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Algorithms at Work: Productivity Monitoring Applications and Wearable Technology as the New Data-Centric Research Agenda for Employment and Labor Law

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ALGORITHMS AT WORK: PRODUCTIVITY MONITORING APPLICATIONS AND WEARABLE TECHNOLOGY AS THE NEW DATA-CENTRIC RESEARCH AGENDA FOR EMPLOYMENT AND LABOR LAW

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ABSTRACT

Recent work technology advancements such as productivity monitoring software applications and wearable technology have given rise to new organizational behavior regarding the management of employees and also prompt new legal questions regarding the protection of workers' privacy rights. In this Article, I argue that the proliferation of productivity monitoring applications and wearable technologies will lead to new legal controversies for employment and labor law. In Part I, I argue that productivity monitoring applications will prompt a reckoning of the balance between the employer's pecuniary interests in monitoring productivity and the employees' privacy interests. Ironically, such applications may also be both sword and shield in regard to preventing or creating hostile work environments. In Part II of this Article, I note the legal issues raised by the adoption of wearable technology in the workplace—notably, privacy concerns, the potential for wearable tech to be used for unlawful employment discrimination, and worker safety and workers' compensation issues. Finally, in Part III, I chart a future research agenda for privacy law scholars, particularly in defining "a reasonable expectation of privacy" for employees and in deciding legal questions over employee data collection and use.

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I. INTRODUCTION

In the eighteenth century, during the Qing Dynasty, Chinese merchants wore abacus rings which they operated with the use of a tiny pin—perhaps the first wearable technology.[1] And since Frederik Winslow Taylor's time-series experiments in factories in 1911,[2] the notion that an employer's economic interests are best achieved through the close monitoring of workers for efficiency in productivity has attained a firm foothold in American society. Today, recent work technology advancements, such as productivity monitoring software applications and wearable technology, have given rise to new organizational behavior regarding the management of employees and prompted new legal questions regarding the protection of workers' rights. In this Article, I argue that the proliferation of productivity monitoring applications and wearable technologies will lead to new legal controversies for employment and labor law. In Part I, I argue that productivity monitoring applications will prompt a rethinking of the balance between the employer's pecuniary interests in monitoring productivity and the employees' privacy interests. Ironically, such applications may also be both sword and shield in regard to preventing or creating hostile work environments. In Part II of this Article, I note the legal issues raised by the adoption of wearable technology in the workplace—notably, privacy concerns, the potential for wearable tech to be used for unlawful employment discrimination, and worker safety/workers' compensation issues. Finally, in Part III, I chart a future research agenda for privacy law scholars, particularly illuminating the need to define "a reasonable expectation of privacy" for employees and future legal questions over employee data collection and use.

II. PRODUCTIVITY MONITORING APPLICATIONS

Employers with an interest in monitoring worker productivity may request that employees install productivity applications on devices such as computers or mobile phones. Some productivity applications designed for installation on smartphones are Avaza, Boomr, Hubstaff, TSheets, GPS Phone Tracker, Track View, and Where's My Droid.[3] These applications on employees' work smartphones allow employers to easily monitor employees' activities even outside of work hours.[4] According to a 2012 study by a technology research firm

1. *See* Ashely Feinberg, *This Wearable Abacus is Basically the World's Oldest Smart Ring*, GIZMODO (Mar. 17, 2014, 3:40 PM), https://gizmodo.com/this-wearable-abacus-is-basically-the-worlds-oldest-sm-1545627562 [https://perma.cc/QGT6-YZYV].

2. FREDERICK WINSLOW TAYLOR, THE PRINCIPLES OF SCIENTIFIC MANAGEMENT 5 (1911).

3. *See* Steve Chen, *Top 5 Employee GPS Tracking Apps*, SPYZIE (Jan. 11, 2018), https://www.spyzie.com/employee-tracking/top-employee-gps-location-tracking-apps.html [https://perma.cc/6RFN-ZULK]. *See also* Lauren Maffeo, *8 Employee Tracking Apps for Android*, GETAPP (Feb. 15, 2017), https://www.getapp.com/blog/8-employee-tracking-apps-for-android/ [https://perma.cc/4H4M-QRLC].

4. *See* Chen, *supra* note 3.

Aberdeen Group, sixty-two percent of companies with so-called "field employees" were using GPS to track them.[5] This represents more than double the thirty percent figure estimated in 2008.[6]

Tracking the physical location of employees as a means to ensuring productivity or monitoring against misconduct is a social phenomenon that traverses several occupational fields. At the University of California-San Francisco Medical Center, pediatric nurses wear electronic locators that monitor them wherever they go.[7] Nurses at Wyckoff Hospital in Brooklyn are required to wear personal tracking devices, which even record the time they take a break or go to the bathroom, all for the purpose of improving care.[8] The city of Aurora, Colorado puts tracking devices inside its sweepers and snowplows to monitor the workers and it has seen an overall fifteen percent increase in productivity.[9] Employers also monitor workers' activities by installing spyware and GPS trackers[10] on desktops and company-issued laptops.[11] GPS trackers especially record enough data to make detailed profiles of individual employees and to create "biometric CVs" that prove how well an employee is suited to a job.[12]

Some have argued that such technological advances have contributed to the erosion of the demarcation between work and personal life[13] and that these new technologies bring privacy concerns, particularly since such productivity applications are capable of tracking employees outside the workplace.[14] Such persistent tracking is why, in the 1987 case of *O'Connor v. Ortega*, Justice Blackmun noted that as "the workplace has become another home for most working Americans. . . . [t]he tidy distinctions . . . between the workplace and professional affairs, on the one hand, and personal possessions and private

5. Andrea Peterson, *Some Companies Are Tracking Workers with Smartphone Apps. What Could Possibly Go Wrong?*, WASH. POST. (May 14, 2015), https://www.washingtonpost.com/news/the-switch/wp/2015/05/14/some-companies-are-tracking-workers-with-smartphone-apps-what-could-possibly-go-wrong/?utm_term=.350fb364a487 [https://perma.cc/5HN7-6SK7].

6. *Id.*

7. Betsy Stark, *Companies Tracking Employees' Every Move*, ABC NEWS (Jan. 4, 2001), https://abcnews.go.com/WNT/story?id=131333&page=1 [https://perma.cc/E4QT-VKN9].

8. *Id.*

9. *Id.*

10. *See* Aviva Rutkin, *Wearable Tech Lets Boss Track Your Work, Rest and Play*, NEW SCIENTIST (Oct. 15, 2014), https://www.newscientist.com/article/mg22429913-000-wearable-tech-lets-boss-track-your-work-rest-and-play/ [https://perma.cc/U4PW-KYYX].

11. *See* Dune Lawrence, *Companies Are Tracking Employees to Nab Traitors*, BLOOMBERG BUS. WK. (Mar. 12, 2015), https://www.bloomberg.com/news/articles/2015-03-12/companies-are-tracking-employees-to-nab-traitors. *See also* Rob Marvin, *The Best Employee Monitoring Software of 2018*, PC MAG (Oct. 11, 2018), https://www.pcmag.com/roundup/357211/the-best-employee-monitoring-software [https://perma.cc/7H2Z-UDPN?type=image].

12. *See* Rutkin, *supra* note 10.

13. *See* Robert Sprague, *Survey of (Mostly Outdated and Often Ineffective) Laws Affecting Work-Related Monitoring: The Piper Lecture*, 93 CHI.-KENT L. REV. 221, 222 (2018).

14. *See* Rutkin, *supra* note 10.

activities, on the other, do not exist in reality."[15] In the sub-sections below, I discuss the privacy concerns represented by productivity tracking, and note how the power for pervasive tracking intersects with both harassment prevention and harassment claims.

A. Weighing Privacy vs. Employers' Interests

While employers have long had a vested interest in workplace surveillance in order to track employee productivity,[16] novel legal questions are prompted by the new emerging technologies of surveillance. As it has become possible for employers to collect their employees' personal data during and after work hours, scholars[17] and workers have expressed their concerns about privacy[18] and trust in the employment relationship and potential discrimination.[19] Employee tracking also has implications for collective bargaining since an employer could be accused of spying on employee union activity if an employee with a tracked device attends a union meeting during a break or the device tracks the employee's precise locations.[20]

Arias v. Intermex Wire Transfer, LLC

A recent lawsuit shows that there is employer push-back against workplace surveillance. In 2015, shortly after Myrna Arias, the employee and the plaintiff, was hired by her employer Intermex Wire Transfer, a company that provides money wire services, Intermex instructed its employees to download the Xora application ("the Xora app") to their company-issued smartphones.[21] The Xora

15. 480 U.S. 709, 739 (1987); Sprague, *supra* note 13, at 222.

16. *See* Ifeoma Ajunwa, Kate Crawford & Jason Schultz, *Limitless Worker Surveillance*, 105 CAL. L. REV. 735, 740–42 (2017).

17. *See* Patricia Sánchez Abril, Avner Levin & Alissa Del Riego, *Blurred Boundaries: Social Media Privacy and the Twenty-First-Century Employee*, 29 AM. BUS. L.J. 63, 64, 100 (2012) (arguing that "'boundary-crossing' technologies blur the already elusive line between the private and the public, the home and the workplace."). *See also* Ariana R. Levinson, *Toward a Cohesive Interpretation of the Electronic Communications Privacy Act for the Electronic Monitoring of Employees*, 114 W. VA. L. REV. 461, 469 (2012) ("Technology permits a 'boundary-less' workplace in which employees work during non-work hours and while at home . . . . As for employers, the technology provides more ability to monitor employees' communications, made both at work and away from work."); Sprague, *supra* note 13, at 244.

18. *See* Rutkin, *supra* note 10.

19. *See* Peterson, *supra* note 5.

20. *See* Patience Haggin, *As Wearables in Workplace Spread, So Do Legal Concerns*, WALL. ST. J. (Mar. 13, 2016), https://www.wsj.com/articles/as-wearables-in-workplace-spread-so-do-legal-concerns-1457921550?ns=prod/accounts-wsj [https://perma.cc/3DNA-XRKG].

