



# Future Proofing Your Business with HSMAI

# **Software is Eating the Hospitality Operation**

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## Dr. Sungsoo Kim



# • About me

- ACUE Distinguished Teaching Scholar
- Researcher / Consultant
  - Revenue optimization
  - Strategic management
  - Data Analytics (e.g., big data)
  - Economic analysis, including impact studies and supply and demand analysis
  - Feasibility and market study
  - Technology innovation (e.g., cryptocurrency)

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Assigned interaction

2 



Word cloud

...

Are there specific technologies that have significantly improved (or will improve) hospitality operations?

Mentimeter  
Technology

Show results immediately



# Contactless Technology

- Contactless Payment Cards
- Mobile Payments (e.g., apple pay, WeChat, Alipay)
- RFID (Radio-Frequency Identification) Technology (Tag)
- Contactless Ticketing
- Contactless Smart Locks
- Contactless Sensors
- Health Passports

# Voice Technology

**THE CLASSICS**

CLASSIC BEEF		SPICY CHICKEN		VEGGIE DELIGHT	
SMALL	REGULAR	SMALL	REGULAR	SMALL	REGULAR
3.99	5.49	4.49	5.99	4.99	6.49

**FALL FLAVORS**

TURKEY & CHAMBERLAIN BUNGER	PUMPKIN SPICE MILKSHAKE
5.49	3.49

**BURGER SHACK**

SAY "OK I'M READY"

**Burgers**

Classic Beef	3.99 / 5.49
Spicy Chicken	4.49 / 5.99
Veggie Delight	4.99 / 6.49

**ADD-ONS**

Extra patty	0.99
Extra cheese	0.99
Avocado	1.00
Veggie cheese	0.99
Grilled mushrooms	1.00
Spicy sauce	0.75
Non-dairy cheese	0.99
Extra sauce	0.99

**Sides & Salads**

French Fries	1.99
Onion Rings	1.99
Cheese Salad	1.99
Garden Salad	2.99

**Drinks**

Coke/Cola	1.99
Diet Coke	1.99
Sprite	1.99
Root Beer	2.99
Iced Tea	2.79
Milkshake	1.99
Soft ice cream	1.99

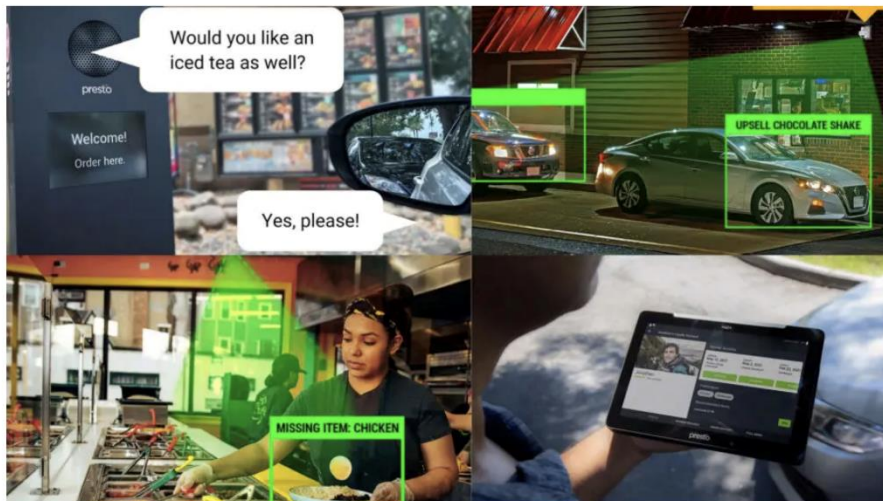
**Sweets**

Milkshake	1.99
Chocolate Sundae	1.99
Chesecake Slice	1.99
Apple Pie	1.99

Home > [Foodservice](#)

## Smart-Voice Technology: Coming Soon, to a Drive-Thru Near You

ZACK JOHNSTON | JANUARY 3, 2023



In a world of fast-changing consumer demands, the classic fast-food drive-thru window is evolving. From doubling lanes to fully digital menu boards, restaurants have made all kinds of improvements to the drive-thru service.

With technology quickly catching up to imagination, more changes to the QSR industry are sure to come.



