Low-Wage Precarious Workers' Sociotechnical Practices Working Towards Addressing Wage Theft

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ABSTRACT

Nearly 40 million workers in the United States, a third of the working population, are low-wage, meaning they make less than $11.65 per hour. These workers face the pervasive and detrimental challenge of wage violations, also known as wage theft, which is any illegal activity by an employer that denies benefits or wages to employees. We interviewed 24 low-wage workers who experienced wage theft and sought justice about their work practices, challenges, and information technology usage. Based on these interviews, we identify three key sociotechnical practices these workers engaged in to address their wage theft: 1) *identifying wage and payment discrepancies*; 2) *tracking and documenting work*; and 3) *pursuing wage claims*. Seeking to leverage HCI research to interrupt uneven social, economic, and information relations in the low-wage workplace, we ultimately reflect on the possibility and limits of several key design recommendations.

Author Keywords

Workplace Studies; Work Practice; Technologies in the Workplace; Low-Wage Workers; Precarious workers; Wage Theft; Wage and Hourly Violations; Wage Disputes; Labor.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (*e.g.,* HCI): Miscellaneous; K.4.2 Social Issues: Employment;

INTRODUCTION

In the United States (U.S.), nearly a third of the working population makes less than $11.65 per hour. These workers face the pervasive and detrimental challenge of pay and wage violations, also known as wage theft, which is any illegal activity by an employer that denies benefits or wages to employees. In this paper, we investigate low-wage workers' sociotechnical practices that attempt to address wage theft.

There are two major factors that motivate this work. First, low-wage work, like many occupations in retail, hospitality, and custodial services, is often considered non-technical (*e.g.*, 17]), but such professions are often inundated by technology in the workplace. For example, their practices are frequently regulated and shaped by technology (*e.g.,* computerized work scheduling systems that control their time; keycards that track worker's location and movement; timekeeping systems that document their work hours).

Regarding the second factor, there have been recent calls by HCI researchers to examine the role of technology in shaping and reproducing economic and social inequality [31, 42]. Speaking to this broader call, we have been studying low-wage workers' sociotechnical practices, as they attempt to address their own concerns in the workplace related to wage violations. By combining these two factors, it positions an examination of low-wage workers' experiences as a key site of inquiry in understanding the evolving relationship between labor, computing, and social inequality.

We interviewed 24 low-wage workers to better understand the role of technology and information as they worked to address wage theft issues. Based on our interviews, we highlight three key worker sociotechnical practices related to wage theft. These practices include: 1) *identifying wage and payment discrepancies*; 2) *tracking and documenting work*; and 3) *pursuing wage claims*. Examining low-wage workers current practices will help designers better identify and understand the possibility for sociotechnical interventions for wage theft. Our research has several contributions. First, we have identified an underrepresented problem and demonstrate how wage theft is, partially, an information problem (*i.e.*, workers do not collect enough information). Second, by examining the low-wage worker's sociotechnical practices, our study contributes to an understudied area in work studies within HCI focused on social inequality [31, 42]. Lastly, we provide design suggestions that highlight the strengths and limitations of sociotechnical interventions in addressing complicated work-place social and economic inequalities like wage theft.

In the rest of the paper, we outline how our work contributes to current conversations within work studies in HCI. Then, we show the scale and scope of wage theft and relate how a labor issue like wage theft is in conversation with current research in HCI. After our literature review, we present our

methods, followed by our findings. In our empirical section, we first present a low-wage worker profile to make our findings more accessible to our readers. Then, we highlight key worker sociotechnical practices in this space. Lastly, in our discussion, we highlight the opportunities and limits of design to intervene in the complex, uneven social, economic, and information relations between workers and employers.

RELATED LITERATURE
Our study builds on research within HCI and other domains. This section outlines the current conversation regarding HCI and work studies and maps material from the social studies of low-wage labor to current research areas within HCI.

Work Studies and HCI
Work studies have long been important to the field of HCI, and other related disciplines such as Participatory Design, with many seminal theories of sociotechnical interaction developed out of workplace-based investigations [*e.g.*, 71, 85]. Examinations of workplace practices are extensive, from communication [*e.g.*, 8, 23, 60], to collaboration and coordination [*e.g.*, 71], and productivity [*e.g.*, 61, 105]. In recent years, a number of studies have directed explicit attention towards the often divergent and even conflicting goals of organizations and individual workers [*e.g.*, 14, 41, 62]. These conflicts are by no means new tensions, but rather suggests that historically HCI scholarship has ignored this theme, most likely in an effort to be seen as neutral and apolitical [see critiques by 4, 56, 27]. Drawing together the lineage of workplace studies and the politics of participatory design work [29, 67, 68, 82, 102], scholars argue for renewed attention to workers' rights and the role of technology in shifting employment relations [35, 76, 79].

Beyond research and critique, scholars working in this space have designed sociotechnical interventions to mitigate the challenges workers face to obtain employment [12, 20, 21, 51] and improve their working conditions [21, 36, 49, 50, 51, 55, 76, 80]. A common theme in this scholarship centers on exploring how technologies might aid or impact the uneven social and economic relationships between workers and their employers. Much of this prior work has focused on the working conditions of new forms of online-enabled work [*e.g.*, TaskRabbit, Mechanical Turk, Uber], in which workers are often contractors, not employees. By examining the working conditions and sociotechnical practices of low-wage workers in more traditional organizations, our study contributes to an understudied area in work studies within HCI focused on social inequality [31, 42].

