

INTELLIGENT TRANSPORTATION SYSTEMS

Research Project – Evaluation Of Real Time
Technology In Portland Streetcar

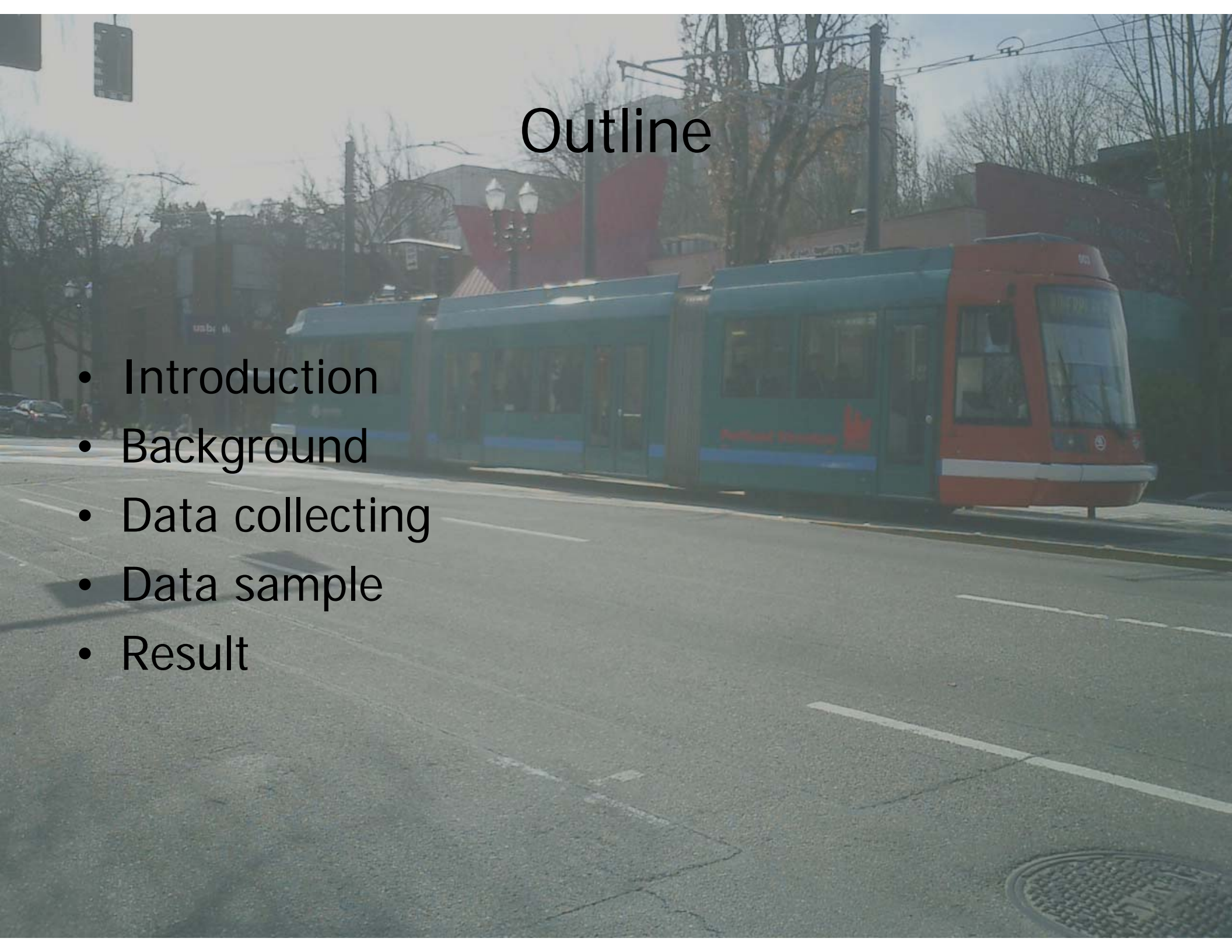
PSU CE 455

Hiu Sui Ng

Winter 2006

Outline

- Introduction
- Background
- Data collecting
- Data sample
- Result



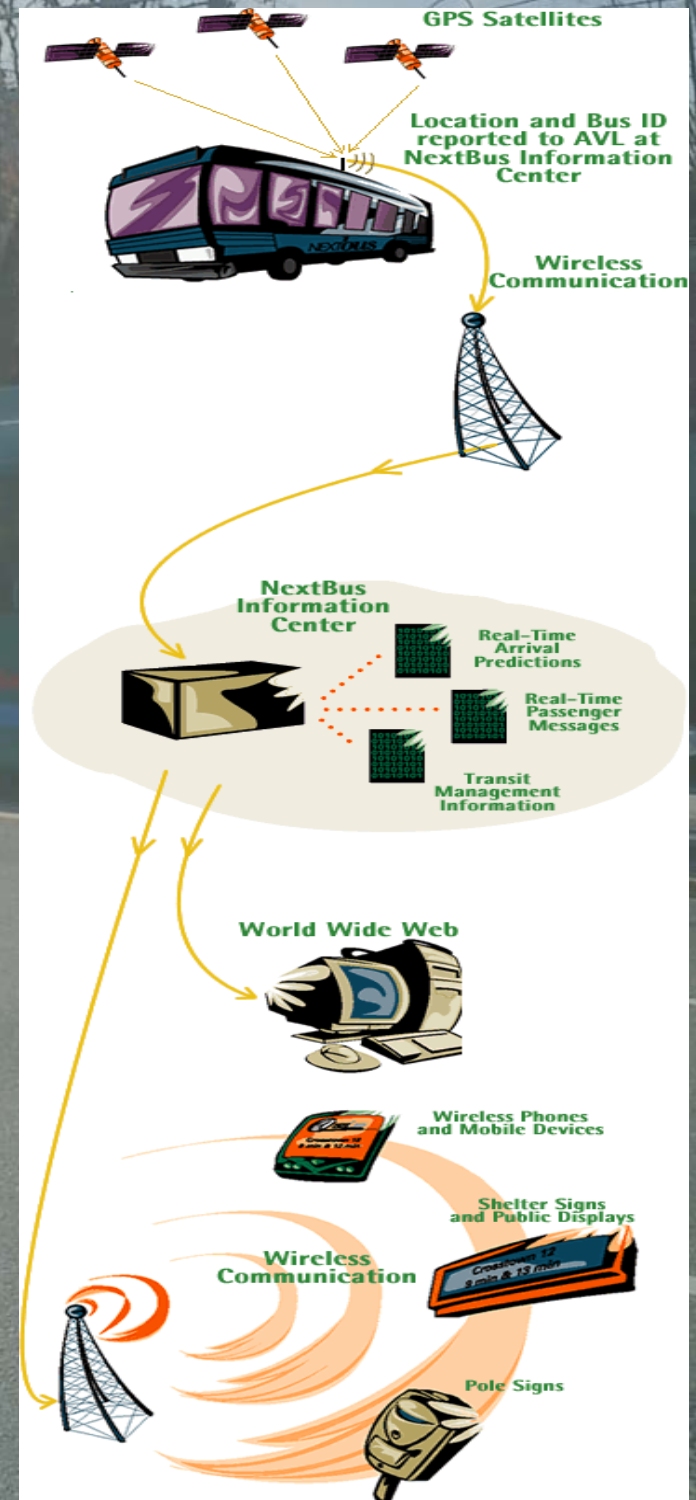
Introduction

Evaluate the existing “Real Time” technology by

- World Wide Web vs. Sign at bus shelters
- Sign at bus shelters vs. Actual arrival time
- Actual arrival time vs. Printed schedule

How "Real Time" technology works?

- GPS installed on streetcar
- AVL picked up location
- Distributed to web and sign by wireless communication



Collecting Data

A blue and red tram is stopped on a city street. The tram has a blue upper body and a red lower body. The street is paved with asphalt and has white lane markings. In the background, there are trees and buildings. The sky is overcast.

- Nextbus.com
- Sign at selected bus shelters
- Actual arrival time
- Printed schedule
- Number of customers

World Wide Web

NEXTbus

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- Wireless Access
- cool My NextBus (Web Alerts)
- ADA Website
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Specify stop to obtain the arrival time for the next vehicle:

- 1 State:
- 2 Agency:
- 3 Route/Line:
- 4 Direction:
- 5 From Stop:



agency website



live map



Google map!

Transit Schedule

Embarcadero 3:37 4:21
Montgomery 3:38 4:22
Powell St. 3:41 4:24
Civic Center 3:43 4:25
Van Ness 3:45 4:27
schedule

Next vehicles arrive in:

5 minutes
19 minutes
32 minutes
46 minutes

Valid as of 6:19 PM Friday, March 10

Bookmark this stop ?