KFC is the first fast food restaurant in India to enable ordering through its branded Alexa skill the company [announced](#) yesterday. It is also the global restaurant's first foray in voice-first ordering.





HERE'S YOUR ORDER!

Set A x 1

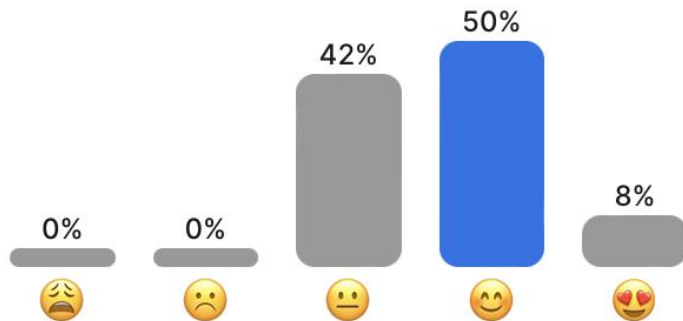


Rating



Is technology (e.g., automation) in restaurants transforming the food industry in a positive way?

Score: 😊 3.7



Show results immediately





CBS  
WEEKEND  
NEWS

CBS  
WEEKEND  
NEWS

END

CBS  
WEEKEND  
NEWS

<https://www.youtube.com/watch?v=zyUekx9NZ18>

MEE  
CBS

MEE  
CBS  
WEEKEND  
NEWS

# Mobile ALOHA

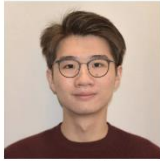
Humans are completely free from physical labor.

# Mobile ALOHA

## Team



**Zipeng Fu**  
(project co-lead)



**Tony Z. Zhao**  
(project co-lead)



**Chelsea Finn**  
(advisor)

- Stanford University and Google Project
- Humans are completely free from physical labor.

