

ARTIFICIAL INTELLIGENCE ON THE DIAMOND: ANALYZING THE LEGAL CURVEBALLS AND POLICY PITCHES FOR HUMANOID ROBOT UMPIRES IN MAJOR LEAGUE BASEBALL

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Abstract

As a former Ball Boy and TrackMan Operator for the Detroit Tigers, I witnessed firsthand the growing role of technology in Major League Baseball (MLB). From instant replay to automated strike zones, baseball has increasingly embraced technological advancements to improve accuracy and fairness. With artificial intelligence rapidly evolving, MLB may one day consider humanoid robot umpires—AI-driven, human-like officials—to further reduce incorrect calls and enhance the integrity of the game. However, this change would raise significant legal and policy challenges that must be addressed before implementation. This Note examines the implications of integrating humanoid robot umpires in MLB, focusing on legal and policy challenges, such as labor and employment law, data privacy and security, and the broader impact on the sport. It also explores other sports that have implemented officiating technology and proposes solutions for MLB to navigate these challenges while preserving the essence of the game.

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I. INTRODUCTION

Could humanoid robots¹ ever replace human baseball umpires? The answer may surprise you. As the “father of baseball umpires” Bill Klem eloquently put it,² “the best umpired game [in baseball] is the game in which the fans cannot recall the umpires who worked it.”³ In other words, if a fan walks away from a baseball game knowing exactly which umpire was behind home plate calling balls and strikes, that umpire potentially did not have their best performance of the season.⁴ However, umpires cannot always avoid the fan spotlight because many decisions they make on the field are “judgment calls.”⁵ A judgment call is any decision that—you guessed it—requires an umpire’s judgment, such as “whether a batted ball is fair or foul, whether a pitch is a strike or a ball, or whether a runner is safe or out.”⁶ Before the replay system was introduced in the 2014 season, whatever call a Major League Baseball (MLB) umpire made on

1. *See What Is a Humanoid Robot?*, NVIDIA, <https://www.nvidia.com/en-us/glossary/humanoid-robot/> [<https://perma.cc/NXF7-F3KT>] (last visited Feb. 26, 2025) (explaining that a humanoid robot is a type of robot that looks like the human body in shape).

2. *Bill Klem*, COOPERSTOWN EXPERT, <https://www.cooperstownexpert.com/player/bill-klem/> [<https://perma.cc/P6KA-6NTZ>] (last visited Feb. 26, 2025) (“Known as the Father of Baseball Umpires, Bill Klem worked a Major League record 18 World Series and was inducted into the Hall of Fame in 1953.”).

3. *Bill Klem Quotes*, BASEBALL ALMANAC, <https://www.baseball-almanac.com/quotes/quoklem.shtml> [<https://perma.cc/4FWQ-8SF9>] (last visited Feb. 28, 2025).

4. *Id.*

5. *Umpire*, MLB, <https://www.mlb.com/glossary/rules/umpire> [<https://perma.cc/2S8Y-PBED>] (last visited Feb. 26, 2025) (“Umpires are responsible for enforcing on-field rules and rendering decisions on judgment calls such as: [w]hether a batter or baserunner is safe or out, and whether a pitched baseball is a strike or a ball.”).

6. *8.02 Appeal of Umpire Decisions*, BASEBALL RULES ACAD., <https://baseballrulesacademy.com/official-rule/mlb/8-02-appeal-of-umpire-decisions/> [<https://perma.cc/9H33-DW78>] (last visited Feb. 26, 2025).

the field could not be overturned, even if it was blatantly incorrect.⁷ This meant that an MLB umpire had the power to drastically change a historic sports moment with one single incorrect call.⁸ If you are a Detroit Tigers fan reading this Note, you know exactly where this Note is headed.⁹

On June 2, 2010, an *almost* historical baseball moment took place.¹⁰ On this warm summer night in the east side of Michigan, Detroit Tigers pitcher Armando Galarraga managed to get through the first *twenty-six* batters that he faced without any of them reaching first base.¹¹ To throw a “perfect game” in an MLB game, an accomplishment that has only happened twenty-four times in the history of the sport, a pitcher needs to retire all twenty-seven hitters that he faces, not twenty-six, the number of players that Galarraga so far faced and retired.¹² With only one out to go in order to reach the history books, Cleveland Indians shortstop Jason Donald hit a groundball to Detroit Tigers first baseman Miguel Cabrera.¹³ Cabrera was too far away to run to first base to get the final out himself, so Galarraga ran to cover the base all the way from the pitcher’s mound.¹⁴ Cabrera threw an on-target ball, which Galarraga caught and stepped on the base afterwards.¹⁵ However, to no avail, first base umpire Jim Joyce called the runner safe, and the potential historical moment quickly vanished from sight.¹⁶ According to Joyce himself, he was positive that he got the call correct

7. Joel Reuter, *Must-Know Facts of the New MLB Replay System*, BLEACHER REP. (Jan. 16, 2014), <https://bleacherreport.com/articles/1926113-must-know-facts-of-the-new-mlb-replay-system> [<https://perma.cc/ZR2E-4CK6>].