21. *See* Notice to Federal Court of Removal of Civil Action from State Court at 17, Arias v. Intermex Wire Transfer, LLC, No. 1:15-CV-01101 (E.D. Cal. July 16, 2015), ECF No.1 [hereinafter *Arias*]. *See also* Timothy L. Fort, Anjanette H. Raymond & Scott J. Shackelford, *The Angel on Your Shoulder: Prompting Employees to Do the Right Thing Through the Use of Wearables*, 14 NW. J. TECH. & INTELL. PROP. 139, 146 (2016); Sprague, *supra* note 13, at 223.

app is part of the StreetSmart workforce management software distributed by ClickSoftware, which provides the location of every mobile employee on a Google Map "with detailed information such as arrival times, break status, the route driven and more."[22] When the employees found out that the Xora app contained a GPS function, Arias and other employees asked their employer whether they would be monitoring their movements even when the employees were off-duty.[23] This was particularly concerning because the employees were required to keep their phones on "24/7 to answer phone calls from clients."[24] Arias' supervisor at Intermex, Stubits, admitted that employees would be monitored while off duty and "bragged that he knew how fast she was driving at specific moments ever since she had installed the app on her phone."[25] Arias had no problem with turning on the Xora app during her work hours, but she objected to having her location monitored during non-work hours and complained to her supervisor that this was an invasion of her privacy, arguing that the Xora app was similar to a prisoner's "ankle bracelet."[26] Afterwards, she was scolded for uninstalling the Xora app, and within a few weeks of her objection to the use of the Xora app, Intermex fired her.[27] After Intermex terminated Arias' employment, the president and CEO of Intermex telephoned the vice president of NetSpend, the company Arias had been working for after being fired by Intermex, and she was promptly fired by NetSpend.[28] Arias filed a lawsuit claiming wrongful termination, invasion of privacy, unfair business practices, retaliation, and other claims, seeking over $500,000 in damages for lost wages.[29] The suit was privately settled.[30] The case is particularly important because employees are increasingly expected to be available at any time, and this leads to the mixing of business and personal activities during office hours where employers can easily "cross the line."[31]

Since the Arias case was settled out of court, we cannot know exactly how it would have been decided in court. It is also curious that there have been no comparable cases, since the use of productivity applications in the workplace is

22. StreetSmart, CLICKSOFTWARE, https://www.clicksoftware.com/products/streetsmart/ [https://perma.cc/Y369-29R7] (last visited Jan. 29, 2019).

23. Arias, *supra* note 21, at 17.

24. *Id.* at 18 (internal quotations omitted).

25. *Id.* at 17–18.

26. *Id.* at 18.

27. *Id.*

28. Arias, *supra* note 21, at 18.

29. *Id.* at 19.

30. Jennifer M. Holly, *There's an App for That: Considerations in Employee GPS Monitoring*, SEYFARTH SHAW: CAL. PECULIARITIES EMP. L. BLOG (Jan. 26, 2017), https://www.calpeculiarities.com/tag/arias-v-intermex-wire-transfer/ [https://perma.cc/F97W-S363].

31. Adriana Gardella, *Employer Sued for GPS-Tracking Salesperson 24/7*, FORBES (Jun. 5, 2015, 10:57 AM), https://www.forbes.com/sites/adrianagardella/2015/06/05/employer-sued-for-gps-tracking-salesperson-247/#240c9bb723e3 [https://perma.cc/L8JV-GR8S].

an ongoing trend. The attorney who represented Arias, believes that "her argument, which relied in part on the section of the California penal code that restricts how GPS tracking can be used, may not have worked anywhere else."[32] California law mandates criminal liability, with few exceptions, for the "use [of] an electronic tracking device to determine the location or movement of a person."[33] As my co-authors and I note in a previous article, California remains one of few states with more comprehensive privacy laws, especially in relation to workers.[34] Therefore, some states may recognize some forms of employee surveillance as a privacy violation while others will not.[35] Thus, would-be plaintiffs, who are similarly situated to Arias, but live outside California, may still find it difficult even to bring a suit.

GPS on Phones

There are similar cases in which employees have complained about their employers' excessive surveillance using productivity and monitoring applications, especially ones with GPS tracking functions. In *Crabtree v. Angie's List, Inc.*,[36] the employees sued their employer, objecting to providing GPS data through their personal cell phones and asserting that they were wrongfully denied overtime compensation based on the Fair Labor Standards Act during a one-year period in which the employees worked as Senior Sales Representatives.[37] The defendant, Angie's List, did not provide company-issued laptops or cell phones for use outside the office, so the workers often used their personal electronic devices for work purposes.[38] As the employees spent approximately ten to twelve hours per day working but were paid based on an eight-hour day and a forty-hour workweek, the employer sought to obtain GPS data from the employees' personal cell phones to construct a timeline of when they were actually were or were not working.[39] The employees rejected this attempt because they believed that it raised the significant privacy concern of tracking the workers' movements even outside of their working time, and that the GPS data would not accurately portray whether they were working at any particular time.[40]

The employer asserted that the data would be relevant to demonstrating whether the employees "left for the day, left for lunch, or some other unpaid

32. Kaveh Waddell, *Why Bosses Can Track Their Employees 24/7*, THE ATLANTIC (Jan. 6, 2017), https://www.theatlantic.com/technology/archive/2017/01/employer-gps-tracking/512294 [https://perma.cc/LJA6-PC8Y].

33. CAL. PEN. CODE § 637.7 (West 2018).

34. *See, e.g.*, Ajunwa, Crawford & Schultz, *supra* note 16, at 739–40.

35. *Id.*

36. No. 1:16-cv-00877-SEB-MJD, 2017 WL 413242, at *1 (S.D. Ind. Jan. 31, 2017).

37. *Id.*

38. *Id.*

39. *Id.*

40. *Id.*

break"[41] during the hours when they could log onto their computer software and still be inactive.[42] Of course, when the workers were permitted to work from home, the GPS data would be meaningless. The employer looked for support in other district court cases.[43] One of them was *Head v. Professional Transportation, Inc.*,[44] in which the employer was permitted to obtain GPS data from trucks used in the business.[45] However, Angie's List overlooked the difference between that case and their own because the trucks in *Head* were owned by the employer and were driven during the workday.[46] In *Baclawski v. Mountain Real Estate Capital LLC*,[47] another case cited by Angie's List, the court denied the employer's request to image the employee's cell phone and computer and allowed access to data only from a time recording application because the data were not as intrusive as GPS data.[48] According to Rule 26(b)(2)(C)(i), discovery of information is limited if it can be obtained from another source that is "more convenient, less burdensome, or less expensive," [49] and the employer allegedly had an alternative in *Crabtree v. Angie's List, Inc*.[50] Rule 26(b)(1) also requires that data collection be "proportional to the needs of the case,"[51] but Angie's List did not demonstrate that the GPS data from employees would be more probative of their working habits than data they already had—such as records of business-related calls.[52] Therefore, the court found that the employer's demand was not proportional to the needs of the case because "any benefit the data might provide is outweighed by Plaintiffs' significant privacy and confidentiality interests."[53] Consequently, the employer's motion was denied.[54]

Haggins v. Verizon New Eng., Inc.[55] also discusses the GPS monitoring of employees. Between November 2008 and February 2009, Verizon New England ("VNE") required its field technicians to carry company-issued cell phones provided by Verizon Wireless during work because supervisors needed to stay in touch with the workers in order to assign installation projects.[56] The cell

41. *Crabtree*, 2017 WL 413242, at *2.
42. *Id.*
43. *Id.*
44. No. 3:13-cv-00208-RLY-WGH, 2015 WL 5785797, at *1 (S.D. Ind. Sept. 30, 2015).
45. *Id.* at *2.
46. *Crabtree*, 2017 WL 413242, at *2.
47. No. 3:15-cv-417-RJC-DCK, 2016 WL 3381258, at *1 (W.D.N.C. June 10, 2016).
48. *Id.* at *1–2.
49. Fed. R. Civ. P. 26(b)(2)(C)(i).
50. *Crabtree*, 2017 WL 413242, at *1.
51. Fed. R. Civ. P. 26(b)(1).
52. *Crabtree*, 2017 WL 413242, at *3.
53. *Id. See also* Hespe v. City of Chicago, 2016 WL 7240754, at *3 (N.D. Ill. Dec. 15, 2016).
54. *Crabtree*, 2017 WL 413242, at *3.
55. 648 F.3d 50, 51 (1st Cir. 2011).
56. *Id.*

phones contained a GPS function, which allowed the employer to determine the location of the employees and monitor them.[57] The cell phones had a feature called Field Force Manager, which allowed employees to punch in and out of work remotely, receive driving instructions, and access customer contact information in addition to the GPS functionality.[58] The employees were represented by a union, the International Brotherhood of Electrical Workers Local 2324, which had a collective bargaining agreement ("CBA") with the employer.[59] The employees sued the employer, asserting that carrying the phones violated their privacy rights under Article 14 of the Declaration of Rights in the Massachusetts Constitution, Massachusetts statutory law, and their state-law rights as alleged third-party beneficiaries of a contract between VNE and Verizon Wireless.[60]

In response, the company asserted that it had adopted the cell phone policy pursuant to the Management Rights clause of the CBA.[61] Also, by switching from pagers to cell phones, VNE sought to improve their ability to respond quickly to emergencies and improve its communication with the employees, who worked as Central Office Equipment Installation Technicians.[62] The company also asserted that the GPS function was important to transmit driving instructions, process employee work hours, and determine whether an employee was at the place he or she was supposed to be.[63]

The court held that the union's claim about privacy was preempted by section 301 of the Labor Management Relations Act[64] because their resolution would require interpretation of the CBA's Management Rights clause.[65] It also granted summary judgment on the third-party beneficiary claim as the plaintiffs had not produced any evidence about the intent of the contracting parties.[66] In the end, the employees' claims were dismissed.[67]

57. *Id.*

58. *Id.* at 53.

59. *Id.* at 51.

60. *See Haggins*, 648 F.3d at 51; Mass. Const. art. XIV, pt. 1.; Mass. Gen. Laws ch. 214, § 1B.

61. *Haggins*, 648 F.3d at 52. (The "Management Rights" in the agreement stated: "[s]ubject only to the limitations contained in this Agreement the Company retains the exclusive right to manage its business including (but not limited to) the right to determine the methods and means by which its operations are to be carried on, to assign and direct the work force and to conduct its operations in a safe and effective manner.").

62. *Id.* at 53.

63. *Id.*

64. *Id.*; Labor Management Relations Act, 29 U.S.C. § 185(a). *See also* Haggins v. Verizon New England, Inc., 736 F. Supp. 2d 326, 329 (D. Mass. 2010).

65. *Haggins*, 648 F.3d at 54.

66. *Id.*

67. *Id.* at 57.