Beyond HCI, other aligned computing fields, such as participatory design and social informatics, place labor and computing issues within a larger social, political, economic, and cultural milieu. In doing so, they create a more contextualized account of labor in ways that are noteworthy for design. In particular, such critical computing scholarship defamiliarizes the worksite as a design space [*i.e.*, 7], which opens it up to new interpretations and ways of understanding the historical trajectories and social relations within a design

and work context [*e.g.,* 40, 63, 107]. Within participatory design, much work has focused on the politics that unfold during the design process as a method to engender social change [24, 29, 57, 87]. In opening up these spaces for alternative and critical understandings of the relationships between labor and design, such literature makes clear that design within a work context is never apolitical or neutral, but is always affirming certain positions and ways of being over others [40, 63]. Such lessons and insights will help us articulate design recommendations that both align with worker's goals and attend to the larger context in which labor struggles are situated.

Low-Wage Workers and Wage Theft in the United States
In this section, we define key terms and highlight the working conditions of low-wage workers, who commonly experience wage theft. Wage theft, also called wage and hourly violations in legal contexts, refers to any illegal conduct that withholds wages or denies benefits to employees, including employee misclassification, minimum wage violations, working off the clock, illegal pay deductions, and denial of breaks [10, 69, 78]. On average, such wage violations are widespread among low-wage, precarious workers (affecting between 10 to 25%) and are typically significantly higher amongst undocumented residents (affecting closer to 70%) [9, 38, 64, 65, 78]. Further, while individual wage violations are usually small amounts of money, over time they create detrimental impacts to a worker's overall income, typically nearly 15% of earnings [9].

Approximately one-third of all working adults in the U.S., nearly 40 million people, are low-wage, meaning they make less than $11.65 per hour [92, 93, 94]. In the US, low-wage status is determined in relation to the U.S. Federal Poverty Guidelines. In 2015, the poverty line set by the U.S. Department of Health and Human Services for a family of four was $24,250; therefore, anything at or below an $11.65 hourly wage for a full-time position is considered low-wage [92]. Compared to their higher-wage counterparts, low-wage workers are more likely to be young, female, a person of color, and never married [93, 94]. Low-wage workers are mostly adults: 83% are 20 or older, and 52.5% are 30 or older. They tend to work full-time (63%), while almost one-third of those working part-time report they would rather work full-time [93, 94]. Frequently, low-wage work is often also precarious work, meaning those occupations generally lack benefits and job security, which is common in industries such as hospitality, janitorial, service, retail, agriculture, construction, and domestic work [53, 65, 72].

Although they comprise a large part of the total workforce, these workers face a myriad of challenges, including discrimination [54, 94], harassment [54], contingent work [43], underemployment [89], poverty [18], and wage theft [10], which reinforce barriers to upward economic mobility, social stability, and better paying occupations [15, 94]. Since, despite these hardships, most low-wage workers

(more than 60%) will remain low-wage [93], it is crucial that we focus on understanding and improving their existing working conditions, rather than solely focusing on upward economic mobility [73].

Existing legal protections safeguard workers, but violations are frequently underreported. The most notable protection, the US Fair Labor Standards Act (FLSA), establishes basic work-related payment protections and enables workers to file wage claims [96] see also [95, 97-99]. Wage claims are the state and federal legal processes through which the government investigates whether employers engaged in pay violations [96, 97]. USDL has recovered a considerable amount of wages for workers. Since 2009, the USDL's Wage and Hourly Division (WHD) recovered nearly $1.6 billion dollars for 1.7 million workers; in 2015, they recovered $246 million in back wages for nearly 250,000 workers [100, 101]. Despite these impressive numbers, many workers do not pursue wage claims, likely due to the complicated and lengthy legal processes of filing claims, a lack of awareness of illegal underpayment, and their uneven economic and social relations with employers [9, 44, 79].

The strength of U.S. workers' rights has generally declined, which is evidenced by the adoption of at-will employment laws, the lack of enrollment in unions, and a dearth of adequate new, sociotechnical or otherwise, forms supporting workers' rights [1, 16, 19, 34, 35, 103]. Many states have "employment at will" laws that enable employers to fire employees without "just cause," including for filing a wage claim [46, 74]. Since some workers are also undocumented residents and threats of deportation may further dissuade them from filing wage claims [78]. Further, union strength, representation, and enrollment in the U.S. have steadily declined in the past several decades [91, 75]. For example, since the 1980s, union membership has declined by 50% [91, 75] and new legislations, such as "right to work" laws, weakens unions' ability to collectively act and organize [30]. These factors contribute to deepening and further entrenching the wage and wealth inequality in the U.S. [84]. Lastly, other scholars have noted that while current support for workers' rights are insufficient [16, 35], new labor organizing strategies – that focus on rank and file members and close-tie relationships – are emerging in response to these challenges, but it is unclear if they will be sufficient to protect workers [16].

