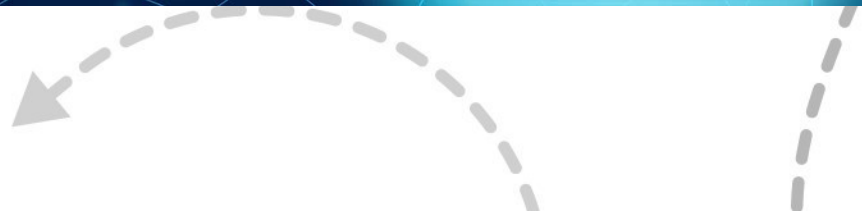


access

# AAV - HMI

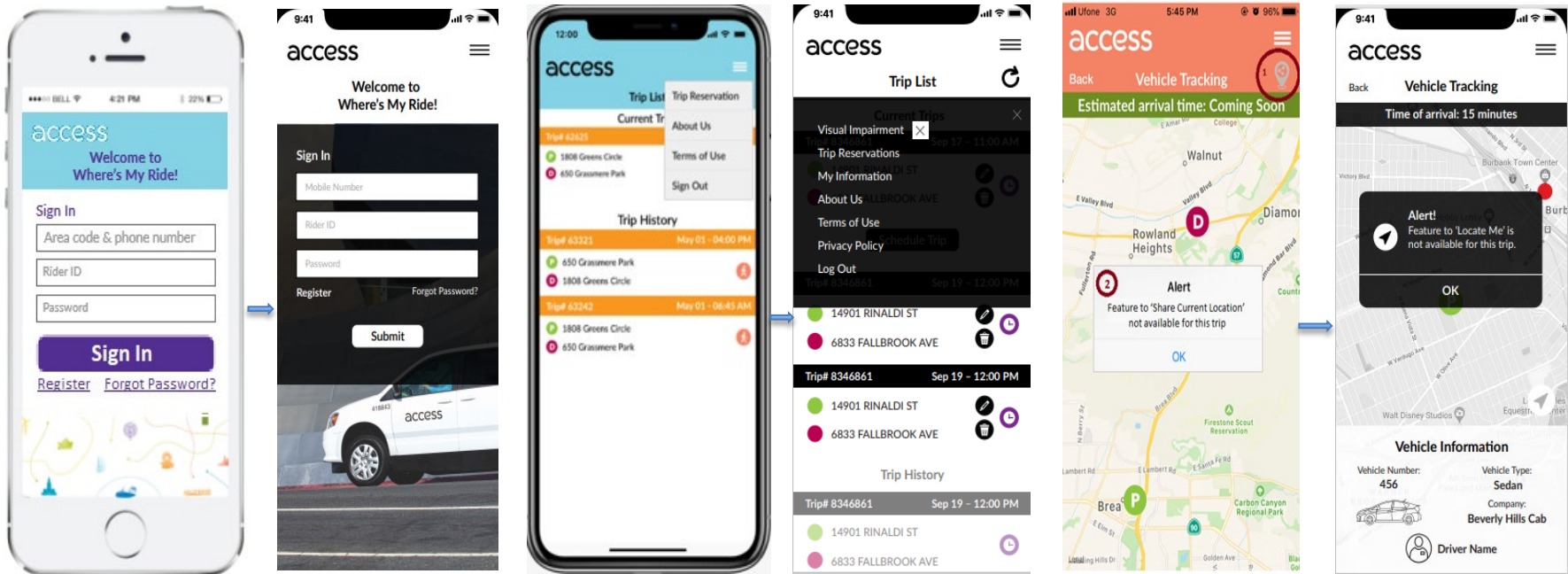


access



# AAV - HMI

WMR focuses on assistive technologies and is compliant with WCAG & Section 508 requirements



access



# Operational Safety

- Partnered with Lilee Systems in San Jose, CA
- Vehicle Safety
  - SAE Level 4 autonomy
  - Cyber Defense: Centralize vehicle connectivity, include telematics, with VLAN & subnet
  - SafeRide - Real Time Vehicle Status Monitoring System
    - ODB II codes
    - On Board visualization
    - Low latency 4G/5G multi-carrier connectivity
    - Vehicle intervention capability
- 7/24/365 Operational Control Center
  - Same concept as rail operational control center
  - Vehicle remote control capability
  - Remote voice communication