8. See, e.g., Amy K. Nelson, *From the Archives: Blown Call in Armando Galarraga’s Perfect Game Still Haunts Umpire Jim Joyce*, ESPN (June 2, 2020, 10:00 AM), <https://www.espn.com/espn/otl/news/story?id=5993137> [<https://perma.cc/N58G-FQNA>] (explaining the story of the blown call that “forever linked [MLB umpire Jim] Joyce and pitcher Armando Galarraga”); Kevin Kaduk, *Bad Infield Fly Rule Call Mars Cardinals Victory over Braves in NL Wild Card Game*, YAHOO SPORTS (Oct. 5, 2012), <https://sports.yahoo.com/blogs/big-league-stew/bad-infield-fly-rule-call-mars-cardinals-victory-003924296--mlb.html>? [<https://perma.cc/9NB3-ZTYA>] (describing one of the “worst call[s] of the postseason” by an umpire involving the infield fly rule, which in turn played a large part in the loss of the Atlanta Braves).

9. E.g., Nelson, *supra* note 8; Rob Rogacki, *Tigers Den Roundtable: What is Your Saddest Moment as a Tigers Fan?*, BLESS YOU BOYS (Feb. 22, 2017, 2:00 PM), <https://www.blessyouboys.com/2017/2/22/14695532/tigers-den-roundtable-jim-joyce-armando-galarraga-2013-als> [<https://perma.cc/F6KN-TPTE>].

10. Chad Moody, *June 2, 2010: Blown Call Costs Tigers’ Armando Galarraga a Perfect Game*, SABR, <https://sabr.org/gamesproj/game/june-2-2010-blown-call-costs-tigers-armando-galarraga-a-perfect-game/> [<https://perma.cc/4SEE-9QT3>] (last visited Mar. 3, 2025).

11. Ryan Ford, *Armando Galarraga’s ‘Imperfect Game’ Here’s What You Need to Know, 10 Years Later*, DETROIT FREE PRESS (June 2, 2020, 11:00 AM), <https://www.freep.com/story/sports/mlb/tigers/2020/06/02/armando-galarraga-detroit-tigers-perfect-game-numbers-jim-joyce/5304865002/> [<https://perma.cc/6DKV-LJGK>]; *Past Weather in Detroit, Michigan, USA — June 2010*, TIME & DATE, <https://www.timeanddate.com/weather/usa/detroit/historic?month=6&year=2010> [<https://perma.cc/3NC4-FS1G>] (last visited Feb. 26, 2025).

12. Ford, *supra* note 11; Andrew Simon, *A Look at All 24 Perfect Games in AL/NL History*, MLB (June 29, 2023), <https://www.mlb.com/news/all-time-perfect-games> [<https://perma.cc/D235-YTPA>]. See *Retire in Order*, BASEBALL ALMANAC, <https://www.baseball-almanac.com/dictionary-term.php?term=retire+in+order> [<https://perma.cc/4RFS-CBME>] (last visited Feb. 25, 2025) (defining “retire” in baseball to simply mean to get the hitter out).

13. *Cleveland Indians v. Detroit Tigers: Play-by-Play*, ESPN (June 2, 2010), https://www.espn.com/mlb/playbyplay/_/gameId/300602106 [<https://perma.cc/N4NR-U5DQ>].

14. See *Armando Galarraga – Only Hit of Almost Perfect Game*, YOUTUBE (May 26, 2020), <https://www.youtube.com/watch?v=dfCfjT5BH9o> [<https://perma.cc/A8VP-XU33>] (showing the play-by-play).

15. *Id.*

16. *Id.*

at the time.¹⁷ Since the game took place in Detroit, Tigers fans in attendance were not exactly pleased with Joyce and his decision, booing him as he walked off the field after the game.¹⁸ But, soon after the game ended, Joyce entered the umpires' locker room, turned on the replay of his call with two outs in the ninth inning, and realized he made a big mistake.¹⁹ The next day, Joyce umpired the Indians versus Tigers game again, and tears were brought to Joyce's eyes after the crowd gave Galarraga a standing ovation for his strong performance the night before.²⁰ Before the game began, General Motors even awarded Galarraga a \$53,000 red Corvette convertible to acknowledge his good sportsmanship for how he handled the challenging situation.²¹ It was an emotional moment for the parties involved.²²