GPS on Vehicles

There are laws and cases related to GPS tracking of vehicles as well. As an example of one such law, an Illinois statute enacted in 2014 prohibits the utilization of GPS tracking to monitor the location of vehicle without the consent of the vehicle owner, unless the tracking is lawfully conducted by a law enforcement agency.[68] It is therefore not illegal for employers to track the location of a company-owned vehicle used by its employees because the employer, the owner of the vehicle, consents to the tracking. Also, California Penal Code §637.7 prohibits the use of "an electronic tracking device to determine the location or movement of a person" via a "vehicle or other moveable thing," unless "the registered owner, lessor, or lessee of a vehicle has consented to the use of the electronic tracking device with respect to that vehicle."[69]

Several courts have supported this idea by holding that an employee driving an employer-owned vehicle is not able to claim invasion of privacy when the employer tracks his or her whereabouts. Some example lawsuits are *Elgin v. Coca-Cola Bottling Co.*[70] and *Tubbs v. Wynne Transp. Servs.*[71] In *Elgin v. Coca-Cola Bottling Co.*, the employer investigated the employee, an African-American employee, and other Caucasian employees when it had cash shortages from vending machines with no sign of forced entry.[72] After the investigation, the employee was informed that a GPS tracker had been placed on his vehicle and that he had been cleared of wrongdoing.[73] The employee did not experience any adverse employment action.[74] The employee sued the employer, asserting that it violated the Missouri Human Rights Act and intruded upon his seclusion by performing a racially motivated investigation.[75]

As part of the reasoning for the decision in favor of the employer, the court stated that the use of the tracking device on the company car, even though it was used by the employee, did not constitute a great intrusion because it revealed only highly public information of the van's location and it should not be highly offensive to the employee because the van was the employer's property.[76] Similarly, in *Tubbs v. Wynne Transp. Servs.*, no invasion of privacy for the

68. 720 ILL. COMP. STAT. 5/21-2.5(c) (West 2012).

69. CAL. PEN. CODE § 637.7 (West 2018). *See also* Holly, *supra* note 30 (regarding the legal restriction and employee GPS monitoring).

70. No. 4:05cv970-DJS, 2005 WL 3050633, at *5 (E.D. Mo. Nov. 14, 2005).

71. No. H-06-0360, 2007 WL 1189640, at *1 (S.D. Tex. Apr. 19, 2007).

72. *Elgin*, 2005 WL 3050633 at *1.

73. *Id.*

74. *Id.*

75. *Id.*

76. *Id.* at *4.

employee was found when the employer had its trucks outfitted with GPS devices.[77]

In *Gerardi v. City of Bridgeport*,[78] an employee hired as a fire inspector for the city's fire department sued the city and its fire chief, alleging violations of Conn. Gen. Stat. sections 31-48b[79] and 31-48d.[80] The city equipped fire inspectors' vehicles with GPS without informing the inspectors and then brought a disciplinary proceeding against the employee, claiming that he was not performing his job well based on the GPS data.[81] Because the Connecticut Electronic Monitoring Act defines electronic monitoring as "the collection of information on an employer's premises," the court held that an employer's off-site GPS monitoring of its own vehicles would not be prohibited by the Act.[82] The court found that the statutes the plaintiff claimed were violated did not apply and that plaintiff had not exhausted his administrative remedies as provided in the CBA.[83]

When it comes to privacy expectations for workers, "[m]any courts have found that employees do not have a reasonable expectation of privacy when employer-owned equipment or technology is involved, the employer has a legitimate business interest, and the intrusion occurs during normal work hours."[84] However, the law is less clear when an employer tries to track employees who use their personal vehicles for company business. For example, in *Cunningham v. New York State Dept. of Labor*, installing a GPS device on a vehicle owned by a state employee was found to be an unreasonable search.[85]

77. No. H-06-0360, 2007 WL 1189640, at *10 (S.D. Tex. Apr. 19, 2007).

78. No. CV084023011S, 2007 WL 4755007, at *1 (Conn. Super. Dec. 31, 2007), *aff'd*, 985 A.2d 328 (Conn. 2010).

79. CONN. GEN. STAT. ANN. § 31-48b (West 2012) (limiting use of electronic surveillance devices by employers limited and prohibiting recording negotiations between employers and employees).

80. CONN. GEN. STAT. ANN. § 31-48d (West 2012) (requiring employers engaged in electronic monitoring required to give prior notice to employees).

81. *Gerardi*, 2007 WL 4755007, at *1; CONN. GEN. STAT. ANN. § 31-48d (West 2012).

82. *Gerardi*, 2007 WL 4755007, at *8; Hugh W. Cuthbertson, *Supreme Court's Decision: Privacy and GPS*, ZANGARI COHN, https://www.zcclawfirm.com/what-the-u-s-supreme-courts-decision-about-privacy-and-gps-monitoring/ [https://perma.cc/8326-T42W].

83. *Gerardi*, 2007 WL 4755007, at *8.

84. Clement L. Tsao, Kevin J. Haskins & Brian D. Hall, *The Rise of Wearable and Smart Technology in the Workplace*, A.B.A. NAT'L SYMP. ON TECH. IN LAB. & EMP. L. 1, 3 (2017). *See also* Garrity v. John Hancock Mutual Life Ins. Co., No. CIV.A. 00–12143–RWZ, 2002 WL 974676, at *2 (D. Mass. May 7, 2002) (finding no reasonable expectation of privacy for emails sent on computer system owned by employer and when the employer has a legitimate business interest); Thygeson v. U.S. Bancorp., No. CV–03–467–ST, 2004 WL 2066746, at *21 (D. Or. Sept. 15, 2004) (no reasonable expectation of privacy when the employee used his employer's computer and network for personal use, saved personal information in a location that was accessible by his employer, and the employee handbook prohibited personal use of the employer's computer).

85. 997 N.E.2d 468, 470 (N.Y. 2013). *See also* Tsao, Haskins & Hall, *supra* note 84, at 3.

The New York State Department of Labor (the "DOL") suspected that the employee submitted false time reports and attached a GPS device to his car.[86] Later, the GPS data substantiated the DOL's suspicions, and the employee was terminated after a hearing.[87] Because the employer's search was within the workplace, the court concluded that the employer did not violate the New York or United States Constitutions by not seeking a warrant first.[88] However, the search was considered unreasonable because it was extremely intrusive as the GPS tracked the employee even on evenings, weekends, and vacation.[89] The search as a whole was regarded as unreasonable because the employer did not make a reasonable effort to avoid tracking the worker outside of the worker's working hours.[90] The GPS evidence was therefore suppressed.[91]

However, other courts have reached different conclusions. In *El-Nahal v. Yassky*,[92] taxi driver Hassan El-Nahal filed a complaint against David Yassky, Commissioner Matthew Daus, Mayor Michael Bloomberg, and the City of New York, claiming that the New York City Taxi and Limousine Commission ("TLC") violated 42 U.S.C. § 1983, the Fourth Amendment, and Article I, Section 12 of the New York State Constitution by using GPS to track his whereabouts without probable cause or a search warrant.[93] In this case, the court found that taxi drivers in New York City did not have an expectation of privacy in GPS data even though the drivers personally owned their vehicles because the state regulatory authorities required GPS tracking system to be installed in all cabs.[94] Furthermore, regulations mandated use of the technology system and required taxi drivers to create handwritten trip records if the system was not working to keep records of the driver's activity.[95] When considering invasion of privacy claims, "courts generally weigh the employee's expectation of privacy against the employer's asserted business purposes for monitoring its employees."[96] *Katz v. United States* brought the term "reasonable expectation" into privacy issues and protections.[97] "A reasonable expectation of privacy is an

86. *Cunningham*, 997 N.E.2d at 470–71.

87. *Id.* at 471.

88. *Id.* at 472.

89. *Id.* at 473.

90. *Id.*

91. *Cunningham*, 997 N.E.2d at 473.

92. 993 F. Supp.2d 460, 461 (S.D.N.Y. 2014).

93. *Id.*

94. *Id.* at 466; Elizabeth Austermuehle, *Monitoring Your Employees through GPS: What is Legal, and What Are Best Practices?*, GREENSFELDER (Feb. 18, 2016, 2:33 PM), https://www.greensfelder.com/business-risk-management-blog/monitoring-your-employees-through-gps-what-is-legal-and-what-are-best-practices [https://perma.cc/HL28-TBTX].

95. *El-Nahal*, 993 F. Supp. 2d at 466.

96. Matthew E. Swaya & Stacey R. Eisenstein, *Emerging Technology in the Workplace*, 21 LAB. LAW. 1, 13 (2005).

97. 389 U.S. 347, 360 (1967) (Harlan, J., concurring).

objective entitlement founded on broadly based and widely accepted community norms,"[98] and courts have recognized that lack of notice and consent typically support employees' invasion of privacy claims.[99]

B. Harassment and Hostile Work Environment Issues

Beyond the concerns over privacy, electronic monitoring—as effectuated by productivity tracking applications—holds implications both for the employer harassment of employees as well as for the employer's obligation to prevent harassment in the workplace. Consider that the previously mentioned *Arias* case[100] essentially depicts a supervisor's abuse of the power to monitor. Notably, Arias' supervisor at Intermex, Stubits, admitted that employees would be monitored while off duty and bragged that he knew Arias' driving speed at any given moment.[101] When Arias uninstalled the app after expressing concern that the app was similar to a "prisoner's ankle bracelet,"[102] she was scolded for uninstalling the app and was fired.[103] Furthermore, after Intermex terminated Arias' employment, the president and CEO of Intermex telephoned the vice president of another company, NetSpend, where Arias had been working and Arias was then fired by NetSpend.[104] It is no surprise then, that Arias's lawsuit included a claim for "retaliation" among other claims.[105]

However, it is also important to understand that in some instances the law may encourage or even require workplace monitoring. As noted by one scholar:

> Hostile work environment jurisprudence is one [area in which law may compel surveillance]. *Burlington Industries, Inc. v. Ellerth*, and its companion case *Faragher v. City of Boca Raton*, offers employers a defense against a hostile environment created by a supervisor (when no tangible employment action is taken) if it exercised reasonable care to prevent and correct promptly any sexually harassing behavior. This places greater pressure on employers to monitor employee behavior.[106]

98. Gonzales v. Uber Techs., Inc., 305 F. Supp. 3d 1078, 1091 (N.D. Cal. 2018) (quoting Hill v. Nat'l Collegiate Athletic Ass'n., 865 P.2d 633, 655 (Cal. 1994)).

99. Swaya & Eisenstein, *supra* note 96, at 13.

100. *See* Arias, *supra* note 21, at 17. *See also* Fort, Raymond & Shackelford, *supra* note 21, at 146; Sprague, *supra* note 13, at 223.

101. Arias, *supra* note 21, at 39.

102. *Id.*

103. *Id.* at 40.

104. *Id.*

105. *Id.* at 42.

106. Sprague, *supra* note 13, at 224.

Others have noted that new technologies used in hiring may prompt new data retention mandates.[107] While this is different from surveillance to track productivity, the notion is that the use of technologies with increased tracking capabilities may give rise to new data-keeping responsibilities for employers. For example, many hiring technologies operate by observing patterns,[108] thus use of such technologies could create opportunities for claims of disparate impact and the obligation to retain the data that would prove or disprove those claims. Additionally, as I discuss next, when wearable technologies such as exoskeletons are used in the workplace, this may trigger data retention responsibilities, particularly regarding workers compensation claims.

