Human Actions Tracking

31/8 - 2022

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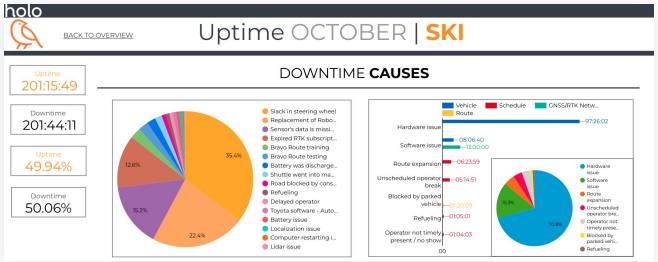
holo

Operational reporting



Monthly uptime reports detailing all downtime causes

Type	Timestamp	Route	Vehicle	Downtime	Uptime	BREAK?	Issue	Specification	Responsible
	12/1/2021 0:00:00	SEM-SLA	109	-4:00:00		FALSE	Route	Snow	External factors
	12/2/2021 0:00:00	SEM-SLA	109	-4:00:00		FALSE	Route	Snow	External factors
	12/2/2021 0:00:00	SEM-SLA	66	-5:30:00		FALSE	Route	Snow	External factors
start	12/1/2021 13:04:32	SEM-SLA	66	-2:34:32	2:02:54	FALSE	Route	Heavy rain	External factors
stop	12/1/2021 15:07:25	SEM-SLA	66	-0:02:39		FALSE	Route	Heavy rain	External factors
start	12/1/2021 15:10:05	SEM-SLA	66		1:11:31	FALSE			
stop	12/1/2021 16:21:36	SEM-SLA	66	-0:08:24		FALSE	Route	Heavy rain	External factors
start	12/3/2021 6:31:27	SEM-SLA	109		4:00:00	FALSE			
stop	12/3/2021 10:30:35	SEM-SLA	109			FALSE			
start	12/3/2021 14:48:56	SEM-SLA	109		1:41:10	FALSE			
stop	12/4/2021 16:30:00		109						
start	12/3/2021 10:32:23	SEM-SLA	66		4:16:00	FALSE			
stop	12/3/2021 14:46:06	SEM-SLA	66	-0:02:50		FALSE	Schedule	Low battery	Holo

Thorough data collection of all route issues and time driven

Comprehensive dashboards providing a full overview of the performance of the route, vehicles and project