Although low-wage work often has a reputation for not being very technical [*e.g.* 5, 17], low-wage workers are often saturated by technology and information across their domestic, civic, and work lives [*e.g.*, 32, 52]. Many low-wage workers use technology at work, and their work practices are often regulated and shaped by technology [*e.g.*, 32, 33, 81, 88]. In their personal lives, low-income individuals tend to be strong mobile adopters, with 50% owning and using smart phones to access the internet as compared to 64% of all Americans [83]. Thus, given both wage theft's and technologies pervasiveness in the workplace, we focused on understanding the role of technology, information, and communication when experiencing wage violations.

In addition to this evidence that low-wage workers' lives are saturated by technology and information, our work also responds to a call within HCI to examine the role of technology and social inequality [*e.g.,* 27, 31, 42]. We contribute knowledge on sociotechnical work arrangements that enable and perpetuate precarious, insecure, low-wage work. Lastly, this work also contributes to an emerging stream of research concerning the relationship between design, computing, and systemic social issues, which has been explored in areas of sustainability, food access, and development [6, 25, 26, 49, 90], but is not yet well-understood in the context of low-wage work.

METHODS

We conducted a qualitative interview-based study to understand a wide range of phenomena related to technology and work-related experiences of low-wage workers in large urban cities within the United States: Los Angeles, California; Indianapolis, Indiana; and Knoxville, Tennessee. These three different cities were chosen to provide a sampling of different urban experiences of wage theft. Additionally, we had existing partnerships with organizations from prior work experiences and were granted access to participants. Our interviews focused on information and documentation-related work practices, technology in the workplace, and any workplace-related challenges participants experienced. We specifically discussed workers' experiences of wage and payment violations and their decision making processes for addressing those issues, including if they chose not to address it and why, and any support related to these challenges. Each participant received a $10 visa gift card as a thank you and small compensation for their time.

These research activities were conducted over three months. Two authors interviewed 24 low-wage workers in a variety of jobs, including construction (9), food service (9), childcare and cleaning services (2), garment factory (1), courier service (1), blog editor (1) and stockbroker (1). Our participants ages ranged from 22 to 62 (M: 39 years; SD: 28.28) and included 8 women and 16 men. Additionally, our participants were racially diverse, in that we spoke with 2 African-American, 11 Caucasian, and 11 Hispanic workers (13 U.S. citizens; 3 dual citizens; 8 undocumented workers in the U.S.). We identified and recruited participants in three different ways, including using our own personal networks, directly discussing our project with people in low-wage jobs, and lastly through the assistance of low-income advocacy organizations. We focused on low income populations and undocumented residents because they far more likely to experience wage theft according to our literature review and our early, informal conversations with worker advocacy experts (*i.e.*, lawyers, pro-work advocacy organizations). Commonly, participants were unaware that what they were

experiencing was illegal, but after we described wage theft scenarios (*i.e.*, working off the clock; working through breaks; not getting paid for hours worked), participants affirmed that they had experienced those situations. Participants were only recruited if they had experienced some form of wage theft.

All interviews were conducted in a location of the participant's choosing and lasted between 20 and 60 minutes and were on average 35 minutes long. They were audio recorded and transcribed, except for five participants who declined to be recorded. In these cases, extensive notes were taken during the interview and thorough memos created post-interview, usually within 24 hours of the initial interview. Additionally, nine of the interviews were conducted and transcribed in Spanish and then later translated into English. In terms of the participants' language fluency, multiple interviewed individuals were bi-lingual, but we conducted the interview in the language the interviewee preferred and the following interviews were conducted in Spanish: Los Angeles, CA: 4; Knoxville, TN: 3; Indianapolis, IN: 2.

The research team met regularly to discuss trends in the interview data. After we discussed all of the interviews, we determined that two participants did not describe wage theft (*e.g.*, an employee, not the employer, was stealing the worker's physical paychecks) and were removed from further analysis. Dominant early themes included: how different challenges manifested in their work; how participants made decisions regarding different work-related challenges; the roles these individuals played with other similar workers, and the role of technology in these challenges. We conducted inductive analysis of our notes and interview transcripts using memoing, coding, and affinity diagramming. Our initial codes typically focused on understanding workers' practices and challenges and the role of technology, information, and communication in the workplace. Subsequent iterations focused on situating how workers understood wage violations, and the role of information, communication, and technologies in producing documentation and how they made decisions about how and when to pursue a wage claims.

WORKING TO ADDRESS WAGE THEFT

In this section, we first introduce a low-wage worker profile to situate their workplace context. Then, we highlight three key sociotechnical practices workers engage in to attempt to address wage theft in their own lives: 1) *identifying wage and payment discrepancies*; 2) *tracking and documenting work*; and 3) *pursuing wage claims*. We highlight the role of technology and information within each of these sociotechnical practices to examine their strengths and limits of technology and information in addressing wage violations.

Our study showed that, once workers have identified payment discrepancies, they typically begin creating alternative, personal accounts of their work, which draws attention to key limits in current workplace timekeeping systems. While workers use their documentation to help

them address their wage theft, in the section on pursuing wage claims we highlight the limits of these personal accounts in effectively addressing wage theft.

Low-wage Worker Profile

To more firmly ground our insights, we generated a profile that represents a low-wage workers' daily practices and challenges related to communication, information, and technology. This profile highlights these workers' broader contexts and challenges that, while they extend beyond technology, are key to understanding their work and potential design opportunities. While this profile represents a blend of personalities and experiences from our fieldwork and is grounded in our empirical data, the details are used in amalgamation to make the context of low-wage work more accessible to our readers.