## Abstract

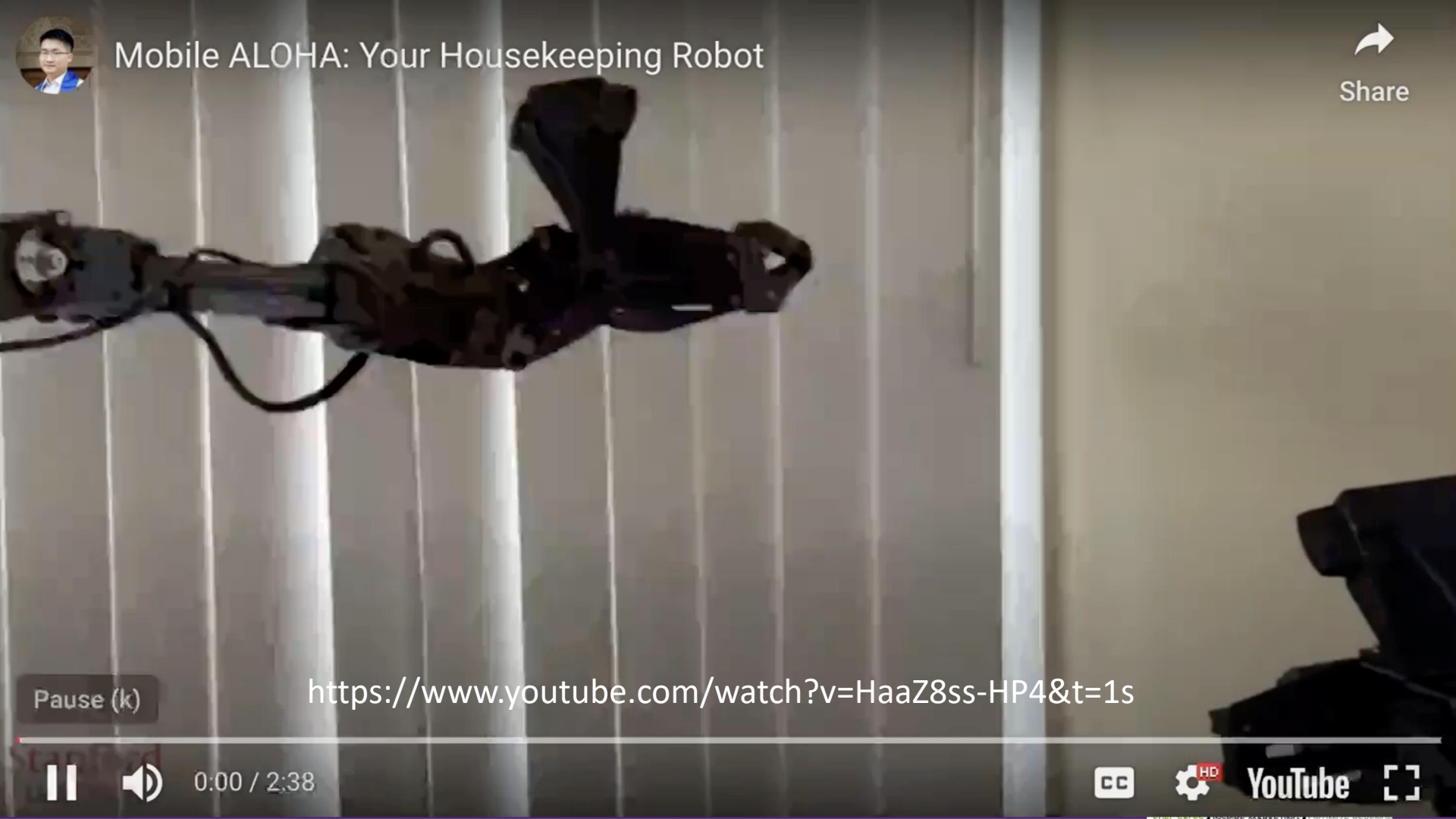
Learning from human demonstrations has shown impressive performance in robotics. However, most results are on table-top manipulation, lacking the mobility and dexterity necessary for generally useful tasks. In this work, we develop a system for imitating mobile manipulation tasks that are bimanual and require whole-body control. We present Mobile ALOHA, a low-cost and whole-body teleoperation system for data collection. It augments the ALOHA system with a mobile base, and a whole-body teleoperation interface. Using data collected with Mobile ALOHA, we learn to perform supervised behavior cloning and find that co-training with existing static ALOHA datasets boosts performance on mobile manipulation tasks. With 50 demonstrations for each task, co-training can increase success rate by up to 90%, allowing Mobile ALOHA to autonomously complete complex mobile manipulation tasks such as opening and serving a piece of shrimp, opening a two-door wall cabinet to store heavy cooking pots, calling and riding an elevator, and lightly rinsing a used pan using a kitchen faucet.



# Mobile ALOHA: Your Housekeeping Robot



Share



Pause (k)

<https://www.youtube.com/watch?v=HaaZ8ss-HP4&t=1s>



0:00 / 2:38



HD

YouTube



Assigned interaction

4 



Word cloud


...

Can you give a ballpark figure about how much it costs to make Mobile Aloha?

1 million

2M

1 milion USD

 Show results immediately



# Materials

- All materials are available to purchase on Internet

## Bill of Materials

Part	Quantity	Link	Price (per unit)
<b>Robots</b>			
ViperX 300 Robot Arm 6DOF	2	<a href="https://www.trossenrobotics.com/viperx-300-robot-arm-6dof.aspx">https://www.trossenrobotics.com/viperx-300-robot-arm-6dof.aspx</a>	\$5,695.95
WidowX 250 Robot Arm 6DOF	2	<a href="https://www.trossenrobotics.com/widowx-250-robot-arm-6dof.aspx">https://www.trossenrobotics.com/widowx-250-robot-arm-6dof.aspx</a>	\$3,295.95
Tracer AGV	1	<a href="https://www.trossenrobotics.com/agilex-tracer-agv.aspx">https://www.trossenrobotics.com/agilex-tracer-agv.aspx</a>	\$8,999.95
<b>Onboard Compute</b>			
Lambda Labs Tensorbook	1	<a href="https://lambdalabs.com/deep-learning/laptops/tensorbook">https://lambdalabs.com/deep-learning/laptops/tensorbook</a>	\$2,399.00
<b>Robot Frame</b>			
4040 800mm x 8	4	<a href="https://a.co/d/2DOKaGT">https://a.co/d/2DOKaGT</a> (2 pcs)	\$42.29
4040 500mm x 6	2	<a href="https://a.co/d/8mc69EV">https://a.co/d/8mc69EV</a> (4 pcs)	\$58.99
4040 400mm x 2	2	<a href="https://a.co/d/9LNXjQg">https://a.co/d/9LNXjQg</a> (1 pcs)	\$22.99
4040 300mm x 7	2	<a href="https://a.co/d/6vgSVEO">https://a.co/d/6vgSVEO</a> (4 pcs)	\$59.99
4040 L-shape connectors x 28	5	<a href="https://a.co/d/ddY3mIX">https://a.co/d/ddY3mIX</a> (6 pcs)	\$32.99
4040 T-shape connectors x 4	1	<a href="https://a.co/d/fFDfjsg">https://a.co/d/fFDfjsg</a> (6 pcs)	\$30.99
4040 45-degree corner connectors	1	<a href="https://a.co/d/1wijAh3">https://a.co/d/1wijAh3</a>	\$21.99
4040 Corner Bracket and T-Slot Sliding Nuts	2	<a href="https://a.co/d/fh7Gb8r">https://a.co/d/fh7Gb8r</a>	\$24.99