Ruter#
003
DR 88668
EV 89324
Ruter#
DR 88623

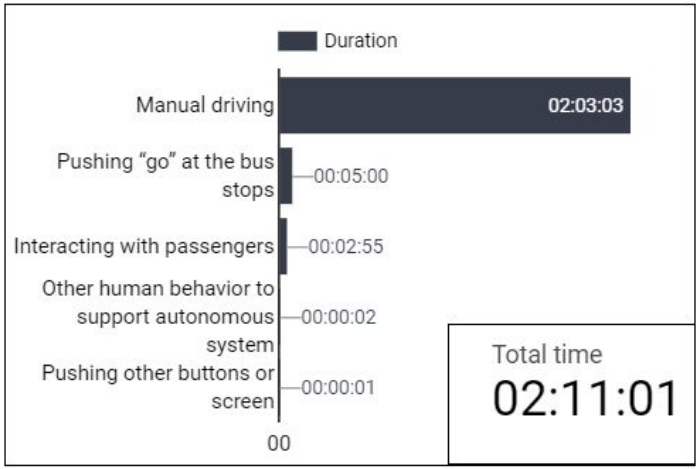
The human factor

Data collection - a very manual process

Time started	Time finished	Task	Action	Sub-action	Topic	Duration of tasl	Total time durin	Other comments	Duration
11:40:18	11:42:33	Manual driving - Driving manually to the station	Manual driving	Driving manually to the station		0:02:15	11:34:05		135
11:44:21	11:44:25	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:04			4
11:44:50	11:44:59	Manual driving - Other reasons:	Manual driving	Other reasons:		0:00:09			9
11:45:33	11:45:39	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:05			5
11:47:11	11:47:18	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:07			7
11:47:21	11:47:36	Manual driving - Parked car on the route	Manual driving	Parked car on the route		0:00:15			15
11:49:46	11:49:48	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:02			2
11:50:42	11:50:45	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:03			3
11:51:22	11:54:01	Manual driving - Driving manually to the station	Manual driving	Driving manually to the station		0:02:38			158
12:03:49	12:03:51	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:02			2
12:04:23	12:04:25	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:02			2
12:04:45	12:04:47	Other human behavior to support autonomous system	Other human behavior to support autonomous system	Other human behavior to support autonomous system		0:00:02			2
12:04:59	12:05:01	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:02			2
12:06:58	12:07:09	Manual driving - Parked car on the route	Manual driving	Parked car on the route		0:00:11			11
12:07:44	12:07:45	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:01			1
12:09:00	12:09:00	Pushing “go” at the bus stops	Pushing “go” at t	Pushing “go” at the bus stops		0:00:01			1
		Pushing “go” at							