Bus Shelter

- Predicted time
- Printed schedules
- Number of customers



Data Sample

Location	SW Park at Mill						
Direction	To NW 23rd and Marshall						
Time	12:40 PM						
Weather	Sunny						
Date	Monday	1/23/2006					
	Time Display in Shelter (min)		Time Display in NEXTBUS.COM (min)				
Recorded Time	1st Next Car	2nd Next Car	1st Next Car	2nd Next Car	Actual Arrival Time	Printed Schedule	# of Customers
12:41 PM	10	23	10	23	12:53	12:53	15
12:46 PM	5	18	5	18	12:53	12:53	
12:51 PM	1	13	1	13	12:53	12:53	
12:54 PM	10	23	10	23	13:05	13:06	7
1:00 PM	4	17	4	17	13:05	13:06	
1:04 PM	1	13	1	13	13:05	13:06	
1:07 PM	10	23	10	23	13:18	13:19	10
1:11 PM	6	19	6	19	13:18	13:19	
1:15 PM	2	15	2	15	13:18	13:19	
1:20 PM	10	23	10	23	13:31	13:32	6
1:26 PM	4	17	4	17	13:31	13:32	
1:28 PM	2	15	2	15	13:31	13:32	
1:33 PM	10	23	10	23	13:45	13:45	12
1:35 PM	8	21	8	21	13:45	13:45	