# Source Coding

The screenshot shows the GitHub interface for the repository 'MarkFzp/mobile-aloha'. The repository is public and has 1 branch (main) and 0 tags. The commit history is displayed, showing a recent commit by MarkFzp titled 'update README for init release' 4 days ago. The commit message is 'Mobile ALOHA: Learning Bimanual Mobile Manipulation with Low-Cost Whole-Body Teleoperation'. The commit includes several files: aloha\_scripts, config, hardware, launch, .gitignore, CMakeLists.txt, LICENSE, README.md, commands.txt, package.xml, and setup.py. The README.md file is selected, and its content is visible at the bottom of the screenshot.

File	Commit Message	Time
aloha_scripts	re-add aloha_mobile_shrimp_truncated_cotrain	2 weeks ago
config	first commit	last year
hardware	Add shim rotor STL files (designs by Thinh Nguyen).	4 months ago
launch	working aloha, base_test.py for tracking one waypoint	3 months ago
.gitignore	working aloha, base_test.py for tracking one waypoint	3 months ago
CMakeLists.txt	first commit	last year
LICENSE	Create LICENSE	6 months ago
README.md	update README for init release	4 days ago
commands.txt	aloha init, 1265 obs, base speed tests	3 months ago
package.xml	first commit	last year
setup.py	first commit	last year

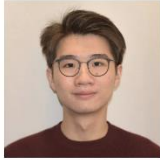
**Mobile ALOHA: Learning Bimanual Mobile Manipulation with Low-Cost Whole-Body Teleoperation**

# Mobile ALOHA

## Team



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(project co-lead)



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## Abstract

Imitation learning from human demonstrations has shown impressive performance in robotics. However, most results are limited to table-top manipulation, lacking the mobility and dexterity necessary for generally useful tasks. In this work, we develop a system for imitating mobile manipulation tasks that are bimanual and require whole-body control. We present Mobile ALOHA, a low-cost and whole-body teleoperation system for data collection. It augments the existing ALOHA system with a mobile base, and a whole-body teleoperation interface. Using data collected with Mobile ALOHA, we learn to perform supervised behavior cloning and find that co-training with existing static ALOHA datasets boosts performance on mobile manipulation tasks. With 50 demonstrations for each task, co-training can increase success rate by up to 90%, allowing Mobile ALOHA to autonomously complete complex mobile manipulation tasks such as opening and serving a piece of shrimp, opening a two-door wall cabinet to store heavy cooking pots, calling and riding an elevator, and lightly rinsing a used pan using a kitchen faucet.

- Stanford University and Google Project
- Humans are completely free from physical labor.
- All materials are available to purchase on Internet
- Imitation learning from human demonstration.