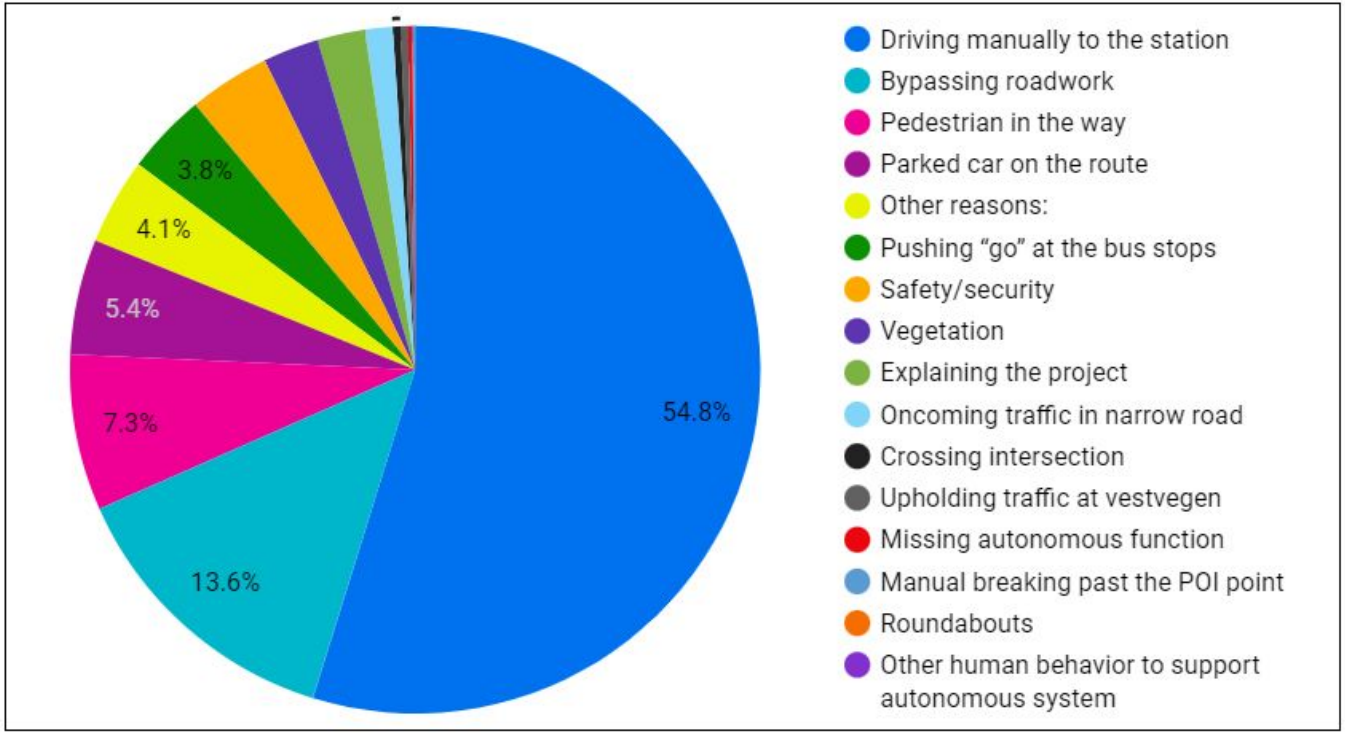
First batch of data

Data between 5th and 8th July 2021

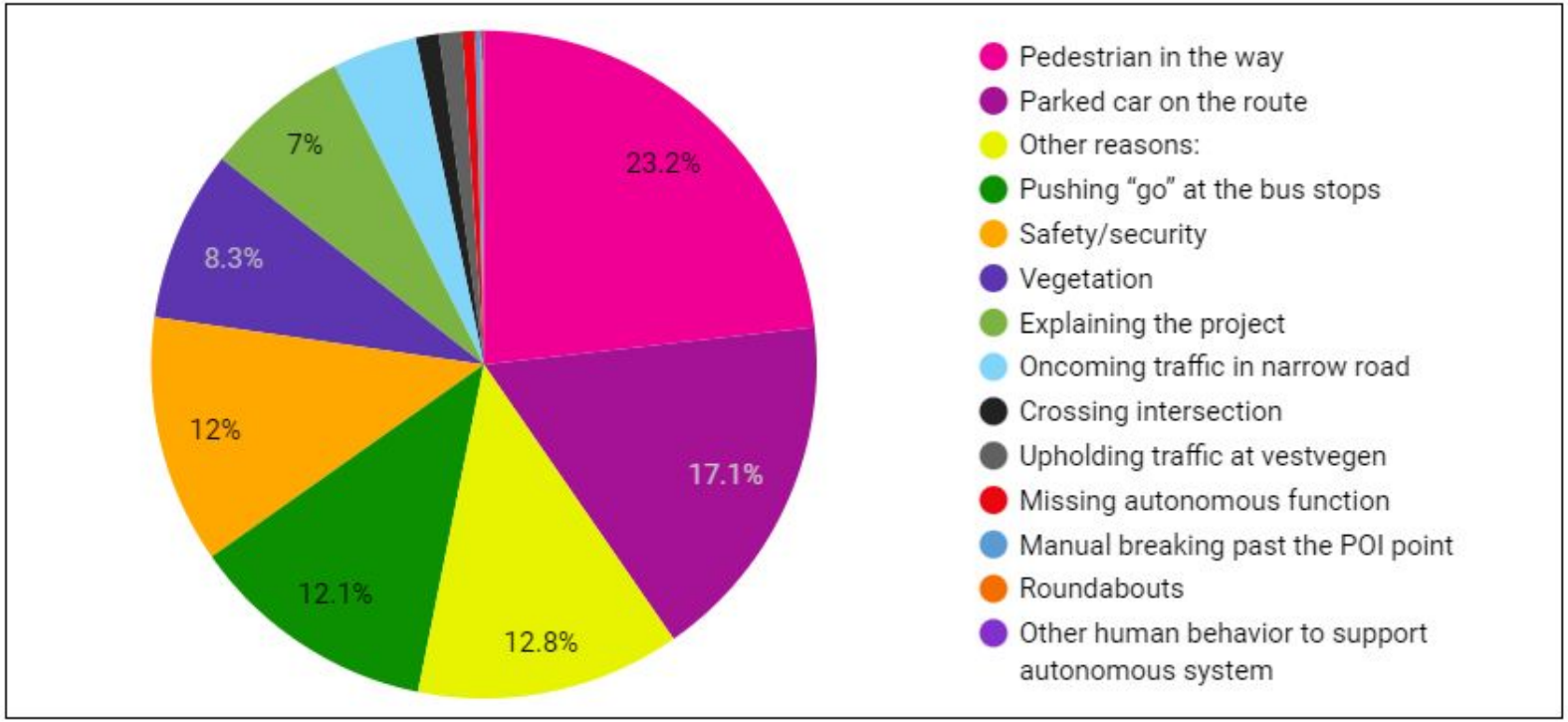


Action	Count
Manual driving	145
Pushing “go” at the bus stops	142
Interacting with passengers	1
Pushing other buttons or screen	1
Other human behavior to support autonomous system	1