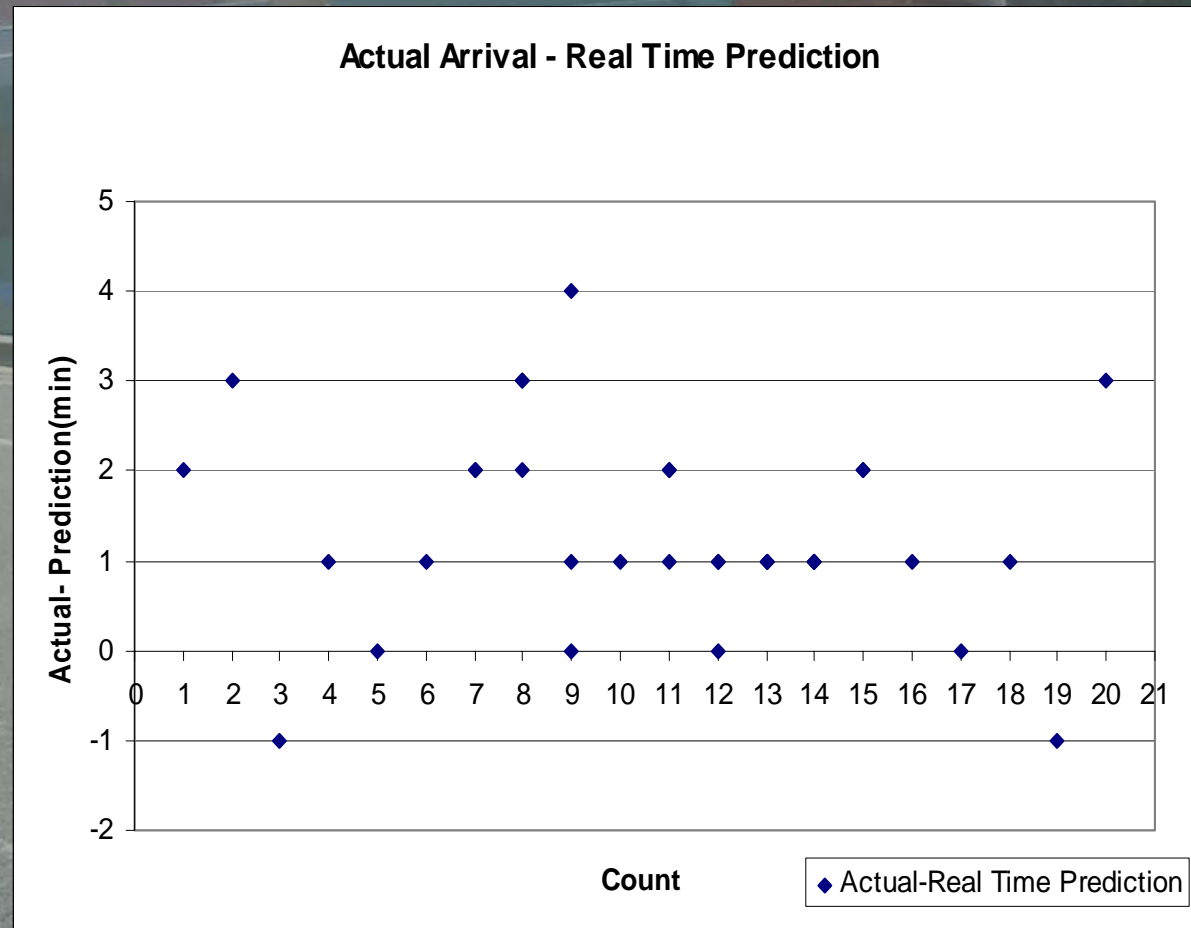
Result – Web vs. Display

Location	SW Park at Mill						
Direction	To NW 23rd and Marshall						
Time	12:40 PM						
Weather	Sunny						
Date	Monday	1/23/2006					
	Time Display in Shelter (min)		Time Display in NEXTBUS.COM (min)				
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12:46 PM	5	18	5	18	12:53	12:53	
12:51 PM	1	13	1	13	12:53	12:53	
12:54 PM	10	23	10	23	13:05	13:06	7
1:00 PM	4	17	4	17	13:05	13:06	
1:04 PM	1	13	1	13	13:05	13:06	
1:07 PM	10	23	10	23	13:18	13:19	10
1:11 PM	6	19	6	19	13:18	13:19	
1:15 PM	2	15	2	15	13:18	13:19	
1:20 PM	10	23	10	23	13:31	13:32	6
1:26 PM	4	17	4	17	13:31	13:32	
1:28 PM	2	15	2	15	13:31	13:32	
1:33 PM	10	23	10	23	13:45	13:45	12
1:35 PM	8	21	8	21	13:45	13:45	

They are identical

Result-Actual Arrival Time vs. Real Time Prediction

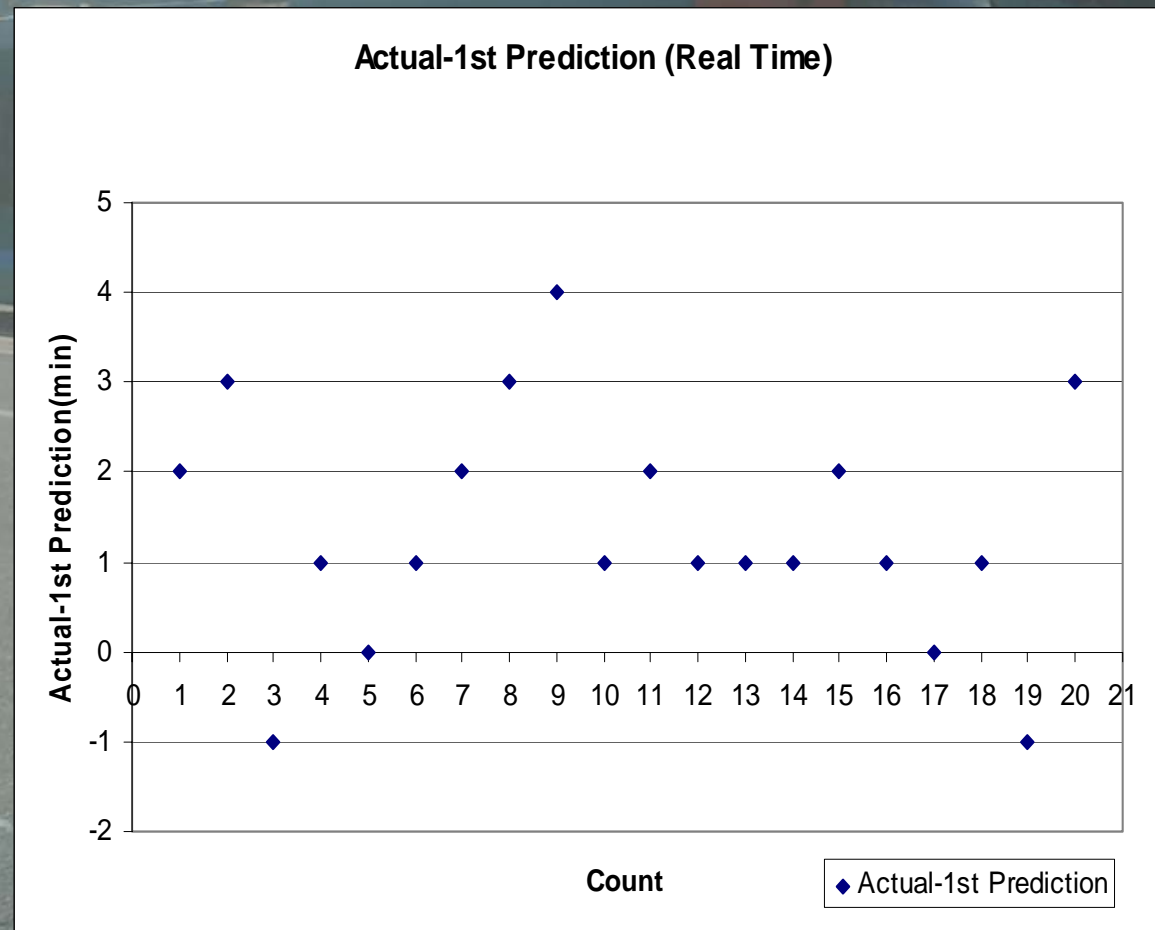
Performance Measure	Count
On Time	4
Come Earlier than Actual Arrival (total)	18
1 min early	10
2 min early	4
3 min early	3
4 min early	1
Later than Actual Arrival (total)	2
1 min late	2
Average 1.32 minute earlier than actual arrival	