The Low-Wage Worker

Helen is a 46-year-old Hispanic, soon-to-be grandmother with three children and one grandchild on the way. She has worked as a cashier at a grocery store for the past four years, and a few months ago her daughter Gabriella started working as a baker there. For most of her life, Helen has worked in service-oriented jobs, including as a maid and nanny.

Workplace information and technology have played a large role in her worksite. Although she has a general work schedule, it constantly changes, as other employees may call in sick and need to be replaced. Since the family shares a single car, she tries to carpool with her daughter, but because of her changing schedule it does not always work. She clocks in everyday to her work's timekeeping system that requires her to stamp a paper timecard. Her boss collects these timecards every week and puts out new ones for the employees. After her boss takes her time card, Helen has no access to the timekeeping system to review her hours.

Every two weeks she receives her paycheck, which is based on hours worked. A new store manager started working three months ago and Helen began to noticed irregularities in her paycheck. She tried to talk to her new manager about the issues with her paycheck, but he mentioned her time card showed that she only worked three 8-hour full shifts and one partial 6-hour shift, but she remembers working four full 8-hour shifts. Since she does not have any documentation, she could not prove that she actually worked those four full shifts. She is a little afraid of her new manager because he has fired several long-term employees. Understandably, Helen feels frustrated and angry; she needs every dollar in her paycheck to pay her bills and mortgage, otherwise she may make late or insufficient payments, which would land her with late fees she cannot afford. After talking with co-workers, Helen decided to start documenting her hours and started a personal journal where she writes down her time at work. Several months later, she noticed another discrepancy in her paycheck. When showing her paycheck and journal to her manager, her manager questioned her about the journal's validity, as it differed from the company's records. The manager threatened to fire her if she brought up these issues

again. This profile highlights the tenuous positions these workers hold in the workplace as well as variance in work-related data that can exist from employee to employer.

Identifying Wage and Payment Discrepancies
The first step towards dealing with wage theft is identifying and understanding that it has happened. Typically, our participants learned about wage theft as they discovered payment discrepancies. Specifically, participants often recognized payment inconsistencies between actual and expected wages.

It [the paycheck] did not add up because, like I said, I am one of these people that when it comes to money, and I don't have a lot of money, I budget. And that's what I was doing. When it was near to get my paycheck, I was literally budget[ing] my money out. – Robert, food service, 34 years old

Repeated encounters with these payment discrepancies, in which remembered hours worked did not correspond to hours paid, lead participants to recognize wage issues.

…When I get my paycheck it was exactly the same pay […] as the rest of the time it was a flat check, whatever I made on my regular checks, I didn't get pay for time and a half, I think I get paid nothing [for the overtime hours]. – Robert, food service, 34 years old

In more severe cases, eight participants experienced situations in which they did not receive any payment for their work, or received inaccurate payments weeks or months later.

I kept waiting for my pay ... I was there for a month and pay was every two weeks. It [the payment] was two weeks later and I was like [to my manager], "where's my check?" – Kyle, food service, 30 years old

Participants also identified and educated each other about payment issues through discussions about their work with colleagues, coworkers, friends, and worker advocacy organizations, like unions or lawyers.

I am in [the] trade union […] I learned the ways, what to do, what not to do, what happens, what should not happen. […] I have to help somebody while I read it [the union manual] because they [the company] don't want to pay us. And I have to help them with the overtime you know? And that is maybe not even happening to me but there I am, you know? […] It is not fair! It is not right! I don't care who it is you know? Get it right! We work hard for the money. Pay me [for] my work and give me my money! - Mary, food service, 52 years old

Somebody from here noticed that [the company was] not paying correctly and somebody filed a complaint and we all got our paychecks reviewed […] And from there it was discovered who was missing payments […] because I thought they were paying me correctly, it never occur

to me that they were stealing from me! – Felipe, food services, 53 years old

The most common wage issue we saw were wage violations or hourly discrepancies in the workers' paychecks. Conversations between coworkers were essential to understanding and identifying common payment irregularities, because workers did not always have access to the timekeeping systems.

Some participants were completely unaware that they were being illegally underpaid until someone, usually a trusted co-worker, as in Felipe's case, or a professional explained that something seemed wrong.

When I forwarded my paycheck stub to my accountant so he can have it on file ... and my accountant notified me that ... [my] mileage [as a courier] has been the same every day, he said that, "it's impossible that your mileage is the same every day." It should be fluctuating […] it's not stated on your W2, and that's against the law ... The most I could put down on the mileage sheet [per their boss] was 120 [miles] because that's the way [the boss's] accountant told [the boss] to do it but in actuality, it was for [the boss] not to take taxes for full wages plus mileage. [The boss] just avoided [paying workers in full] for years. – Elena, courier services, 54 years old

These quotes and stories reveal how different work-related systems (*i.e.*, timekeeping systems; payment and accounting systems) may be poorly designed for the workers, describing major issues regarding the use, access, and management of these work-related systems. Once the employer's system had failed to accurately report the employees' hours, most workers were forced to find alternative, independent ways to track work hours and outcomes, which we discuss in the next section.