Type of manual action - Distribution of all actions by duration

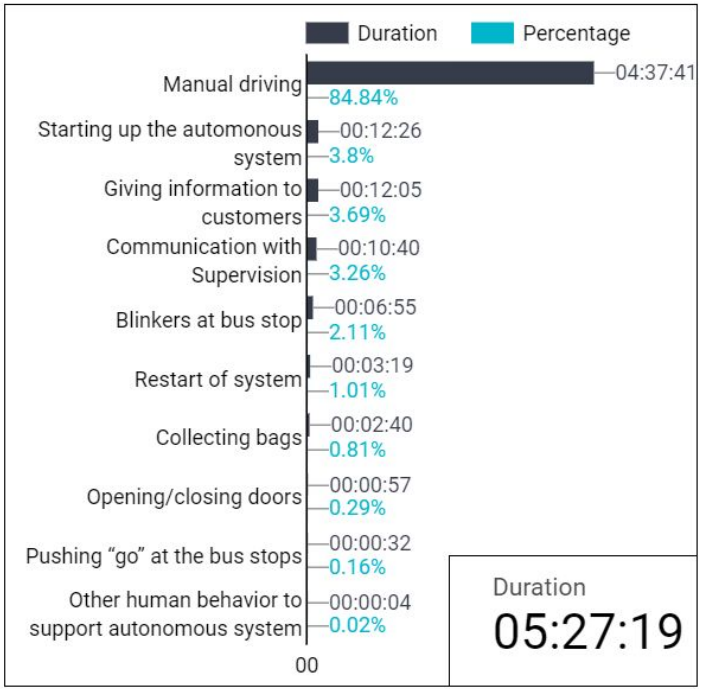


Excluding planned manual actions



2nd batch of data

Data was collected on 6 full shifts (with 90% uptime) 25th September - 4th October