Result-Actual Arrival Time vs. Real Time Prediction (1st)

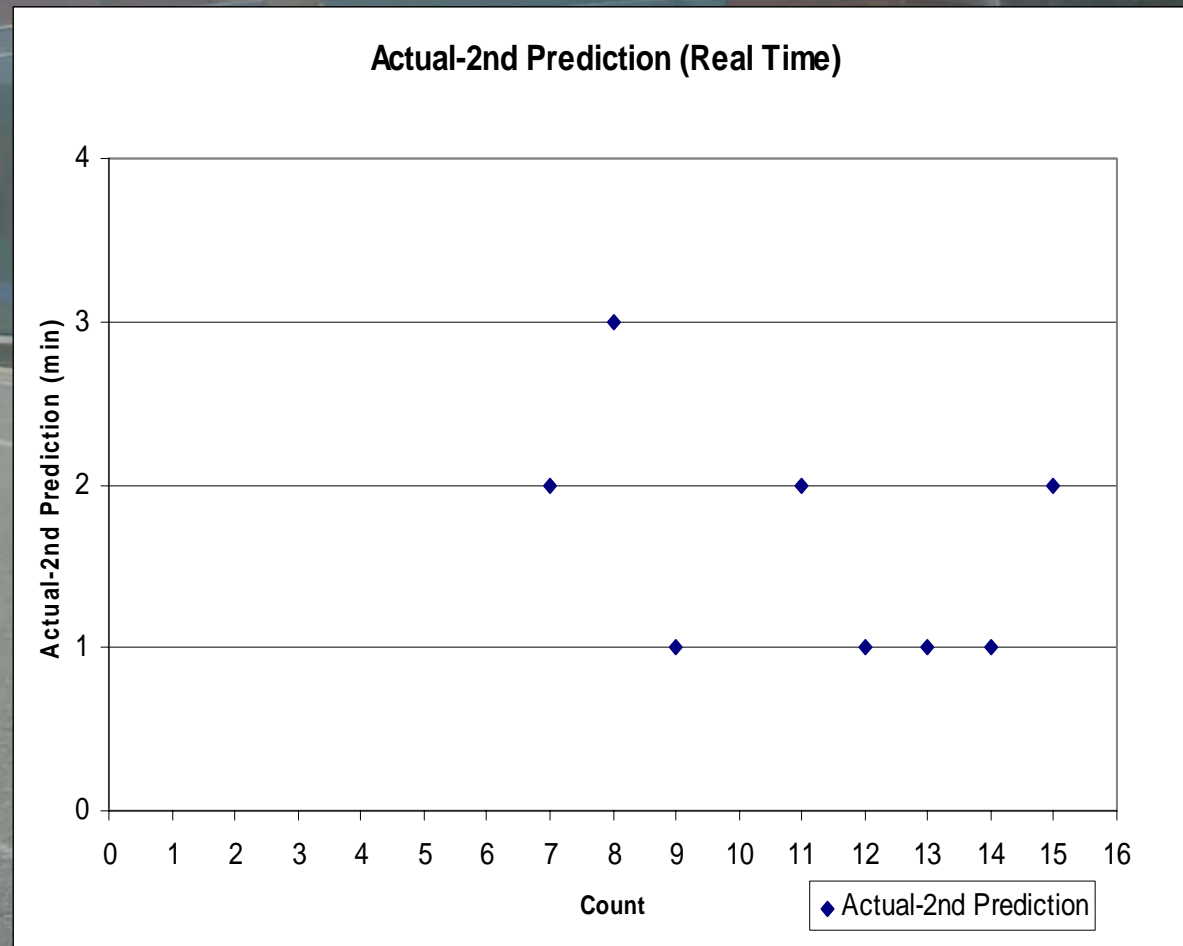
Performance Measure (Actual - 1st Prediction)	Count
On Time	2
Come Earlier than Actual Arrival	16
1 min early	8
2 min early	4
3 min early	3
4 min early	1
Later than Actual Arrival	2
1 min late	2