Tracking and Documenting Work
Here, we showcase different ways the workers used technology to produce these alternative work accounts. In the following section, we highlight the limits of these personal accounts in actually addressing wage theft. There is no one standard way to track employee's work hours. Some employees clocked in to an electronic or digital timekeeping system, while others reported in-person to their managers, who controlled the company's timekeeping system. After discovering payment discrepancies, participants knew that official systems, however they were kept, were inaccurate. In some cases, workers did not have access to the company's records.

Tracking forward to the month I quit, I was like, "Do I have any records to validate that I worked as many hours as I did?", and I didn't. I even asked [the company] if I could get a printout of the hours I worked. [The manager] was like, "No, you're required that you should keep track of all that yourself." - Kyle, food service, 30 years old

After having wage issues, many workers did not trust their company's timekeeping systems' ability to accurately reflect their worked hours. These issues revealed that workplace documentation and recordkeeping technologies are designed for the company, not the workers. Workers frequently complained about the lack of access to the information these systems documented and produced. Participants also criticized the lack of transparency of these systems in terms of who can access them, how they register hours, and by whom and when the recorded documents could be altered.

There is always an excuse with the computer, but if I clock in I should be getting pay for what it says I clock[ed] in and out for. But [the manager] can go in and change and adjust what they want. – Mary, food service, 52 years old

Given workers' challenges with and mistrust of these systems, many study participants often created their own alternative modes of recording their work and outcomes. Many deemed it necessary to maintain personal records of their work separate from the records used by their employer, either to correct or prevent being shorted of future hours and wages.

I keep a log at home, I really do, just to write down, when I go home ... We have to, because this has been going on for a long time and you never know, when they [the company] are going to get you. – Mary, food service, 52 years old

According to their computers, supposedly, they did not have records of my overtime working or working on holidays. I just thought that was awfully odd, because I had the receipts to prove the dates because it [the printed versions of the timekeeping system] gave us the time we clocked and the date and how many hours in total that we had in. – Jennifer, food service, 23 years old

On-call or flexible scheduling [70] makes it more complicated for workers to track their hours, since these employer scheduling strategies encourage workers to stay late or come in for unexpected and unscheduled shifts.

Most interviewed workers tracked their hours as an everyday documentation practice; they habitually recorded clock in and clock out times, break periods, and overtime hours, comparing these personal accounts to their paycheck. Some participants also tracked the outcomes of their work, such as finished construction or manufacturing jobs. The medium of these personal work accounts varied from making videos to recording work progress (especially in construction and manufacturing), taking pictures of time cards, keeping receipts when clocking in and out, and keeping text messages and pictures of their schedule, personal journals of recorded work hours, and chat logs with their boss. With the exception of personal journals, all of the methods were used at their work setting, because they involved the use of some artifacts available only at the place of work.

Yes, I took pictures [of the time cards], they [the manager] told me they did not like me taking pictures. – Joan, garment factory, 47 years old

As Joan states above, documenting at work can be frowned upon by managers; however, some workers had collaborative documentation practices that included their managers and other co-workers.

Every time I clocked in, I texted my boss and I write, "I am here at the job", I texted then at 12:30 and tell him "I am taking my break" and then when I get back at 1:00 pm, and then I will text him at 5:00 pm and he always said "OK. I got you. I will write it down" and I write it down too. I texted my friend too and I let him know the hours that I worked so there was someone more than just me who knew about it. – William, cleaning services, 27 years old

Here, the worker has multiple avenues of documenting their work hours. Such collaborative documentation practices with managers develop multiple layers of verification that the worker's personal account is accurately produced. Such documentation may be better for court cases, since the manger is also recording their responses to the personal reports. Workers also used tools to help understand their current situation and anticipate their paycheck.

[I use] QuickBooks tells me when I need to get paid. Quickbooks tells me how much checks are going out every week and Quickbooks tells me what I need to collect that week. – Pedro, construction, 50 years old

Creating these personal accounts was highly dependent on the type of job the workers held and how they were assessed and paid for their work. Most workers we talked to were paid by the hour; hence, many of them documented their hours. However, we also interviewed contractors, which are typical in construction, and workers who get piece-rate compensation, which is typical in manufacturing [86], who get paid by the completeness, quality, and the quantity of items finished in their work. Thus, they documented not just their hours, but also their completed work and job outcomes. Most of this type of documentation was done via videos and photos taken with their mobile phones.

I started working but I also [video] record[ed] the place. [I did it] because I did not know him [the person who hired him] and it was reasonable. [I recorded it] before, after, and I used to work a little bit and record it, I really don't know why I did it... well I do know the reason, because when we talked, it never made sense the thing[s] he said. - Mauricio, construction, 29 years old

As Joan demonstrates, sometimes workers would take other objects to signify the work they had completed. Joan is paid per garment she produces. She collects a small cord that represents the number of items she has produced.

I would take clips of there is a small cord [where] you are supposed to put your name on it, everybody has their

initials on this cord [...] so I just took off the bundle a little tie that goes around [it was] just fabric like a ribbon. – Joan, garment factory, 47 years old

Given the individual, personal nature of these documentation schemas, workers were concerned about what they should be detailing, and would seek out a lawyer's expert legal advice. Typically, lawyers suggested workers engage in daily documentation of their work hours and what was promised by their boss. Additionally, lawyers would also ask workers to collect documentation from their co-workers to produce more robust verification. In the next section, we highlight the different ways in which workers attempted to deal with the various forms of wage theft they encountered.