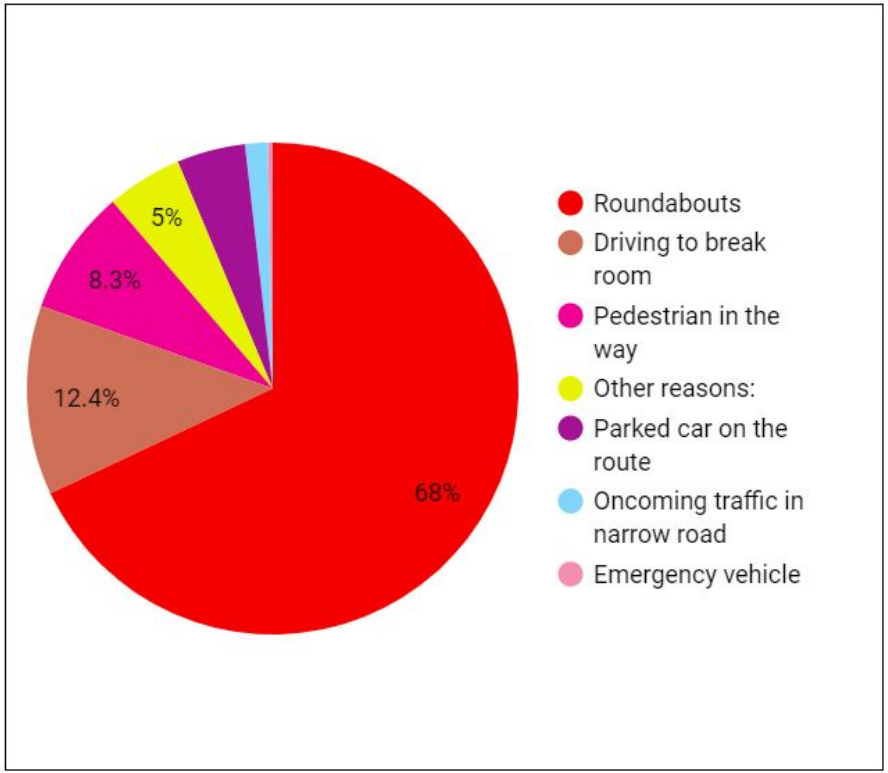


Data collected during operational hours (6 shifts)	
35:15:54	39 hrs 90%

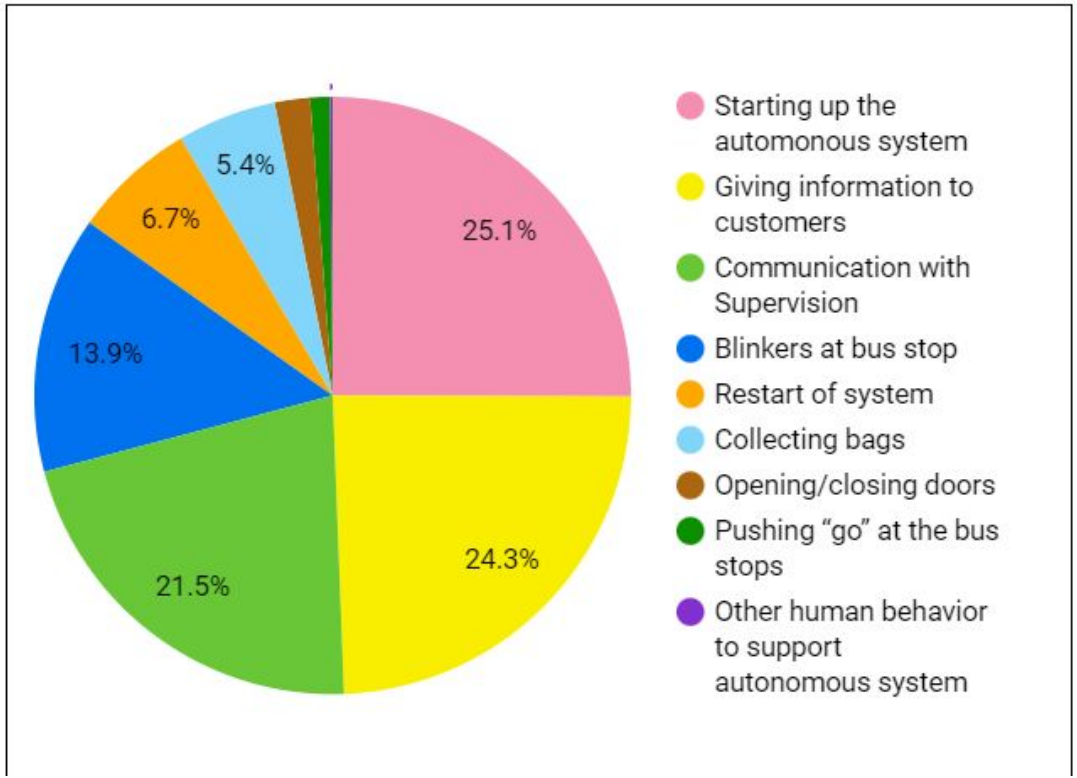
Human actions average (shifts)	Human actions average (shifts)
15%	**0:54:22**

Action	Count
Manual driving	379
Pushing “go” at the bus stops	32
Blinkers at bus stop	29
Opening/closing doors	4
Other human behavior to support autonomous system	4
Starting up the automonous system	3
Communication with Supervision	3
Restart of system	2
Giving information to customers	1
Collecting bags	1
Grand total	**458**

Causes of Manual driving



Other manual actions



Conclusion

- Understanding the role and tasks of the safety driver is crucial to advancing the technology

- Data is valuable to systematically eliminate safety driver roles

- A few unexpected actions are discovered

- A car with no safety driver will not only, need to find other solutions for safety related tasks, but also for:
  - Operational optimization
  - Assessing comfort
  - Customer service and safety perception
  - Software improvement