Average 1.35 minute earlier than printed schedule



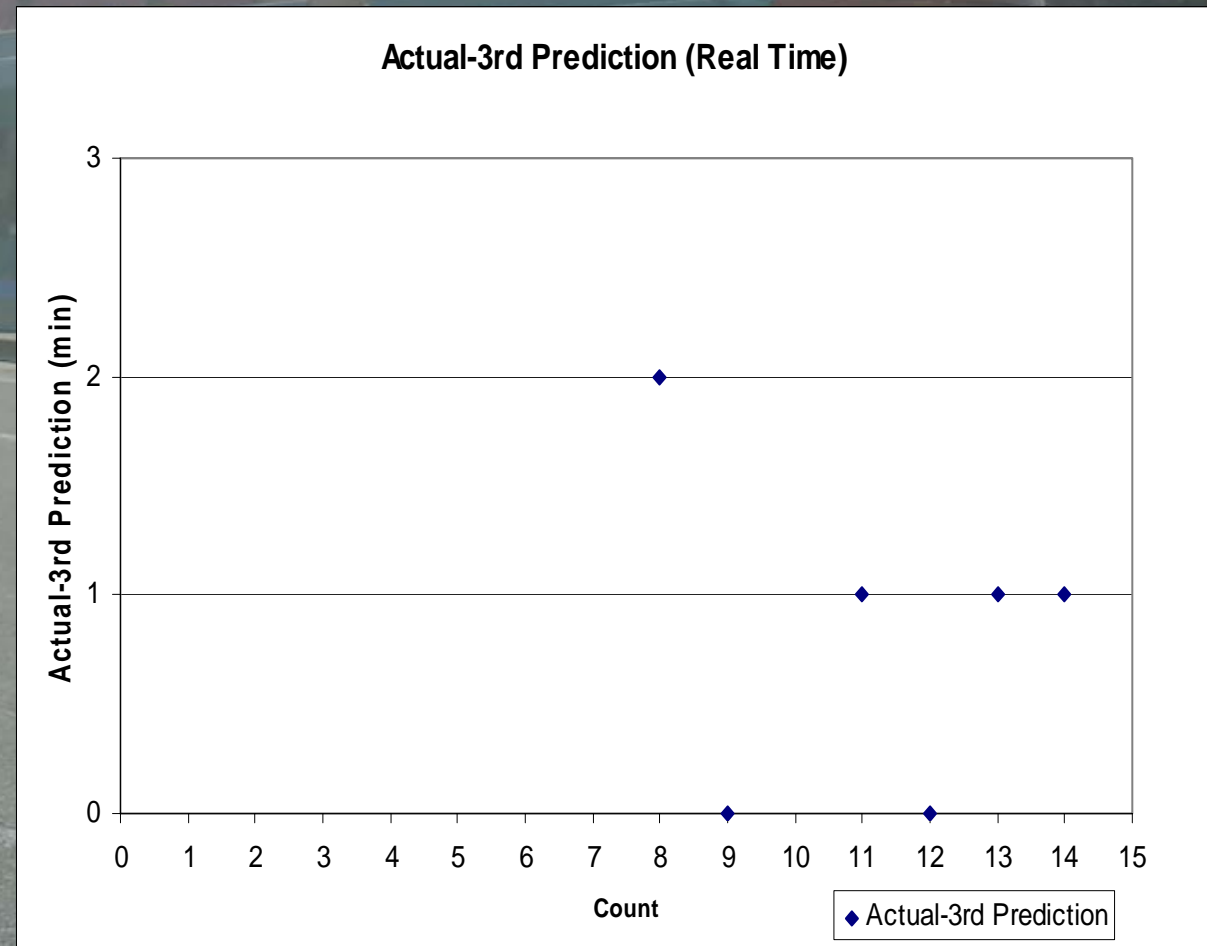
Result-Actual Arrival Time vs. Real Time Prediction (2nd)