Pursuing Wage Claims
In this section, we focus on how our participants used the collected information and produced documentation as evidence in *pursuing wage claims*. We chart the challenges participants faced in pursuing wage claims—from company HR bureaucracy, to false promises, to discouragement from lawyers—and show how a small number of participants overcame these challenges to successfully pursue claims.

Pursuing wage claims is often complicated, time consuming, off-the-clock, and not guaranteed to produce positive results. We define wage claims as the different processes people undergo to address wage discrepancies. Such practices range from filing official online governmental wage complaints to discussing wage discrepancies with a boss, co-workers, or lawyer. Ultimately, while many workers we talked to pursued wage claims, only four participants successfully recovered partial or all owed wages.

Once the workers identified wage discrepancies, they faced challenges related with the company's internal processes and policies for wage claims. Most workers discussed their concerns directly with their company, either with a manager or the Human Resources (HR) department. In some cases, employers would be shocked to hear about the worker's wage concerns and would immediately start procedures to correct the discrepancies. In other cases, the employer was aware of the wage theft, but they themselves were in some economic resource bind and did not have funds to pay their employees. For example, one employer was waiting for the clients to pay them so they could pay their employees. Bill, a construction worker, pointed out that, "when you're a company and you have employees, you're bound by law to pay them. You can't just not pay them because you didn't get paid!" Ultimately, not all employers would pay workers after receiving documentation regarding wage discrepancies.

I did have a cell phone at the time and I took pics because I knew that I was getting the slide [i.e., shorted hours] on my hours, I knew that something was going on, so I kept the records to show how is this happening and the answer never got explained [by the manager] and I never got compensated for it. Nothing! – Robert, food service, 34 years old

[The boss] was like, Kyle, the amount of work you actually put in over the time that you were here, the amount of work you actually did while you were here, you probably produced two days' worth of work or something. So, that's what we are paying you for. If you have a problem with it, then you can document it. Write a letter and just submit it in [to the corporate office]. – Kyle, food service, 30 years old

Thus, even when workers confronted their employer, the power dynamics are such that some employers were not motivated to address the situation at hand. Most workers need their steady, if only partial, income provided by their paychecks, and typically cannot economically withstand a long-drawn out legal battle for their wages.

In other cases, workers explained that their employer would promise to correct the issue, but never would, or would only reimburse partial wages. In many of these cases, the employee was ineffective in recovering their lost wages. In cases like Robert's and Kyle's, the employees talked to their co-workers about their suspicions of wage theft. These conversations would focus on whether they were experiencing similar disparities (*i.e.*, not getting paid overtime, not getting paid for all of the hours worked, and so on) and would often lead to discussions of different approaches to recovering the missing wages. For example, another participant described a weekly practice of "chasing" the boss in groups to recover their money. Bill, a construction worker, said, "There were two or three of us that would literally go stake out his house until we could corner him." Another worker took on a direct supporting role, helping others workers understand their incorrect wages, and, if needed, talking directly to the manager.

Usually when you come to this job and when your first paid [paycheck] arrive[s], [the paycheck] is never right, I warn every new person that comes: "I want you to make sure, write down your hours, check your hours". And sure enough, the new girl that was here, her first paid was not right... I [went] with her [to the manager] and fight with her [the manager on behalf of the new employee]. – Mary, food service, 52 years old

When talking to the company failed, many workers would turn to lawyers. Lawyers required employees to present some evidence or documentation that wage theft occurred (*i.e.*, a mismatch between pay stubs and scheduled work hours). Without this evidence, the ability for the lawyer to assist in recovering wages is very limited, but they can provide general advice on how the employee can deter future wage issues. In some situations, lawyers recommended that the worker investigate the situation further by asking other employees about their work experiences. Among our participants, only one individual with legal representation received her owed wages. Even with documentation, legal experts would advise workers to avoid a lawsuit, or suggested another method to regain lost wages, because the

expenses associated with litigation would likely exceed recovered wages.

> *I ended up calling a lawyer and asking if he'd give me a free consultation because I feel like I've been scammed out of a bunch of money, [...] he was like 'Honestly man, you'd end up spending more money trying to go to court and dealing with that'. – Kyle, food service, 30 years old*

However, not all of the workers could afford lawyers, and, unfortunately, their personal, alternative accounts did not typically hold up in the courts when filing state or federal wage claims. Judges need to make determinations as to what constitutes sufficient evidence, or not, for a wage claim. One of the participants described the process he went through in order to file a small claim in the court. He explained that he was first asked to send a certified letter to the employer, asking for the money he was owed. This letter had to be detailed enough so the judge would understand the situation. After this, the employer and our participant were required to appear in court before the judge.

> *Once we were there [in the court], in front of him [the judge] I explained what happened, I showed him my evidence, the video I took, the video before working and after, the messages we interchanged, the notarized letter. Then the [employer] presented his own story, he argued that I didn't have work insurance, that I was illegal, that I had stolen things in his work area! [The employer] did that to deflect judge's attention. I don't know, I think that when somebody has a lawyer, I think people take their word more seriously than somebody who has not a lawyer. At the end it was his word against mine, I had evidence, I had videos, but the judge did not care. The other guy only had too much to say but he did not have any evidence. He [the judge] said he gave me 10 days, so if I didn't like his decision, I could appeal and come back. But I didn't come back, because I had to get a lawyer and honestly I didn't think I could get my money back. – Mauricio, construction, 29 years old*

Many workers who pursued unsuccessful wage claims kept accurate records of their hours, but these personal records did not help them create a stronger case against the wage violations. For the workers who were successful in pursing wage claims, they often had union representation, as well as internal and external advocates who helped guide them in the process, including informing them of what to document and who to talk to, and, more importantly, how to talk to their manager about the wage discrepancies.