III. WEARABLE TECHNOLOGY

The introduction of wearable technologies in the workplace creates the need for clear guidelines as to what legal protections are left for workers regarding the adoption of such devices. On example of new wearable technology is the haptic feedback wristband invented by Amazon.[109] The full name for the patent is the Ultrasonic Bracelet and Receiver for Detecting Position in 2D Plane, and the goal of the system is to save time locating items in warehouses and increase productivity. [110] The bracelet would also able to monitor and direct the worker to the correct inventory bins via haptic feedback.[111] The bracelet can track more than mere productivity as it can also track location and hand movements.[112]

According to a number of articles, magazines, and the U.S. patent file,[113] the system includes ultrasonic devices installed around the warehouse, the actual wristbands that warehouse workers wear, and a management module that

107. Harvey L. Fiser & Patrick D. Hopkins, *Getting Inside the Employee's Head: Neuroscience, Negligent Employment Liability, and the Push and Pull for New Technology*, 23 B.U. J. SCI. & TECH. L. 44, 59–61 (2017).

108. *Id.* at 61–62.

109. U.S. Patent No. 9,881,276 (issued Jan. 30, 2018).

110. *See id.*

111. *Id.*

112. Ceylan Yeginsu, *If Workers Slack Off, the Wristband Will Know. (And Amazon Has A Patent For It.)*, N.Y. TIMES (Feb. 1, 2018), https://www.nytimes.com/2018/02/01/technology/amazon-wristband-tracking-privacy.html [https://perma.cc/4MHZ-PPUF?type=image]; Memorandum from Eric Liberatore to author (June 12, 2018) (on file with author).

113. *See* '276 Patent. *See also* Thuy Ong, *Amazon Patents Wristbands that Track Warehouse Employees' Hands in Real Time*, THE VERGE (Feb. 1, 2018, 9:15 AM), https://www.theverge.com/2018/2/1/16958918/amazon-patents-trackable-wristband-warehouse-employees [https://perma.cc/8FYU-4RNR]; Olivia Solon, *Amazon Patents Wristband that Tracks Warehouse Workers' Movements*, THE GUARDIAN (Jan. 31, 2018, 7:30 PM), https://www.theguardian.com/technology/2018/jan/31/amazon-warehouse-wristband-tracking [https://perma.cc/R5JZ-UPBZ]; Gunseli Yalcinkaya, *Amazon Patents Wristband to Track Productivity and Direct Warehouse Staff Using Vibrations*, DEZEEN (Feb. 6, 2018), https://www.dezeen.com/2018/02/06/amazon-patents-wristbands/ [https://perma.cc/8Q8S-89MY]; Yeginsu, *supra* note 112; Memorandum from Eric Liberatore to author (June 12, 2018) (on file with author).

oversees the activity. With an ultrasonic unit, the system tracks where the worker is in relation to a particular inventory bin they are seeking, and the bracelet buzzes when he or she is heading the wrong direction.[114] By using the device, supervisors would also be able to identify when the workers pause, fidget, or take a bathroom break.[115]

Amazon already holds the reputation for a management style that some allege results in the treatment of workers, especially low-paid laborers, like "human robots," by having them conduct repetitive tasks as fast as possible.[116] By allegedly timing their toilet breaks and using packing timers, the wristband, with its haptic feedback system, has raised further concerns about poor working conditions and the possibility of harsher workplace surveillance. [117] In response to this, Amazon released a statement about its patents for wristband tracking systems in which it characterized concerns as misguided and asserted that the wristbands would improve the process of product retrieval from bins by "free[ing] up [workers'] hands from scanners and their eyes from computer screens."[118]

Amazon has not yet deployed the bracelet device,[119] but the company already makes use of wearable GPS tags to optimize warehouse routes.[120] Other companies like Intermec Technologies Corporation ("Intermec") have also applied for patents on glove or wristband that would assist in sorting inventory.[121] Similar to Amazon's patent, Intermec's invention, whose patent application is still pending, would communicate proximity to inventory bins. [122]

Other companies are following suit. For example, MAD Apparel, Inc. ("MAD"), has filed a patent for a vest that can monitor, provide feedback, and also make real time adjustments.[123] Although MAD advertises its vest for personal purposes, the vest has applications for the workplace, especially

114. *See* Yeginsu, *supra* note 112.

115. *Id*.

116. *See* Solon, *supra* note 113.

117. *See* Solon, *supra* note 113. *See also* Yeginsu, *supra* note 112.

118. Alan Boyle, *Amazon Wins a Pair of Patents for Wireless Wristbands that Track Warehouse Workers*, GEEKWIRE (Jan. 30, 2018, 10:50 AM), https://www.geekwire.com/2018/amazon-wins-patents-wireless-wristbands-track-warehouse-workers/ [https://perma.cc/XN4M-LUQS]. *See also* Ong, *supra* note 113.

119. *See* Yeginsu, *supra* note 112.

120. Karen Turner, *Are Performance-monitoring Wearables an Affront to Workers' Rights?*, CHI. TRIB. (Aug. 7, 2016, 8:00 AM), http://www.chicagotribune.com/bluesky/technology/ct-wearables-workers-rights-wp-bsi-20160807-story.html [https://perma.cc/E27A-CKNS?type=image].

121. U.S. Patent Application No. 15/145,144, Pub. No. 2016/0247006 (published Aug. 25, 2016) (Intermec Tech. Corp., applicant); U.S. Patent Application No. 13/756,115, Pub. No. 2014/0214631 (published Jul. 31, 2014) (Intermec Tech. Corp., applicant).

122. '144 Application.

123. U.S. Patent No. 9,498,128 (issued Nov. 22, 2016).

involving work where physical labor is required.[124] Similarly, another patent application has been filed for an electromagnetic frequency identification devices which could be used in different settings including health care and law enforcement.[125]

Virtual reality technologies, which are usually used in video gaming, are also being applied in industrial settings. Immersion Corp. has filed a patent application for a haptic feedback bodysuit which can control the intensity of the haptic feedback.[126] The patent application contains a reference to "work colleagues," implying that the technology is intended for a work environment.[127]

Recent healthcare patent applications for wearable technology also have the potential to crossover into the workplace. For example, one proposed wearable technology by IBM would work by both detecting and correcting poor posture.[128] Other smart exoskeletons that can be adjusted via algorithms would do more than correct gait or prevent falls, they would monitor deviations from a prescribed path and also transmit other biometric data.[129] Still others, like Hyundai's proposed exoskeleton, have designated models for the workplace and have been dubbed "wearable robots."[130]

These patent applications with clear applications in the workplace demonstrate a continued future for wearables in the workplace and show that Amazon is not the only company that deploys such technology to improve worker productivity and efficiency. For example, Mike Glenn, the executive vice president of market development and corporate communications at FedEx Corporation ("FedEx"), notes that wearable technology is already having a significant impact on FedEx employees, especially those involved in package

124. *Id.*

125. U.S. Patent Application No. 14/998,746, Pub. No. 2016/0189174 (published June 30, 2016) (Stephan Heath, applicant).

126. U.S. Patent Application No. 15/134,797, Pub. No. 2017/0243453 (published Aug. 24, 2017) (Immersion Corp., applicant).

127. *Id.*

128. U.S. Patent Application No. 14/849,152, Pub. No. 2017/0068313 (published Mar. 9, 2017) (Int'l Bus. Mach. Corp., applicant).

129. *See, e.g.*, U.S. Patent Application No. 15/605,313, Pub. No. 2018/0125738 (published May 10, 2018) (Carnegie Mellon Univ., applicant); Dan Robitzski, *How A.I. Exoskeletons Could Make People Super-Human*, INVERSE (June 22, 2017), https://www.inverse.com/article/33298-personalized-exoskeletons-carnegie-mellon [https://perma.cc/CS7T-W4AX?type=image]; Magdalena Petrova, *A Smart Exoskeleton Can Keep the Elderly Safe*, PCWORLD (May 15, 2017, 11:07 AM), https://www.pcworld.com/article/3196965/wearables/a-smart-exoskeleton-can-keep-the-elderly-safe.html [https://perma.cc/B2RW-YK5K].

130. *Hyundai Motor Leads Personal Mobility Revolution with Advanced Wearable Robots*, HYUNDAI MOTOR COMPANY (Jan. 4, 2017), https://www.hyundaiusa.com/about-hyundai/news/Corporate_HYUNDAI_MOTOR_LEADS_PERSONAL_MOBILITY_REVOLUTION_WITH_ADVANCED_WEARABLE_ROBOTS-20170104.aspx [https://perma.cc/H2YG-78TL].

sorting, pickup, and delivery, who wear ring scanners.[131] In addition, United Parcel Service, Inc. ("UPS") adopted a wearable scanning system in 2012 for its employees who handle packages.[132] The workers wear hands-free imagers on a finger and a small terminal on the wrist or hip so that they can quickly image barcodes and improve data entry.[133] UPS also has sensors on its delivery trucks to collect data and "track the opening and closing of doors, the engine of the vehicle, and whether a seat belt is buckled."[134] A Canadian startup, Thalmic Labs, invented an armband that lets a wearer control movements on a screen with a flick of the wrist.[135] Moving beyond the consumer space, the company targets workers in industries like construction, field service, and healthcare where integration with smart glasses, like Google Glass, could be helpful.[136] In another example of wearables with work applications, XOEye glasses are able to make use of HD video so that the wearer can avoid danger.[137] Additionally, the XOEye glasses have a communication feature which allows for a worker to be guided by another worker or supervisor via the video transmission.[138]

Fitbit has become a particularly popular wearable technology for the workplace. Holding the top spot in the wearable market, it includes "a GPS monitor, a heart rate monitor, and an alarm and can even compile exercise summaries."[139] These days, employees are encouraged—and often rewarded—for providing their information through such devices. For example, "[a]bout 90% of companies now offer wellness programs, some of which encourage

131. *See* Fort, Raymond & Shackelford, *supra* note 21 at 145. *See also Q&A with Mike Glenn, FedEx Services*, ACCESS (Nov. 2013), http://access.van.fedex.com/qa-mike-glenn-fedex-services/ [http://perma.cc/7CXE-PZJ6].

132. Jacques Couret, *UPS Using 'Wearable' Scanning System*, ATLANTA BUS. CHRON. (Aug. 2, 2012, 10:53 AM), http://www.bizjournals.com/atlanta/news/2012/08/02/ups-using-wearable-scanning-system.html [http://perma.cc/8B27-MEN9].

133. *See* Fort, Raymond & Shackelford, supra note 21 at 145. *See also* Couret, *supra* note 132.

134. Andrea Miller, *More Companies Are Using Technology to Monitor Employees, Sparking Privacy Concerns*, ABC NEWS (Mar. 10, 2018, 7:04 AM), https://abcnews.go.com/US/companies-technology-monitor-employees-sparking-privacy-concerns/story?id=53388270 [https://perma.cc/HHP2-R9DK].

135. *See* Hollie Slade, *Hand Gesture Armband Myo Integrates with Google Glass*, FORBES (Aug. 19, 2014, 9:02 AM), https://www.forbes.com/sites/hollieslade/2014/08/19/hand-gesture-armband-myo-integrates-with-google-glass/#39309793608c [https://perma.cc/QZ95-HYSZ].