**access**



# Operational Safety

**LILEE SYSTEMS**  
Lilee Autonomous Bus OCC

george.cho@lileesystems.com  
Administrator

Bus: **Taini\_AV\_Test01**

Refresh Rate: 30 s

Time Range: Last 5 minutes

Pin Your Widget:

- HD-MAP
- Camera
- Camera (Front)
- Camera (Back)
- Camera (Cockpit)
- Chart
- NDT Score
- IMU-X

Vehicle Status: **Vehicle Center** ✓, **Scheduled Route**

Coordinates: **23.112243, 120.266572**

Map: Shows vehicle location on a street map with a blue route line.

NDT SCORE Chart:

Time	Score
09:59:30	12
10:00:00	16
10:00:30	12
10:01:00	12
10:01:30	14
10:02:00	14
10:02:30	18
10:03:00	18
10:03:30	14
10:04:00	14

IMU-X (RAD/s) Chart:

Time	Score
09:59:30	12
10:00:00	16
10:00:30	12
10:01:00	12
10:01:30	14
10:02:00	14
10:02:30	18
10:03:00	18
10:03:30	14
10:04:00	14

Real-time View: 24.33 MPH, Steering Angle 23.2°, 1020 RPM

Trip Database | Repository | Billing | Meal Delivery | Import Data Validation | Report

ASI | Thomas

**Trip Detail**

Trip ID	Provider	Reservation #	Status	Due Time	Client ID	Client Name	Space
66843012	MV	11201902	COMPLETED	09/29/2021 08:06	1042489	Chantansvi	AMB

CDL Table:

CDL	Driver Name	Badge	Prov Veh #
E0780765	Jan Ingram	619040	116212

Booking Table:

Type	Trip Type	Attribute	CX	BTC	Pass.	PCA	Free	Paid
STANDING	REGULAR	ERA	-1		1	0	0	0

Passenger Table:

Category	Amount	Miles	Debit
REGULAR	2.75	14.70	0.00

Map: Shows the trip route on a map with various markers for stops and fences.

Day of Service Table:

Emp	Reported	Per GPS	Flag
Due	08:06		
Arrival	08:21	08:21	On Time
PU	08:21		
DO	09:35	09:35	
NS			

Requesting and Dispatch Table:

Requested	Emp	Time
		07:50
1st Offer		08:06
2nd Offer		
Created	20169	11:10
Dispatch		06:42

IMU-X (RAD/s) Chart:

Time	Score
11:08 am	0.0
11:09 am	0.8
11:10 am	0.0
11:11 am	-0.4
11:12 am	0.0
11:13 am	0.0
11:14 am	0.0
11:15 am	0.0
11:16 am	0.0
11:17 am	0.0
11:18 am	0.0
11:19 am	0.0
11:20 am	0.0
11:21 am	0.0
11:22 am	0.0
11:23 am	0.0
11:24 am	0.0
11:25 am	0.0
11:26 am	0.0
11:27 am	0.0
11:28 am	0.0
11:29 am	0.0
11:30 am	0.0
11:31 am	0.0
11:32 am	0.0
11:33 am	0.0
11:34 am	0.0
11:35 am	0.0
11:36 am	0.0
11:37 am	0.0
11:38 am	0.0
11:39 am	0.0
11:40 am	0.0
11:41 am	0.0
11:42 am	0.0
11:43 am	0.0
11:44 am	0.0
11:45 am	0.0
11:46 am	0.0
11:47 am	0.0
11:48 am	0.0
11:49 am	0.0
11:50 am	0.0
11:51 am	0.0
11:52 am	0.0
11:53 am	0.0
11:54 am	0.0
11:55 am	0.0
11:56 am	0.0
11:57 am	0.0
11:58 am	0.0
11:59 am	0.0
12:00 am	0.0

OCV-Test Vehicle (MAU-Y (RAD/s)) Chart:

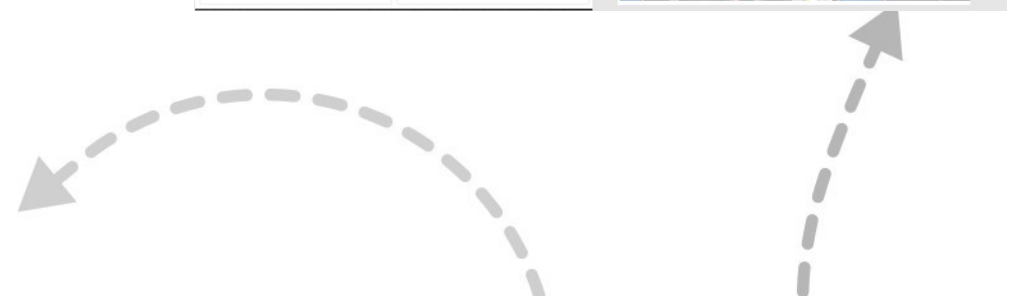
Time	Score
11:08 am	0.0
11:09 am	0.8
11:10 am	0.0
11:11 am	-0.4
11:12 am	0.0
11:13 am	0.0
11:14 am	0.0
11:15 am	0.0
11:16 am	0.0
11:17 am	0.0
11:18 am	0.0
11:19 am	0.0
11:20 am	0.0
11:21 am	0.0
11:22 am	0.0
11:23 am	0.0
11:24 am	0.0
11:25 am	0.0
11:26 am	0.0
11:27 am	0.0
11:28 am	0.0
11:29 am	0.0
11:30 am	0.0
11:31 am	0.0
11:32 am	0.0
11:33 am	0.0
11:34 am	0.0
11:35 am	0.0
11:36 am	0.0
11:37 am	0.0
11:38 am	0.0
11:39 am	0.0
11:40 am	0.0
11:41 am	0.0
11:42 am	0.0
11:43 am	0.0
11:44 am	0.0
11:45 am	0.0
11:46 am	0.0
11:47 am	0.0
11:48 am	0.0
11:49 am	0.0
11:50 am	0.0
11:51 am	0.0
11:52 am	0.0
11:53 am	0.0
11:54 am	0.0
11:55 am	0.0
11:56 am	0.0
11:57 am	0.0
11:58 am	0.0
11:59 am	0.0
12:00 am	0.0

OCV-Test Vehicle (MAU-ROLL (RAD/s)) Chart:

Time	Score
11:08 am	0.0
11:09 am	0.8
11:10 am	0.0
11:11 am	-0.4
11:12 am	0.0
11:13 am	0.0
11:14 am	0.0
11:15 am	0.0
11:16 am	0.0
11:17 am	0.0
11:18 am	0.0
11:19 am	0.0
11:20 am	0.0
11:21 am	0.0
11:22 am	0.0
11:23 am	0.0
11:24 am	0.0
11:25 am	0.0
11:26 am	0.0
11:27 am	0.0
11:28 am	0.0
11:29 am	0.0
11:30 am	0.0
11:31 am	0.0
11:32 am	0.0
11:33 am	0.0
11:34 am	0.0
11:35 am	0.0
11:36 am	0.0
11:37 am	0.0
11:38 am	0.0
11:39 am	0.0
11:40 am	0.0
11:41 am	0.0
11:42 am	0.0
11:43 am	0.0
11:44 am	0.0
11:45 am	0.0
11:46 am	0.0
11:47 am	0.0
11:48 am	0.0
11:49 am	0.0
11:50 am	0.0
11:51 am	0.0
11:52 am	0.0
11:53 am	0.0
11:54 am	0.0
11:55 am	0.0
11:56 am	0.0
11:57 am	0.0
11:58 am	0.0
11:59 am	0.0
12:00 am	0.0

Camera Views: Includes Cockpit view and external views of the bus.

access



# Next Steps

- Funding Sources
- Infrastructure Readiness
- Labor Acceptance
- Rider Confidence
- Cost Per Vehicle
- Cyber Security
- Liability
- Politics

**access**



# Next Steps

- In-Vehicle Unified Communication Systems
- Electric AAV
- Automated Wheelchair Securement
- Automated Ramp Deployment
- Advanced HMI

**access**



# Contact

Bill Tsuei  
Director of Information Technology  
Access Services  
[tsuei@accessla.org](mailto:tsuei@accessla.org)  
213-270-6116

**access**