Performance Measure (Act-2nd Prediction)	Count
On Time	0
Come Earlier than Actual Arrival	8
1 min early	4
2 min early	3
3 min early	1
Later than Actual Arrival	0
Average 1.65 minute eariler than printed schedule	



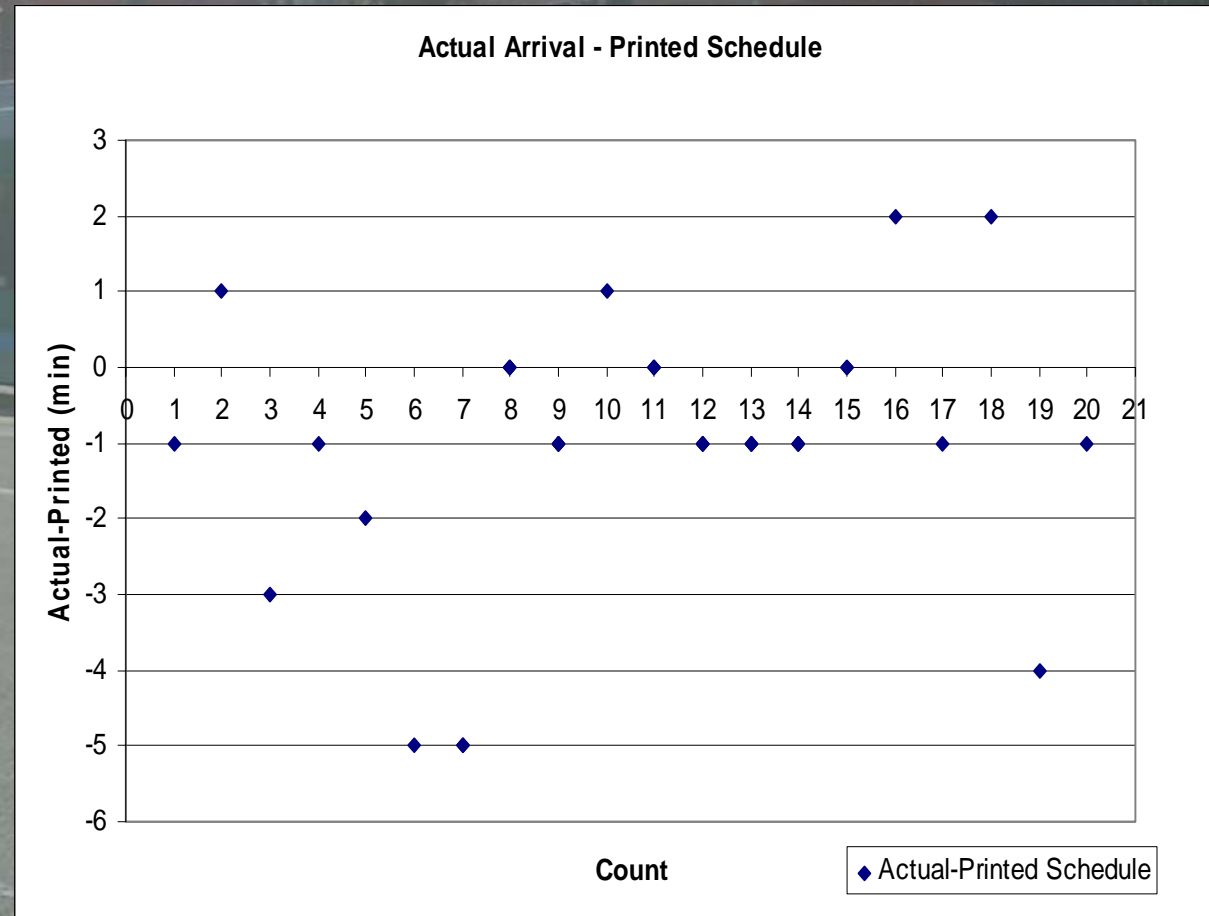
Result-Actual Arrival Time vs. Real Time Prediction (3rd)

Performance Measure (Act-3rd Prediction)	Count
On Time	2
Come Earlier than Actual Arrival	4
1 min early	3
2 min early	1
Later than Actual Arrival	0
Average 0.83 minute earlier than printed schedule	