136. *Id.*

137. Olivia Solon, *Wearable Technology Creeps into the Workplace*, SYDNEY MORNING HERALD (Aug. 7, 2015, 2:43 PM), https://www.smh.com.au/business/workplace/wearable-technology-creeps-into-the-workplace-20150807-gitzuh.html [https://perma.cc/4TPW-LH4Z].

138. *Id.*

139. Alexandra Troiano, Note, *Wearables and Personal Health Data: Putting a Premium on Your Privacy*, 82 BROOK. L. REV. 1715, 1716 (2017). *See also Our Technology*, FITBIT, https://www.fitbit.com/technology [https://perma.cc/87R3-EMG9] (last visited Nov. 7, 2018); *SmartTrack*, FITBIT, https://www.fitbit.com/smarttrack [https://perma.cc/8GYM-46EW] (last visited Nov. 7, 2018).

employees to use Fitbit and other devices that measure the quantity and intensity of their workouts and to employ simple visual and motivational tools to track their progress and help sustain their engagement."[140] Appirio, an information technology consulting company, distributed 400 Fitbits to employees as a part of its corporate wellness program.[141]

Also, smart watches that share many capabilities of fitness bands have pedometer technology or GPS functionality that can measure efficiency and improve employee safety.[142] These devices optimize the storage locations of tools and aim to minimize workers' movement—similar to Amazon's haptic wristband—by tracking the steps required to execute particular operations and automatically shutting down machines when employees are in danger.[143] Employees could also use their smart watches to easily update locations and quantities of inventories, and to conduct transactional operations.[144]

Cap and Helmet

SmartCap, invented by an Australian company called EdanSafe, detects the wearer's brain activity and delivers data to workers about fatigue levels in real time by reading their brain waves.[145] Once per second, an algorithm analyzes the data collected by the SmartCap to determine the wearer's level of alertness and transmits this information by Bluetooth to the user.[146] Audial and visual alarms are activated when the user's fatigue level drops and the sensors also can tell when the SmartCap is removed.[147] Supervisors can monitor the output and fatigue levels of numerous cap-wearing employees during past shifts using the SmartCap and its accompanying Fatigue Manager Server.[148] The SmartCap was initially developed for use in the mining industry and is currently used by many

140. H. James Wilson, *Wearables in the Workplace*, HARV. BUS. REV. (Sept. 2013), https://hbr.org/2013/09/wearables-in-the-workplace [https://perma.cc/UJJ7-BW9L]. *See also* Fort, Raymond & Shackelford, supra note 21, at 153; Troiano, *supra* note 139, at 1717, 1722 (stating that wellness programs and wearable devices are implemented to increase productivity and health-related costs can be reduced).

141. Troiano, *supra* note 139, at 1722.

142. *See* Patrick Van den Bossche, et al., *Wearable Technology in the Warehouse*, SUPPLY CHAIN 24/7 (Feb. 1, 2016), http://www.supplychain247.com/article/wearable_technology_in_the_warehouse [https://perma.cc/T3N5-SG43].

143. *Id.*

144. *Id.*

145. *See* Ben Coxworth, *SmartCap Monitors Workers' Fatigue Levels by Reading Their Brain Waves*, NEW ATLAS (Jan. 31, 2012), https://newatlas.com/smartcap-measures-fatigue-brain-waves/21271/ [https://perma.cc/X7RM-66GE]. *See also* Natalie Holmes, *Wearable Technology within the Workplace*, CONVENE, https://convene.com/catalyst/wearable-technology-within-the-workplace/ [https://perma.cc/W4LH-UA3S] (last visited Nov. 8, 2018).

146. *See* Coxworth, *supra* note 145.

147. *Id.*

148. *Id.*

truck drivers to increase their productive output and physical safety.[149] "A headband version is also in production."[150]

The DAQRI helmet is a similar product that allows workers to see GPS-guided blueprints via augmented reality vision in real time and spot welds by seeing through walls.[151] In addition to a visor that presents visual overlays of information, like instruction and warnings, the helmet has "cameras and sensors that can measure, record, and track information about the wearer's surroundings."[152] The helmet is used by companies like California-based Hyperloop.[153]

High-Tech Vests

Similar to the way the Amazon wristband tracks workers' location, high-visibility vests are fitted with GPS to enhance workplace safety by alerting workers when they are entering a hazardous zone on construction sites.[154] This high-tech vest not only reduces danger by tracking workers throughout a geo-fenced jobsite, but it also optimizes workflow by allowing managers to track workers' movements. [155]

Another example of wearable technology is the implantation of radio-frequency identification ("RFID") microchips under workers' skin to facilitate services. In July 2017, more than fifty—out of a total of approximately eighty—employees at a River Falls, Wisconsin technology company called Three Square Market volunteered to implant the device under their skin between the thumb and pointer finger.[156] One employee at the company said he readily agreed to embed a microchip into his hand and was satisfied with the experience, as the chip allowed him to easily swipe into secure rooms, log into his computer, and use vending machines.[157] The RFID technology was approved by the Food and Drug Administration in 2004.[158]

Lastly, Hitachi created a device affixed to a lanyard called the Business Microscope.[159] Acting as an advanced employee security badge, the Business Microscope is embedded with "infrared sensors, a microphone sensor, and a wireless communication device," which allows for monitoring of how and when

149. *See* Turner, *supra* note 120.

150. *See* Coxworth, *supra* note 145.

151. *See* Turner, *supra* note 120.

152. Jeremy P. Brummond & Patrick J. Thornton, *The Legal Side of Jobsite Technology*, CONSTRUCTION TODAY (June 22, 2016), http://www.construction-today.com/sections/columns/2752-the-legal-side-of-jobsite-technology [https://perma.cc/P5AX-9GRT].

153. *See* Turner, *supra* note 120.

154. *See* Holmes, *supra* note 145.

155. *See* Brummond & Thornton, *supra* note 152.

156. *See* Miller, *supra* note 134. *See also* Yeginsu, *supra* note 111.

157. *See* Miller, *supra* note 134.

158. *Id.*

159. *See* Turner, *supra* note 120.

office workers interact with each other by recognizing when two employees wearing the badges within a certain distance of each other and recording face time and behavioral data.[160] The device tracks everything by sending information to management about how often an employee walks around the office, when he or she stops to talk to other co-workers, and whether he or she contributes at meetings.[161] Regarding the device's capability to detect "who talks to whom, how often, where, and how energetically,"[162] which can provide a better understanding of how frequently different departments interact[163] and improves organizational communication and quantitative evaluation of efficacy,[164] but it has not offered examples of how the device is actually used.[165] Since the Business Microscope was first developed in 2007, Hitachi has collected "over one million days of human behavior and big data."[166]

Exoskeletons

In addition to these relatively small, wearable devices, exoskeletons, or wearable robotics,[167] are "bionic suits that use springs and counterweights to enhance human power and protect from injuries associated with heavy lifting and repetitive movements."[168] They are comprised of robotics and computers, or "more specifically, motors and sensors and software and novel algorithms that combine the former."[169] Because the most experienced construction workers are in their forties and fifties,[170] and construction work can be strenuous, the use of exoskeletons can benefit both workers and the industry by reducing the physical impact of such work. Ekso Bionics created the Ekso Works Industrial Exoskeleton, which lets a person lift heavy tools as if they weighed nothing at all.[171] Exoskeletons are also suited to help those who have with restricted mobility because of paralysis or weakened limbs[172] by allowing people to move

160. *See* Elizabeth A. Brown, *The Fitbit Fault Line: Two Proposals to Protect Health and Fitness Data at Work*, 16 YALE J. HEALTH POL'Y, L. & ETHICS 1, 14 (2016).

161. *See* Bob Greene, *How Your Boss Can Keep You on a Leash*, CNN (Feb. 2, 2014), https://edition.cnn.com/2014/02/02/opinion/greene-corporate-surveillance/index.html?no-st=1529052429 [https://perma.cc/8WM6-EJFE].

162. *Id.*

163. *See* Turner, *supra* note 120.

164. *See* Greene, *supra* note 161.

165. *See* Turner, *supra* note 120.

166. *See* Greene, *supra* note 161.

167. Dov Greenbaum, *Ethical, Legal and Social Concerns Relating to Exoskeletons*, 45 SIGCAS COMPUTERS & SOC'Y 234, 234 (2015).

168. *See* Holmes, *supra* note 145.

169. Greenbaum, *supra* note 167, at 234.

170. *See* Holmes, *supra* note 145.

171. *See* Adam Rogers, *We Try a New Exoskeleton for Construction Workers*, WIRED (Apr. 28, 2015, 7:00 AM), https://www.wired.com/2015/04/try-new-exoskeleton-construction-workers/ [https://perma.cc/PLQ7-4NVK].

172. Greenbaum, *supra* note 167, at 234.

in a more sustained way or walk despite spinal injuries.[173] Exoskeletons in the workplace can thus prevent work-related musculoskeletal ailments and improve productivity by reducing absences due to illness and disability,[174] even though they may cause some ethical concerns about dehumanization.[175]

Exoskeletons may also collect user data, such as "location information, usage information, neural input information, vitals data and other private information relating to the user," so that it can be used for product feedback or medical necessity.[176] For example, DARPA's exoskeleton, which is designed to be strong and pro-active, helps the wearer know the precise location and movements of his or her colleagues, detect and interpret sounds, communicate wirelessly, and monitor his or her mood as well as mental and physical conditions.[177]

International Examples of Workplace Wearable Technology

The expansion of wearable technology in the workplace is not limited to the United States. For instance, Tesco, a British multinational grocer and merchandise retailer, has adopted location tracking wrist computers, similar to Amazon's patents for haptic wristbands.[178] It required its workers at a distribution center in Ireland to wear the armbands, officially named the Motorola arm-mounted terminals.[179] The band tracked the goods workers gathered, reduced the time spent marking clipboards, and allowed the employers to measure employee productivity by providing data points on the workers' loading, unloading, and scanning speeds.[180] It also allocated tasks to the wearer, forecasted their completion time, and quantified the worker's movements through the facility to provide analytical feedback, verifying the correct order or alerting a worker who performs below expectations.[181] Except for the workers' lunch breaks, any distribution center workers' activity—including the time

173. Isabelle Wildhaber, *The Robots Are Coming: Legalities in the Workplace*, HR MAGAZINE (June 20, 2016), http://www.hrmagazine.co.uk/article-details/the-robots-are-coming-legalities-in-the-workplace [https://perma.cc/VMP9-Z2QX].

174. *Id.*

175. Greenbaum, *supra* note 167, at 236.

176. *Id.* at 239.

177. *See* Ana Viseu, *Simulation and Augmentation: Issues of Wearable Computers*, 5 ETHICS & INFO. TECH. 17, 22 (2003).

178. *See* Rutkin, *supra* note 10.