DISCUSSION

Interviewing participants introduced us to the low-wage workers' context and their diverse strategies for dealing with wage violations Here, we articulate sociotechnical design recommendations for helping address wage theft in the low-wage workplace, and discuss their possibilities and limits for interrupting these uneven social, economic, and information relations.

Limits of Redesigning Existing Workplace Technologies

Most business contexts have ignored participatory design in workplace technologies and, thus, these sociotechnical practices and systems often center management's priorities in tracking workers through key access cards, timekeeping systems, workplace surveillance cameras, and just-in-time scheduling systems [33, 88]. These technologies not only track and regulate workers, but also shift economic market burdens from the company to workers. Companies often use these technologies to "black box" themselves to workers by prohibiting employee access and obfuscating how these systems work [33]. While we could imagine designing and implementing different sociotechnical interventions that supplement existing technologies in the low-wage workplace (*e.g.*, redesigning timekeeping systems so that workers can access information about themselves), such design strategies are not likely to widely adopted by employers, since most companies have no clear economic incentive to re-work these information systems. Further, such supplemental interventions would not significantly impact the inherently inequitable working arrangements and power dynamics. Indeed, our empirical findings demonstrate a need for technologies to focus on workers' challenges, workplace experiences, and goals. Repeatedly in our interviews, we saw participants asking to better understand their workplace systems and to be better position to discuss their concerns with their management and employers. We recognize that many of these workers are not on the same socioeconomic playing field as their employers and managers, particularly in the "right to work" states where employees can be fired without cause and at will [46]. Thus, we recommend design strategies that may help to reconfigure unequal socioeconomic relations in the workplace.

Designing to Reconfigure Socioeconomic Relations in Low-wage Workplace

We have identified three design areas that can help foster and build capacities to help workers prepare to address wage theft, including technologies to help educate people on their rights, track hours and work outcomes, and collectively act. Technology has the capacity to inform workers of their rights, strengthen their capacity to make informed decisions about wage theft, and share their experiences with other workers. Despite the great potential innovative solutions might hold for these workers, we also highlight potential privacy concerns while designing with worker data. We will discuss each design area in turn.

Educate and Connect Workers

During our interviews, we found that workers may not be aware of their rights, which is supported by previous research [10]. Given that there are many different forms of wage theft, a starting point for educating workers is to focus on their fundamental work rights and protections, aiming to help them to understand and identify wage theft and the possible avenues of actionable recourse. Mobile technologies, in particular, could be particularly useful given their current

widespread adoption by low-income populations and their capacity for quick, discreet interactions [83].

Several tools already focus on educating and connecting low-wage workers. For example, the Domestic Worker App is a "call-in service [that] connects workers to fictional, educational audio episodes about domestic workers rights and common employee-employer scenarios" [37]. Other applications, like HourVoice and the Jornalero Wage Theft App [11, 106], allow workers to rate employers, enabling day labors and self-employed contractors, who constantly look for new opportunities with new employers, to make informed decisions about which jobs to accept.

Prior work within HCI strongly suggests the importance of interpersonal relationships for critical information to be accepted and acted upon [28, 81]. Thus, a design opportunity here is to create more tailored advice about work rights and specific situations. For example, workers could send a short message service (SMS) (*i.e.,* a text) asking others about their work rights. These messages could be read by a supporting advocacy organization or by volunteers familiar with workers' legal rights. Additionally, tracking and recording such inquiries could help identify workers' knowledge gaps and where further training may be useful. Such educational approaches could assist workers in cultivating actionable insight [58] and help them decide where and under what circumstances they may wish to pursue actionable recourse, such as a wage claim. Additionally, such designs could help train more established employees to act as information brokers and coaches on workers' rights [28, 39, 81].

Identify and Document Wage Violations
Beyond informing workers about their legal rights and expectations, new systems could help workers identify, document, and prevent potential wage theft. Since low-income communities have widely adopted mobile technologies, and work documentation typically happens at the workplace [83], mobile applications are well suited to support low-wage workers' documentation practices. In what follows, we demonstrate key ways in which mobile applications may help workers identify and document their hourly and pay violations.

While almost all of the workers we interviewed were already documenting their hours, they often experienced challenges producing and presenting these personal accounts, including a lack of consistency when reporting hours and objections to the validity of their personal accounts. Mobile applications could help generate clear, complete, and consistent automated and semi-automated reports. For example, many mobile phones could use location-based information to track and document work hours and provide workers with a secondary source of data to corroborate their claims. While some data can be automated, such as detecting where and for how long a person was at a particular location, data that is less easily automatically detectable (*e.g.,* breaks; promises from employers; testimonies from other co-workers; photographs of posted work schedules) would be helpful in

preparing against potential wage theft. While collecting data, discreet smart phone surveys [13] could capture a high-granularity of information, including both traditional open-ended questions, multiple choice, and ordinal scale responses as well as multi-media, such as pictures, videos, audio.