Today, a similar call would never happen because of the replay review system implemented by MLB in the 2014 season.²³ A force/tag play call, such as the situation in the Joyce incident, can now be reviewed by the Replay Command Center, which is located in MLB Advanced Media headquarters in New York.²⁴ However, not all calls made in an MLB game can be reviewed, which means that there are some important judgment calls, such as calling balls and strikes, that are currently left entirely to the umpire's discretion.²⁵ Furthermore, even the umpiring technology—namely, the electronic strike zone—that MLB is testing in Minor League Baseball (MiLB) would not have prevented Joyce's incorrect call at first base.²⁶ This technology, known as the Automatic Balls and Strikes system (ABS),²⁷ will be only calling balls and strikes, so it would not be determining, for example, if the runner was safe or out at first base.²⁸ During the 2023 MiLB regular season, half of the games were played with all pitches being determined by the ABS electronic strike zone; the remaining half still used ABS, but each team was only limited to three pitch challenges per game.²⁹ Because an umpire's role encompasses many more responsibilities than just calling strikes and balls, it appears humanoid robot

17. Nelson, *supra* note 8.

18. *Id.*

19. *Id.*; *Cleveland Indians v. Detroit Tigers: Play-by-Play*, *supra* note 13.

20. Micheline Maynard, *Good Sportsmanship and a Lot of Good Will*, N.Y. TIMES (June 3, 2010), <https://www.nytimes.com/2010/06/04/sports/baseball/04tigers.html> [<https://perma.cc/3FFR-2X7Z>].

21. *Id.*

22. *See id.* (describing Joyce receiving support from fellow umpires and Galarraga welcomed by a standing ovation).

23. Reuter, *supra* note 7.

24. *Replay Review*, MLB, <https://www.mlb.com/glossary/rules/replay-review> [<https://perma.cc/8CR4-EEU8>] (last visited Feb. 3, 2025).

25. *Id.*

26. *See* Matthew Postins, *Robot Umpires at Triple-A Ballparks in 2023*, SPORTS ILLUS. (Jan. 13, 2023), <https://www.si.com/mlb/rangers/news/triple-a-ballparks-robot-umpires-2023-milb-round-rock-texas-rangers> [<https://perma.cc/C9E2-MCB2>] (describing the implementation of the electronic strike zone technology).

27. *See* Glaser, *infra* note 88 (explaining what ABS is and that some people call ABS "robot umps," but this Note will be only using robot umps when referring to humanoid robots).

28. Postins, *supra* note 26.

29. *Id.*

umpires in MLB are not exactly on the horizon.³⁰ However, due to technology's rapid advancement in society, humanoid robot umpires in baseball may potentially arise one day.³¹

This Note will explore the different legal and policy considerations that MLB will have to consider if it decides to pursue humanoid robot baseball umpires in the future. While this Note will briefly analyze technology-assisted officiating in other sports, the scope of this Note is limited to baseball. Part II describes the historical and current role of umpires in baseball, examines the relevant technology being introduced in baseball, and analyzes sports officiating technologies that have emerged in other professional sports, such as tennis and soccer (or football to non-Americans).³² Part III will analyze the significant legal and policy challenges that MLB will face in order to effectively introduce humanoid robot umpires down the road, such as labor & employment law, data privacy & security, and the impact on the sport itself. Part IV will provide the best answers to the legal and policy challenges that were analyzed and discussed in Part III. Part V concludes.

II. BACKGROUND

A. *The History and Current State of Umpiring in Major League Baseball*

Many, if not all, baseball fans understand that umpiring a baseball game is difficult.³³ Despite this, that does not prevent some baseball fans from hostilely challenging and arguing with umpires.³⁴ In fact, baseball has a long history of

30. See *Umpire*, *supra* note 5 (“Umpires are responsible for enforcing on-field rules and rendering decisions on judgment calls such as: Whether a batter or baserunner is safe or out, and whether a pitched baseball is a strike or a ball.”).

31. See Amardeep Pundir, *How Fast is Technology Advancing in 2023*, LINKEDIN (Jan. 24, 2023), <https://www.linkedin.com/pulse/how-fast-technology-advancing-2023-amardeep-pundir> [<https://perma.cc/72PZ-2CZ7>] (explaining that the exponential growth of technology is inevitable).

32. See Matt Hughes, *Premier League to Bring in AI-Powered Camera System to Speed up VAR Process*, THE GUARDIAN (Aug. 13, 2024), <https://www.theguardian.com/football/article/2024/aug/13/premier-league-to-introduce-revolutionary-camera-system-to-aid-var-process> [<https://perma.cc/3SGP-DM2J>] (stating that the Semi-automatic offside technology (SOAT) “will produce the best officiating setup in the world” by delivering “VAR verdicts within seconds and shave minutes off top-flight matches”); Dinis Guarda, *IBM GenAI Catch Me Up and Wimbledon Case Study – How is AI Being Used in Sports and Tennis?*, MEDIUM (July 14, 2024), <https://dinisguarda.medium.com/ibm-genai-catch-me-up-and-wimbledon-case-study-how-is-ai-being-used-in-sports-and-tennis-fa7568bbc35d> [<https://perma.cc/4ZVP-X5R5>] (discussing AI technology development in tennis, particularly the Hawkeye system which “create[s] a three-dimensional representation of the ball’s trajectory”). See also discussion *infra* Part II (exploring the historical and current roles of umpires in baseball, discusses the introduction of relevant technology in the sport, and analyzes of officiating technologies that have emerged in other professional sports).