179. Fort, Raymond & Shackelford, supra note 21, at 144; Claire Suddath, *Tesco Monitors Employees with Motorola Armbands*, BLOOMBERG (Feb. 13, 2013), https://www.bloomberg.com/news/articles/2013-02-13/tesco-monitors-employees-with-motorola-armbands [http://perma.cc/G925-8BR9].

180. *See* Scott R. Peppet, *Regulating the Internet of Things: First Steps Toward Managing Discrimination, Privacy, Security, and Consent*, 93 TEX. L. REV. 85, 114 (2014). *See also* Suddath, *supra* note 179.

181. *See* Wilson, *supra* note 140.

going to the bathroom or the water fountain—was tracked and marked as decreasing the workers' productivity score.[182]

Moreover, companies are expected to adopt more of these types of wearable devices that improve efficiency by reducing the sequence of movements. According to an article in the Harvard Business Review by H. James Wilson, emerging wearables, most notably Google Glass, will replace the process required to check smartphones for work with simple gestures that take much less time.[183] In addition, Microsoft is developing armbands that project keyboards and displays onto wearers' wrists.[184] Other early prototypes are based on predictive feedback system of wearer's movements.[185] Of particular interest to labor scholars may be the implications in the way XOEye, DAQRI, and their cousins shift dangerous jobs to untrained, inexperienced, or unskilled workers.

A. Privacy Concerns

Although wearable devices can contribute to business productivity, these devices also raise new legal issues.[186] The privacy of the worker is a primary concern, given that these devices are worn in close proximity to the body.[187] In addition, wearable technology may pose challenges to traditional privacy practices and principles like the Fair Information Practice Principles, which are guidelines concerning fair information practices in an electronic marketplace and for the Internet of Things. [188] The basic privacy principles include: collection limitation, purpose specification, use limitation, accountability, security, notice, choice, and data minimization.[189] As many wearable devices lack input

182. *See* Suddath, *supra* note 179.

183. *See* Wilson, *supra* note 140.

184. *See id.*

185. *See id.*

186. *See id. See also* Suddath, *supra* note 179 (explaining that from 2007 to 2012, the average number of full-time employees in a Tesco superstore fell nearly eighteen percent); Turner, *supra* note 120 (explaining that, according to a Rackspace study, workers who integrate wearable technology are 8.5 percent more productive and 3.5 percent more satisfied, and management can get insight about human labor through worker data.).

187. Janice Phaik Lin Goh, *Privacy, Security, and Wearable Technology*, 8 LANDSLIDE 30, 30 (Nov./Dec. 2015), https://www.americanbar.org/content/dam/aba/publications/landslide/2015-november-december/ABA_LAND_v008n02_privacy_security_and_wearable_technology.authcheckdam.pdf [https://perma.cc/2FCF-YP4L].

188. *See* OECD, OECD GUIDELINES GOVERNING THE PROTECTION OF PRIVACY AND TRANSBORDER FLOWS OF PERSONAL DATA 70–71 (2013), http://www.oecd.org/sti/ieconomy/oecdguidelinesontheprotectionofprivacyandtransborderflowsofpersonaldata.htm [https://perma.cc/YX8E-JJRX] [hereinafter OECD Guidelines]; Phaik Lin Goh, *supra* note 187, at 30–31; Christopher Wolf, Jules Polonetsky & Kelsey Finch, *A Practical Privacy Paradigm for Wearables*, FUTURE OF PRIVACY FORUM 1, 4 (Jan. 8, 2015), https://fpf.org/wp-content/uploads/FPF-principles-for-wearables-Jan-2015.pdf [https://perma.cc/W8R9-8HRW].

189. *See* OECD Guidelines, *supra* note 187, at 70–71. *See also* Phaik Lin Goh, *supra* note 187, at 31; Wolf, Polonetsky & Finch, *supra* note 188, at 4.

mechanisms and extensively collect, store, and transmit personal data on a cloud, they are at a high risk of challenging basic privacy principles. For example, screenless devices may generate a great amount of invisible data, thus straining the limits of notice and consent.[190]

Moreover, because of the greater potential for employer surveillance posed by wearables, there is a possibility that the National Labor Relations Act (the "NLRA") is challenged. The NLRA considers an employer to engage in unlawful surveillance "when it surveils employees engaged in Section 7 activity by observing them in a way that is 'out of the ordinary' and therefore coercive."[191] Since it is difficult for employees to reject using wearable devices in the employment relationship[192] and employers have the ability to track each employee's precise location and physiological activity, wearable technology could have a chilling effect on protected concerted activity under the NLRA.[193]

However, despite these concerns about privacy for employees' personal information, case law has demonstrated that the law is unlikely to effectively protect employees from privacy intrusions via wearable technology.[194] The Electronic Communications Privacy Act and the Stored Communications Act prohibit the "intentional interception, access and disclosure of wire, oral or electronic communications and data," but contain employer-centric exceptions.[195] Also, legal protection of privacy is weak. While some laws may aim to protect unsuspecting employees or unauthorized gathering of information, case law has shown that few protections exist when an employee consents to information gathering and use within the scope of her employment.[196] The law "generally does not protect employees . . . from information that is willingly shared and/or information that is gathered after consent is provided."[197] Regarding this, some states, including California and Texas, have laws protecting employees from equipment tracking without

190. *See* Peppet, *supra* note 180, at 117. *See also* Phaik Lin Goh, *supra* note 187, at 32.

191. Aladdin Gaming, LLC, 345 N.L.R.B. 585, 585–86 (2005), *petition for review denied*, 515 F.3d 942, 947 (9th Cir. 2008); Tsao, Haskins & Hall, *supra* note 84, at 1; National Labor Relations Act, 29 U.S.C. §157 (2012) (providing that "[e]mployees shall have the right to self-organization, to form, join, or assist labor organizations, to bargain collectively through representatives of their own choosing, and to engage in other concerted activities for the purpose of collective bargaining or other mutual aid or protection.").

192. Adam D. Moore explains that the consent takes the following form: if an employment is to continue, then an employee must agree to such-and-so kinds of surveillance. Moore calls this "thin consent" because it is assumed that jobs are hard to find and the employee needs the job. *See* Adam D. Moore, *Employee Monitoring and Computer Technology: Evaluative Surveillance v. Privacy*, 10 BUS. ETHICS Q. 697, 701 (2000).

193. *See* Tsao, Haskins & Hall, *supra* note 84, at 1.

194. Phaik Lin Goh, *supra* note 187, at 32.

195. *See* Brummond & Thornton, *supra* note 152.

196. *See* Fort, Raymond & Shackelford, *supra* note 21, at 166.

197. *Id.* at 145.

express consent, and the proposal of the Location Privacy Protection Act and other similar bills like the Geolocation Privacy and Surveillance Act (the "GPS Act") demonstrate that lawmakers are increasingly concerned about location information.[198]

In *United States v. Simons*, the court held that an employee does not have a reasonable expectation of privacy regarding his use of the Internet when the employer has policies about Internet use.[199] Because the employer's privacy policy in this case stated that it would "audit, inspect, and/or monitor" employees' use of the Internet, the employee was found not to have an objectively reasonable expectation of privacy.[200] This conclusion was based on the Supreme Court case of *O'Connor v. Ortega*, in which the Court found that the employee's reasonable expectation of privacy should be analyzed in the employment relationship context.[201] Also, *Seff v. Broward County* shows that the Americans with Disabilities Act will not limit employers from requiring employees to submit health and fitness data as part of establishing a "bonafide benefit plan."[202]

B. Potential for Discrimination

Another legal issue concerning wearable technology is the potential for discriminatory employer actions in contravention of the Americans with Disabilities Act (the "ADA") and the guidelines of the Equal Employment Opportunity Commission. The ADA prohibits discrimination against a qualified individual in regard to employment on the basis of disability[203] and also prohibits employers from administering medical examinations[204] and other disability inquiries[205] to employees unless the examination or inquiry is job-related and consistent with business necessity.[206]

198. Cal. Penal Code § 637.7 (West 2018); Tex. Penal Code Ann. § 16.06 (West 2018); Phaik Lin Goh, *supra* note 187, at 33.

199. 206 F.3d 392, 398 (4th Cir. 2000).

200. *Id.*

201. 480 U.S. 709, 717 (1987).

202. 691 F.3d 1221, 1224 (11th Cir. 2012) (In this case, the employer's wellness program was a term of the county's benefit plan); Brown, *supra* note 160, at 28.

203. Americans with Disabilities Act, 42 U.S.C. § 12112(a) (2012).

204. The EEOC's enforcement guidance states that a "medical examination" is any procedure or test "that seeks information about an individual's physical or mental impairments or health." *See* U.S. EQUAL EMP'T. OPPORTUNITY COMM'N, Notice 915.002, *Enforcement Guidance: Disability-Related Inquiries and Medical Examinations of Employees Under the Americans with Disabilities Act* (2000), https://www.eeoc.gov/policy/docs/guidance-inquiries.html [https://perma.cc/6H5R-QLJ5].

205. *Id.* (The EEOC's enforcement guidance states that a "disability-related inquiry" is a question that "is likely to elicit information about a disability.").

206. Americans with Disabilities Act, 42 U.S.C. § 12112(d)(4)(A) (2012). *See also* Kevin J. Haskins, *Wearable Technology and Implications for the Americans with Disabilities Act, Genetic*

Wearable devices present cause for concern because they are very adept at tracking health data and providing a picture of an employee's health.[207] Managers prohibited from conducting medical examinations on employees can have access to physical data, including health and disability information, about the workers, regardless of the employer's intentions.[208] For example, devices that read heart rates reveal potential medical information.[209] Also, employees who might not be reaching productivity standards due to a medical condition or disability could be discriminated against,[210] bosses could potentially abuse the power to monitor by targeting populations of a certain gender, race, or age disproportionally,[211] and it would be very easy for employers to gain access to the personal data of employees and use that data without consent in promotion and retention decisions.[212] Furthermore, as some scholars have noted, corporate wellness programs may lead employers to consider data outside work hours, such as sleep patterns or dietary habits, when determining employee benefits or compensation, potentially discriminating against employees in reliance on data entirely outside of the conventional workplace.[213]

Wearable devices such as exoskeletons also have implications for the ADA. The ADA requires employers to provide reasonable accommodations,[214] including acquisition or modification of equipment or devices, to qualified employees with disabilities, unless doing so would pose an undue hardship to the business.[215] Because exoskeletons, for example, could be considered a mitigating measure, which is an element that "eliminates or reduces the symptoms or impact of an impairment,"[216] employees using exoskeletons might not be regarded as having a disability.[217] Therefore, there is a concern about

Information Nondiscrimination Act, and Health Privacy, 33 A.B.A. J. LAB. & EMP. L. 69, 70 (2017).

207. *Id*.

208. *See* Haggin, *supra* note 20 ("[I]f a warehouse employee does poorly on tracked activity measures on the job, the employer might need to consider whether the data could indicate a physical disability that would require the employer to make a reasonable accommodation"). *See also* Haskins, *supra* note 206, at 70.