# Clean Restroom (teleop)



[https://mobile-aloha.github.io/resources/teleop/teleop\\_restroom\\_10x\\_speed.mp4](https://mobile-aloha.github.io/resources/teleop/teleop_restroom_10x_speed.mp4)

0:00 / 0:29



# Imitation learning from human demonstration.

**Mobile ALOHA: <https://mobile-aloha.github.io>**

	Wipe Wine (50 demos)				Cook Shrimp (20 demos)				
	Grasp Towel	Lift Glass and Wipe	Place Glass	Whole Task	Add Oil	Add Shrimp	Flip Shrimp	Plate Shrimp	Whole Task
Co-train	100	95	100	<b>95</b>	100	100	60	67	<b>40</b>
No Co-train	95	58	90	50	100	100	40	50	20

	Rinse Pan (50 demos)				Use Cabinet (50 demos)				
	Grasp Pan	Turn On Faucet	Place Pan	Whole Task	Open Cabinets	Grasp Pot	Place Pot	Close Cabinet	Whole Task
Co-train	100	80	100	<b>80</b>	95	100	95	95	<b>85</b>
No Co-train	100	0	100	0	95	95	100	95	<b>85</b>

	Call Elevator (50 demos)				Push Chairs (50 demos)			High Five (20 demos)				
	Navi.	Press Button	Enter Elevator	Whole Task	1-3rd Chair	4th (OOD)	5th (OOD)	Whole Task	Unseen Attire	Unseen Human	Navi.	Whole Task
Co-train	100	100	95	<b>95</b>	100	85	89	<b>80</b>	90	80	100	<b>85</b>
No Co-train	100	5	0	0	100	70	0	0	90	80	100	<b>85</b>

Software is Eating the World.

Marc Andersson at a16z Venture Capital



# Six Levels of AGI

AGI - highly autonomous systems that outperform humans at most economically valuable work

		<i>like learning new skills</i>
<b>Level 0: No AI</b>	<b>Narrow Non-AI</b> calculator software; compiler	<b>General Non-AI</b> human-in-the-loop computing, e.g., Amazon Mechanical Turk
<b>Level 1: Emerging</b> <i>equal to or somewhat better than an unskilled human</i>	<b>Emerging Narrow AI</b> GOFAI <sup>4</sup> ; simple rule-based systems, e.g., SHRDLU (Winograd, 1971)	<b>Emerging AGI</b> ChatGPT (OpenAI, 2023), Bard (Anil et al., 2023), Llama 2 (Touvron et al., 2023)
<b>Level 2: Competent</b> <i>at least 50th percentile of skilled adults</i>	<b>Competent Narrow AI</b> toxicity detectors such as Jigsaw (Das et al., 2022); Smart Speakers such as Siri (Apple), Alexa (Amazon), or Google Assistant (Google); VQA systems such as PaLI (Chen et al., 2023); Watson (IBM); SOTA LLMs for a subset of tasks (e.g., short essay writing, simple coding)	<b>Competent AGI</b> not yet achieved
<b>Level 3: Expert</b> <i>at least 90th percentile of skilled adults</i>	<b>Expert Narrow AI</b> spelling & grammar checkers such as Grammarly (Grammarly, 2023); generative image models such as Imagen (Saharia et al., 2022) or Dall-E 2 (Ramesh et al., 2022)	<b>Expert AGI</b> not yet achieved
<b>Level 4: Virtuoso</b> <i>at least 99th percentile of skilled adults</i>	<b>Virtuoso Narrow AI</b> Deep Blue (Campbell et al., 2002), AlphaGo (Silver et al., 2016, 2017)	<b>Virtuoso AGI</b> not yet achieved
<b>Level 5: Superhuman</b> <i>outperforms 100% of humans</i>	<b>Superhuman Narrow AI</b> AlphaFold (Jumper et al., 2021);	<b>Artificial Superintelligence (ASI)</b>

# Mobile Aloha (Level 3: Expert)






Word cloud



How soon will we see AGI (human-like) robots, such as enhanced mobile Aloha, in hospitality operations?



5 5 years  
5 5 yrs  
2 years

 Show results immediately



# Things to Consider

- How do you balance the need for automation with maintaining a personal touch in your services?
- Have you observed any resistance or challenges from staff in adapting to new technological tools?
- How do you see human-like AI robotics influencing customer choices or customer satisfaction in the hospitality industry?
- What measures do you have in place to address cybersecurity or privacy concerns in your operation?



# Future Proofing Your Business with HSMAI