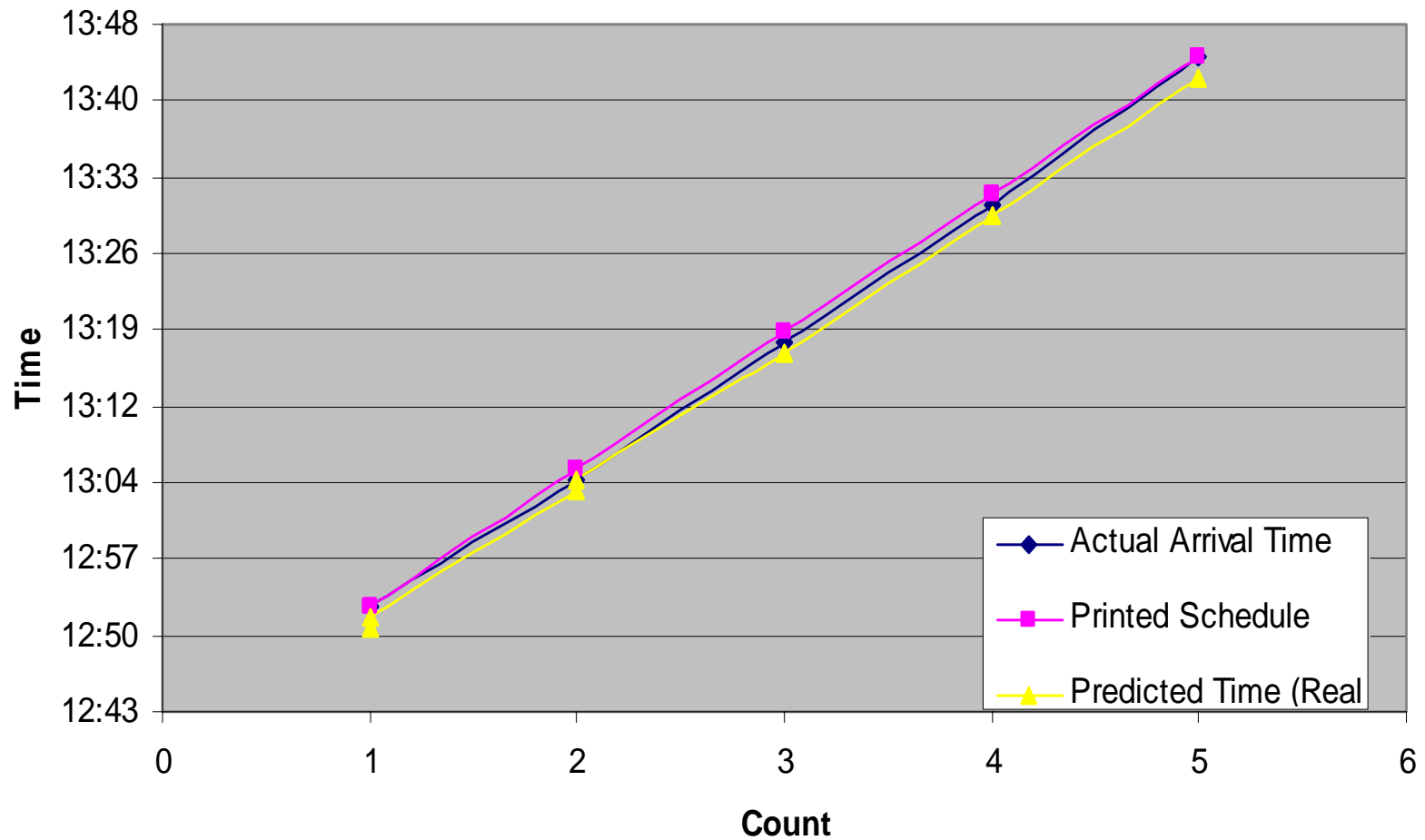
Result-Actual Arrival Time vs. Printed Schedule

Performance Measure	Count
On Time	3
Come Earlier than Printed Schedules (total)	13
1 min early	8
2 min early	1
3 min early	1
4 min early	1
5 min early	2
Later than Printed Schedule (total)	4
1 min late	2
2 min late	2
Average	1.00 minute earlier than printed schedule



Result-Overall

**StreetCar Performance and Real Time Prediction
(SW Park at Mill)**



A blue and red tram is stopped on a city street. The tram has a blue upper body and a red lower body with a white stripe. It is positioned on a street with white lane markings. In the background, there are buildings, trees, and a street lamp. The text "THANK YOU!!" is overlaid in the center of the image.

THANK YOU!!