209. *See* Turner, *supra* note 120.

210. *See* Haskins, *supra* note 206, at 74. *See also* Turner, *supra* note 120; Haggin, *supra* note 20.

211. *See* Turner, *supra* note 120.

212. *See* Fort, Raymond & Shackelford, *supra* note 21 at 158.

213. Alexander H. Tran, Note, *The Internet of Things and Potential Remedies in Privacy Tort Law*, 50 COLUM. J.L. & SOC. PROBS. 263, 273 (2017).

214. Americans with Disabilities Act, 42 U.S.C. § 12112(b)(5)(A) (2012); 42 U.S.C. § 12111(9)(b) (2012).

215. Americans with Disabilities Act, 42 U.S.C. § 12111(10) (2012).

216. U.S. EQUAL EMP'T. OPPORTUNITY COMM'N, *Questions and Answers on the Final Rule Implementing the ADA Amendments Act of 2008*, https://www.eeoc.gov/laws/regulations/ada_qa_final_rule.cfm [https://perma.cc/K7KN-CZZC] (last visited Nov. 8, 2018).

217. *See* Greenbaum, *supra* note 167, at 237–38.

defining an employee as disabled and providing reasonable accommodation, because while employers cannot ignore the fact that a person is disabled and uses an exoskeleton, they could not force an employee to use an exoskeleton.[218] It is also unclear whether compensation might differ between employees who use exoskeletons and those who do not.[219]

Moreover, wearable technology that collects health-related information of employees can also implicate the Health Insurance Portability and Accountability Act ("HIPAA"), which establishes national standards for protecting individually identifiable health information, or protected health information ("PHI").[220] However, HIPAA applies to the PHI of "covered entities" and their business associates,[221] and since employees with wearable devices and their employers are not considered "covered entities," such employees are not subject to HIPAA.[222]

C. Worker Safety and Workers' Compensation

Wearable technology such as bionic suits, exoskeletons, and helmets can improve worker performance and safety while also allowing employers to promote biometric analysis beyond mere health and wellness.[223] Better safety and employee performance may also lead to reductions in workers' compensation program costs for employers and to higher profit margins.[224] Mathiason et al., in Littler Reports, describe that this is realized in two ways: first, as robots take over tasks that are dangerous, strenuous, or repetitive, workers are likely to suffer fewer work-related injuries, and second, applications

218. *Id.*

219. *Id.* at 239.

220. *See* 45 C.F.R. §160.103 (2014); 45 C.F.R §162.923 (2012); 45 C.F.R. §164.306 (2013).

221. *See* 45 C.F.R. §160.103 (2014); 45 C.F.R. §162.923 (2012); 45 C.F.R. §164.306 (2013).

222. *See* 45 C.F.R. § 160.103 (2014). *See also* Haskins, *supra* note 206, at 76; Phaik Lin Goh, *supra* note 187, at 32–33.

223. *See* Michael B. Stack, *Wearable Technology in Workers' Compensation*, AMAXX (Jul. 27, 2017), http://blog.reduceyourworkerscomp.com/2017/07/wearable-technology-workers-compensation/ [https://perma.cc/KW6G-8SZK?type=image].

224. *See* GARRY MATHIASON ET AL., LITTLER ON LEGAL COMPLIANCE SOLUTIONS FOR THE TRANSFORMATION OF THE WORKPLACE THROUGH ROBOTIC ARTIFICIAL INTELLIGENCE, AND AUTOMATION § 3.1 (2017) ("For example, employers with thousands of employees report that reducing the lost-time period by only a few days can result in saving millions of dollars, both in terms of reductions in wage-loss benefits (*i.e.*, 'indemnity' benefits) and medical costs."). *See also* Greenbaum, *supra* note 167, at 239 (contending that workers' compensation for employees may be limited in part due to the use of exoskeletons in the workforce); John Rehm, *Exoskeletons and the Workplace*, WORKER'S COMPENSATION WATCH (Dec. 7, 2015), https://workerscompensationwatch.com/2015/12/07/exoskeletons-and-the-workplace/ [https://perma.cc/L73A-4MYJ] (positing that the use of exoskeletons could result in fewer workers' compensation claims); Stack, *supra* note 223; Turner, *supra* note 120.

that are designed to assist workers in performing the physical requirements of their jobs will improve the ability of injured workers to return to work. [225]

Michael B. Stack, an expert in workers' compensation, also explains that the reduction in workers' compensation cost for employers is made possible through real-time reporting of an employee's location, immediate reporting of an employee in distress—thereby allowing faster emergency assistance—and measuring of the force of impact for diagnosis and treatment of workplace injury.[226] As an example of real-time reporting, wearable technology can caution employees regarding their posture, therefore assisting employees performing sedentary work to make adjustments to reduce injury at the workstation.[227] One major corporation, Target, is using activity and sleep-tracking devices to promote health habits for employees, and employers are showing greater interest in using wearable technology to prevent occupational injuries.[228] In addition, assistive wearable devices that help employees suffering from severe spinal cord injuries and the information they can provide in relation to post-injury care, progress, and return-to-work issues contribute to the change in workers' compensation.[229]

Furthermore, employers can use data from wearable devices to defend themselves against an employee's workers' compensation claim. For example, since Fitbit "monitors sleep patterns, decides how many hours a user sleeps, and determines the quality and efficiency of that sleep" and a wearer can be compared against the "average" sleeper, such that an employer could use that information as evidence of the sleep-deprivation of the employee at the time of the accident.[230]

Although no specific lawsuit was found regarding workers' compensation for workplace injury caused by wearable technology, there have been reports of a Canadian law firm—cited by several law reviews and news articles—which used evidence collected by a wearable device in a personal injury case.[231] It is

225. *See* Mathiason et al., *supra* note 224, at § 3.1.

226. *See* Stack, *supra* note 223. *See also* Van den Bossche, et al., *supra* note 142 ("Employee biometrics could be monitored to identify which operations or situations cause excessive exertion on an operator that could result in future injury").

227. *See* Stack, *supra* note 223.

228. William Vogeler, *Technology Is Quickly Reshaping Workers' Compensation Claims*, FINDLAW (Feb. 24, 2017, 1:11 PM), https://blogs.findlaw.com/technologist/2017/02/technology-is-quickly-reshaping-workers-compensation-claims.html [https://perma.cc/E72X-AWKJ].

229. *See* Stack, *supra* note 223.

230. Antigone Peyton, *A Litigator's Guide to the Internet of Things*, 22 RICH. J.L. & TECH. 9, 20 (2016).

231. *See* Antigone Peyton, *The Connected State of Things: A Lawyer's Survival Guide in an Internet of Things World*, 24 CATH. U. J.L. & TECH. 369, 391 (2016). *See also* CLAIMS & LITIGATION MANAGEMENT, *Rise of the Machines: Can and Should Your Fitness Tracker Be Used Against You in a Court of Law?* (2017) [hereinafter CLM]; Kate Crawford, *When Fitbit Is the Expert Witness*, THE ATLANTIC (Nov. 19, 2014), https://www.theatlantic.com/technology/archive/

the first known personal injury case in which the plaintiff used activity data from a Fitbit to show the effects of an accident in a legal proceeding.[232] The plaintiff was apparently injured in 2010 and sought to use the Fitbit data in November 2014.[233] The plaintiff was injured when she was working as a personal fitness trainer, and she attempted to use her Fitbit data as evidence of her diminished physical activity resulting from a work-related injury.[234] With the help of a analytic company called Vivametrica that prepared analytical reports from aggregated Fitbit data and a law firm in Calgary, she aimed to show that her "post-injury activity levels were lower than the baseline for someone of the same age and profession."[235] Although not an employment law case, this shows that information from wearable devices could be used as evidence in litigation[236] and could also help to support or disprove disability discrimination, workers' compensation, and harassment claims.[237] It is important to note that prior to the Americans with Disabilities Act Amendments Act ("the ADAA") becoming law, employers could "account for the ameliorative effects of efforts that employees have undertaken to lessen the negative effect of their conditions when determining whether they were substantially limited in a major life activity . . . ."[238] But passage of the ADAA "changed this paradigm by [defining] an individual's disability without reference to any but the most rudimentary ameliorative measures."[239]

Although wearable devices could reduce workers' compensation costs with the data they collect, employers must also consider the injuries that wearable devices may cause. Wearable products with a heads-up display, such as the DAQRI helmet or Google Glass are of particular concern because employees

2014/11/when-fitbit-is-the-expert-witness/382936/ [https://perma.cc/3NXD-UWUT]; Parmy Olson, *Fitbit Data Now Being Used in the Courtroom*, FORBES (Nov. 16, 2014, 4:10 PM), https://www.forbes.com/sites/parmyolson/2014/11/16/fitbit-data-court-room-personal-injury-claim/#19c35e5d7379 [https://perma.cc/AZ6L-AQTU]; Turner, *supra* note 120.

232. *See* Peyton, *supra* note 231, at 391; CLM, *supra* note 231, at 6.

233. CLM, *supra* note 231, at 6.

234. Peyton, *supra* note 231, at 391.

235. *Id. See also* Crawford, *supra* note 231; Olson, *supra* note 231.

236. *See* Nicole Chauriye, Note, *Wearable Devices as Admissible Evidence: Technology Is Killing Our Opportunities to Lie*, 24 CATH. U. J.L. & TECH. 495, 507 (2016). *See also* Peyton, *supra* note 231, at 391; CLM, *supra* note 231, at 6; Chauriye, *supra* note 236, at 509–11 (discussing *Commonwealth v. Risley*, a non-employment case in which Fitbit data was used in the courtroom, and the Fitbit data contradicted the statements of an alleged victim).

237. *See* Karla Grossenbacher & Selyn Hong, *Wearable Device Data in Employment Litigation*, SEYFARTH SHAW: EMP. L. LOOKOUT (Sep. 29, 2016), https://www.laborandemploymentlawcounsel.com/2016/09/wearable-device-data-in-employment-litigation/ [https://perma.cc/3D99-BXDV].

238. Gregory A. Hearing & Marquis W. Heilig, *Recent Developments in Employment Law and Litigation*, 2 TORT TRIAL & INS. PRAC. L.J. 45, 322 (2010).

239. *Id.* ("Specifically, the ADAA notes that a vision impairment, properly remedied by eyeglasses or contact lenses, is not a disability.").

may be distracted by images on the displays while operating or driving heavy equipment at workplaces like construction sites.[240] In addition, robots or exoskeletons that are incompatible with the human body or poorly designed or implemented could damage muscles, tendons, and nerves, especially when performing repetitive tasks.[241] Exoskeletons could also negatively impact workers, particularly those with pre-existing conditions, such as chronic obstructive pulmonary disease, because wearing such a device may increase chest pressure.[242] Lawyers explain that workers' compensation and other claims could be brought against employers in the event of an accident involving such devices and advise that employers who intend to implement these wearable devices should consider adjusting their policies and protocols to limit their liability.[243]

IV. EMPLOYEE RIGHTS: RESEARCH QUESTIONS FOR LEGAL SCHOLARS

In this section, I detail unanswered questions regarding the governance of these new emerging technologies in the workplace.