Work-related data could have two major uses for workers. First, worker data-generated reports could help workers compare their recorded hours with their paycheck's hours. Many low-wage workers often have variable schedules, so such reports could help them verify whether they have been accurately paid. Second, data comparing their work schedule accounts to their employer's account could help streamline workers' wage claims. Prior work has suggested that workers should consider first approaching their boss with their evidence before filing a state or federal wage claims [10]. Applications could produce documentation that workers could give to the employers to demonstrate the wage discrepancies. If workers fail to reach an agreement with their employer, the data could be used to file online-based federal and state wage complaints [*e.g.*, 47, 48]. Lastly, our interviews suggest that documentation alone without social support from either trusted colleagues or worker advocates will not address wage theft, thus, in the next section, we showcase how such documentation can be paired with worker advocates to help them collectively address wage theft.

Collectively Organize
For several reasons, both our empirical investigation and insights into the larger working context of the U.S. provides implications that the capacity to collective organize is necessary for these workers. First, our data suggests that people have more successful outcomes when working with others to understand and pursue their wage claims, thus, connecting with others might help them effectively negotiate with their employer. Second, individual workers are easier targets for potential employer retaliation, but such tactics are typically more costly and difficult against a group of workers. Lastly, within the U.S. there has been a general decline in the strength of workers' rights as evidenced by the adoption of right-to-work policies, in the lack of enrollment in unions, and a dearth of adequate new, sociotechnical or otherwise, forms that might support workers' rights [35, 88].

Design explorations focused on computational technologies engendering broader protections for workers, could do so by supporting coalition building with advocacy organizations and specialized legal experts. In particular, designing inter-organizational collaborative information system could provide additional protections in two key ways. First, informed collaborative decision making can help workers collectively decide when to pursue actions such as formal or informal whistleblowing or filing claims, but supporting advocacy organizations, like legal aid, can inform those decisions. Such organizations could help identify when it might be most productive to pursue certain actions or to help them identify which types of data to more thoroughly collect

and document. For example, when multiple workers have independent evidence for wage theft, legal aid clinics, which are clinics that provide legal support for low-income individuals, can create stronger, more easily defendable legal cases by using data from multiple individuals to show the scale of an employer's wage theft. For example, if five employees were to each have independent evidence to suggest a payment violation, such not paying for overtime, has occurred, that in turn has the potential to make the collection of cases stronger. Second, interpersonal communication systems can help individuals understand and anonymously share information about the scope and scale of experienced problems at their worksites. Supporting advocacy organizations and other workers either within an organization or those in similar occupational roles can provide interpersonal support in terms of situating these concerns and offer advice on how to deal with issues of wage theft.

By providing platforms for informed collaborative decision making and interpersonal support and awareness, such systems have the potential to develop worker protections. Namely, it helps educate workers by sharing interpersonal information and best practices to help people individually deal with wage theft. Beyond the individual, such a system can develop critical masses of workers to engender collective decision making which in turn can provide group-level anonymity during collective actions. Further, by connecting workers to other supporting organizations or individuals, it can develop organizational capacity by sharing access to resources and information like best practices or policy information. Lastly, by working together to collect and document experiences and incidents of wage theft, it can provide robust multi-sourced evidence for pursuing various categories of action, including arbitrating on workers' behalf, filing wage claims, or anonymously whistle blowing to the U.S. Department of Labor.

Privacy Concerns While Designing with Worker Data
While we see many potential uses for technology, we caution that there could be unintended consequences of collecting worker data. Prior research has demonstrated that surveillance can be problematic when it inhibits expressions of civil liberties and because often there is a disparity between who is having data collected about them and who has access to that surveilled data, and thus, runs the risk of "discrimination, coercion, and the threat of selective enforcement" [77; see also 2, 3]. Low-income communities tend to be highly surveilled [32, 33, 52, 59, 88], so our proposed designs' self-surveillance infrastructures could deepen this potential for discrimination, coercion, and selective enforcement. Further, there are security and privacy concerns regarding the collection of these data. As Ticona points out, heavy data collection on a worker's location and activities may be "very attractive to those seeking to deport or intimidate the undocumented" [88]. Thus, while collecting data and connecting workers with others could help low-wage workers, as designers we need to consider how to

anonymize collected data, when to not record certain information, and clearly enable the expunging of data once it has lived past its useful to the worker. Further, future work aiming to help people address wage theft needs to explore these worker's preferences and the tradeoffs between privacy and security when collecting data related to workers' practices and experiences.

CONCLUSION
In this paper, we highlighted key sociotechnical practices by workers related to employer wage theft. These practices include: 1) *identifying wage and payment discrepancies*; 2) *tracking and documenting work*; and 3) *pursuing wage claims*. We highlight the role of technology and information within each of these sociotechnical practices to examine their strengths and limits of technology and information in addressing these wage violations. Then, we articulated sociotechnical design recommendations for helping these workers address wage theft. We wrapped up the paper by discussing the capacity and limit of design in interrupting these uneven social, economic, and information relations. Future work would be useful in exploring different stakeholders' experiences of the sociotechnical aspects of wage theft, including employers, worker advocacy organizations, legal experts. Further, design research could explore workers' preferences for the tradeoffs between privacy and worker-related data collection.

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