A. A Reasonable Expectation of Privacy for Employees

A reasonable expectation of privacy is the fulcrum on which employee-monitoring cases turn. One problem is that while a reasonable expectation of privacy is well defined for Fourth Amendment cases, it is not as defined within the employment context, and some scholars have argued that workplaces operate as "private governments" with employers exercising near dictatorial power over what privacy rights may be granted to workers.[244] While *Katz v. United States* was the case that introduced the term "reasonable expectation," [245] that term has been defined as "an objective entitlement founded on broadly based and widely accepted community norms,"[246] and courts have recognized that, in the private

240. *See* Brummond & Thornton, *supra* note 152.

241. *See* Mathiason et al., *supra* note 224, at § 3.1.

242. Alissa Zingman, et al., *Exoskeletons in Construction: Will They Reduce or Create Hazards?*, CDC: NIOSH SCI. BLOG (Jun. 15, 2017), https://blogs.cdc.gov/nioshscience-blog/2017/06/15/exoskeletons-in-construction/ [https://perma.cc/2VWQ-QZFM].

243. *See* Mathiason et al., *supra* note 224, at § 3.1 (stating that when determining eligibility for workers' compensation, injuries caused by robots will be treated the same as injuries caused by using other tools used in the workplace like hammers or computer keyboards). *See also* Brummond & Thornton, *supra* note 152 (suggesting that employers consider revising their safety policies and protocols).

244. *See* ELIZABETH ANDERSON, PRIVATE GOVERNMENT: HOW EMPLOYERS RULE OUR LIVES (AND WHY WE DON'T TALK ABOUT IT) 38–39, 41 (2017).

245. 389 U.S. 347, 360 (1967) (Harlan, J., concurring) (note that this case involved government action, and non-governmental employers are not subject to Fourth Amendment restrictions that would be afforded to government employees).

246. Gonzales v. Uber Techs., Inc., 305 F. Supp.3d 1078, 1091 (N.D. Cal. 2018) (quoting Hill v. Nat'l Collegiate Athletic Ass'n., 865 P.2d 633, 655 (Cal. 1994)).

sphere, lack of notice and consent typically support employees' invasion of privacy claims.[247] Yet, courts have also found that employees do not have a reasonable expectation of privacy when employer-owned equipment or technology is involved, the employer has a legitimate business interest, and the intrusion occurs during normal work hours.[248]

Emerging technologies and their advanced data collection functions challenge the notion that a "reasonable expectation of privacy" continues to hold any well-settled definition. This is especially true for devices, such as wearable technologies that continue to collect data even during off-work hours. Consider the recent Supreme Court case, *Carpenter v. United States*,[249] in which the Court held that accessing cell phone location data without a warrant was a violation of the Fourth Amendment.[250] Although some might argue that any precedents from the *Carpenter* case should be constrained to the Fourth Amendment, the Ninth Circuit reasoned, in *O'Connor v. Ortega*,[251] that the employee's reasonable expectation of privacy should be analyzed in the employment-relationship context.[252] This means that as employees are obliged to interact with emerging technologies in the workplace, which by their operation collect employee data—sometimes without affirmative consent—the question of what constitutes or should constitute a reasonable expectation of privacy for employees remains an important one for legal scholars.

B. The Battle over Employee Data

The emerging technologies of productivity applications and wearable technology also raise legal questions about the collection and control of employee data. Compounding the problems with data generated by wearable technology at work is the fact that there are no real federal laws limiting the collection of data that is not facially-related to the protected category. As my coauthors and I explained in a previous article, the applicability of various federal statutes in the context of surveillance is extremely narrow.[253] This gives employers broad license to monitor employees. Furthermore, the sheer volume of data that can legally be obtained from and about employees could make data-

247. Swaya & Eisenstein, *supra* note 96, at 13.

248. Tsao, Haskins & Hall, *supra* note 84, at 3. *See also* Thygeson v. U.S. Bancorp., No. CV–03–467–ST, 2004 WL 2066746, at *21 (D. Or. Sept. 15, 2004) (finding no reasonable expectation of privacy when the employee used his employer's computer and network for personal use, saved personal information in a location that was accessible by his employer, and the employee handbook prohibited personal use of the employer's computer).

249. 138 S. Ct. 2206, 2206 (2018).

250. *Id.* at 2221, 2223.

251. 280 U.S. 709, 717 (1987).

252. *Id.*

253. Ajunwa, Crawford & Schultz, *supra* note 16, at 748–57.

generated evidence seem especially persuasive, enhancing biases that may already exist.

Workplace wellness programs enjoy the support of the federal government but they can also become a vehicle for the introduction of workplace wearable technologies and their monitoring functions.[254] Employers could use data obtained from wellness programs to run predictive analytics of employee risk of injury. Thus, data from wearables will determine not only workers' compensation, but could influence which workers will remain employed. These risk assessments could include factors like weight or whether a worker smokes cigarettes and there would be no federal law to protect workers from that genre of discrimination.[255] Thus, via the use of wearable technology in wellness programs, employers can (absent relevant state laws) discriminate against workers using data that has been collected under the guise of helping employees achieve their personal health goals. Past research has also revealed that employee data collected as part of workplace wellness programs are frequently sold to third parties without the employee's knowledge or consent.[256]

The fight over employee data, however, will not only be about limits on what data can be collected and who controls that data. Rather, particularly for workers compensation claims, there will also be legal grappling regarding the interpretation of the data. Legal scholars like Scott R. Peppet ask whether consumers will accept "the possible use of [wearable technology data] by an adversary in court [or] an insurance company when denying a claim."[257] Just as Vivametrica was called upon in the Canadian case to compare personal Fitbit data to some baseline, an employer could compare data from the wearable device against a larger population.[258] As one legal scholar notes, this raises two issues: First, a comparison not specific to the person or their circumstances; and second, variance among data analysis methods (whether from an outside firm or engineered into the device itself).[259] Although some data might be viewed as admissible, the interpretation for such data might be contested. As the technologist Kate Crawford has noted, this could lead to wildly divergent results whereby someone differently situated from the general population is deemed responsible for their own injury because their patterns stray from a median, or where the use of a different algorithm produced different results.[260] Thus, legal

254. *Id.* at 764–67.

255. *Id.* at 767.

256. *See* Ifeoma Ajunwa, Kate Crawford & Joel Ford, *Health and Big Data: An Ethical Framework for Health Information Collection by Corporate Wellness Programs*, 44 J.L., MED. & ETHICS 474, 474–80 (2016).

257. Peppet, *supra* note 180, at 89.

258. Peyton, *supra* note 231, at 392.

259. *Id.* at 392–93.

260. Crawford, *supra* note 231.

standard for both the admissibility of data are admissible for workers' compensation claims, and for how such data will be interpreted seems critical.[261]

Accuracy of the data from wearable technology, however, remains an issue. Fitbit, in particular, has been the focus of class action lawsuits questioning the accuracy of features like sleep or heart rate monitoring.[262] These raise concerns around Fitbit data being introduced in court as evidence for or against workers' compensation claims. Data from wearable technologies may be made even less accurate if device users try to "game" their design flaws. Furthermore, data quality may be affected by the psychological effects of surveillance on workers. As demonstrated by a study, surveillance has a potential to make an individual nervous, which could then skew the data collected.[263] Thus, individuals with the "worst" results on metrics generated by wearable technology could reflect a discomfort with being surveilled. As such, the data wearable technology produces might be favorable to those who are comfortable being surveilled. Wearable data as part of court testimony is challenging because it may not be possible to interrogate the analytical processes behind the data as those processes might be considered trade secret.[264] Thus, a belief in data objectivity—that is, the idea that data cannot "lie"—may go unquestioned because the information is simply unavailable, even if the decision-maker has the requisite technological knowledge.[265]

Although one could argue that electronic data makes for an unreliable witness, keeping data from wearable devices out of litigation will be nearly impossible in the current legal landscape. Since there is no legal expectation of privacy at work,[266] employees cannot ordinarily prevent data collected from work devices from being used in court. Employers may present wearable technology as a benefit to workers.[267] However, due to the risk of financial penalties to workers, the dearth of precise information, as well as the asymmetrical power relationship between workers and employers, workers may not have a true choice regarding whether to use those devices.[268]

261. *Id.*

262. *See* Brickman v. Fitbit, Inc., No. 3:15-cv-02077-JD, 2017 WL 6209307, at *1–3 (N.D. Cal. Dec. 8, 2017) (ongoing class action regarding sleep-tracking accuracy). *See also* McLellan v. Fitbit, Inc., No. 3:16-cv-00036-JD, 2018 WL 2688781, at *1 (N.D. Cal. June 5, 2018) (ongoing class action regarding heart-rate-monitoring accuracy); Memorandum from Eric Liberatore to author (June 12, 2018) (on file with author).

263. Solon, *supra* note 137.

264. Peyton, *supra* note 231, at 398–99.

265. Crawford, *supra* note 231.

266. Ajunwa, Crawford & Schultz, *supra* note 16, at 748.

267. *See* Ajunwa, Crawford & Ford, *supra* note 256, at 474–80.

268. *See id. See also* Ifeoma Ajunwa, *Workplace Wellness Programs Could be Putting Your Health Data at Risk*, HARV. BUS. REV. (Jan. 19, 2017), https://hbr.org/2017/01/workplace-wellness-programs-could-be-putting-your-health-data-at-risk [https://perma.cc/BQG9-SB5N]; Peyton,

V. CONCLUSION

It is no accident that one of the corporate leaders in workplace management technology is Kronos, named after the Greek god of time.[269] Even before Taylor's time series experiments in the early twentieth century, employers have been preoccupied with squeezing the most profit out of their employee's time.[270] The twenty-first century has ushered in new technologies uniquely designed to attend to employers' interests in profit-maximization, but those new technologies also bring with them new concerns about employee privacy and the potential to effectuate employment discrimination. The introduction of productivity applications and wearable technology in the workplace will create more opportunities to capture employee data. There will be legal controversies as to who should control the data, what data could be introduced in legal proceedings, and how they should be interpreted, et cetera. These issues may, unfortunately, overshadow the greater socio-legal question of whether employers should be able to collect such data in the first place.

supra note 231, at 392; Memorandum from Eric Liberatore to author (June 12, 2018) (on file with author).

269. *See* Kronos, *Workforce Management and HCM Cloud Solutions*, https://www.kronos.com/ [https://perma.cc/QPF7-VTHF] (last visited Nov. 8, 2018).

270. *See, e.g.*, Feinberg, *supra* note 1.