33. Ted Berg, *Umpiring a World Series Game is Extremely Hard and MLB Umps Are Great at It*, USA TODAY (Nov. 1, 2016, 11:41 AM), <https://ftw.usatoday.com/2016/11/world-series-indians-cubs-umpires-umpiring-is-super-hard-mlb> [<https://perma.cc/3DUM-2Q96>] (explaining “that umpires provide a support system for one another, and noted that many dedicated baseball fans do appreciate the difficulty of officiating a game”).

34. See, e.g., Dan Gelston, *In This Youth Baseball League, Fans Who Mistreat Umpires Are Sentenced to Do the Job Themselves*, ASSOCIATED PRESS (June 9, 2023, 3:03 PM), <https://apnews.com/article/umpires-youth-baseball-parenting-little-league-418d8797016b4c3cb9c08af03f84a4b3> [<https://perma.cc/89G6-7USL>] (highlighting the struggles of amateur and youth league umpiring where umps have “watched fan conduct become ‘far worse’ than [they] could have imagined”).

fans heckling the umpires.³⁵ A youth baseball league in New Jersey understood this situation precisely, so much so that the league implemented a new rule on fan sportsmanship.³⁶ After two umpires in the league resigned after “spectator abuse,” the league president updated the code of conduct, stating that “any spectator deemed in violation [of spectator abuse] would be banned from the complex until three umpiring assignments were completed.”³⁷ In other words, if a parent violated the league’s code of conduct, the parent’s punishment would be to serve as an umpire in a few baseball games, presumably to experience firsthand the difficulty of being an umpire because of both the job responsibilities and the negative fan interactions they may encounter.³⁸ While such a code of conduct may seem comical to some readers of this Note, the truth is that in some instances, the outbursts of bad behavior at baseball events can be much worse than pure heckling.³⁹ For example, on May 13, 2023, in an eleven-year-old and under baseball league in Alabama, a furious coach ran onto the field and tackled the umpire to the ground.⁴⁰ In order to stop the coach-initiated altercation, adults, and even kids, had to run on the field to separate the coach and umpire.⁴¹ While this Note will be focusing on MLB umpires, where a similar type of violent act is unlikely (due to protective nets and enhanced security), professional umpires still deal with heckling fans.⁴² For instance, on August 2, 2016, home plate umpire Bob Davidson ejected a fan due to his improper/inappropriate language toward him during the sixth inning of a regular season game.⁴³ The reason for this behavior toward umpires at all levels of baseball (professional and amateur) is simple: umpiring is a difficult job that includes the power to inadvertently negatively affect the lives of players, coaches, and fans.⁴⁴ With ABS, MLB hopes to more accurately determine balls and strikes in a game, which in turn strengthens the integrity and fairness of

35. See, e.g., *id.* (explaining that “[b]aseball is steeped in the tradition of fans wanting to jeer the umpire”); *Umpire Heckles*, STEVE THE UMP, http://www.stevetheump.com/umpire_heckles.htm [https://perma.cc/V4A7-B2AU] (last visited Oct. 2, 2023) (“Perhaps the most well known heckle of all time, ‘Kill the Ump!’ was first recorded in Ernest L. Thayer’s 1888 poem ‘Casey at the Bat.’ Today, possibly because of the legal repercussions of screaming a threat on a man’s life, the term is seldom used.”).

36. See Gelston, *supra* note 34.

37. *Id.*

38. See *id.* (explaining a former little league umpire’s opinion on the matter, stating that “[h]e wonders where the next generation of officials will come from, especially when the job description includes little pay and lots of crap”).

39. *Id.*

40. *Id.* (citing (@ThatSportsDad), X (May 13, 2023, 8:29 PM), <https://x.com/ThatSportsDad1/status/1657558803108298752?s=20> [https://perma.cc/MVG3-XMS9]).

41. *Id.*

42. Kyle Newport, *Home Plate Umpire Ejects Fan from Giants-Phillies Game for Heckling Him*, BLEACHER REP. (Aug. 3, 2016), <https://bleacherreport.com/articles/2655635-home-plate-umpire-ejects-fan-from-giants-phillies-game-for-heckling-him> [https://perma.cc/X45G-8JSD].

43. *Id.*; *Baseball Nets Catch!: All MLB Teams to Introduce Protective Netting at Ballparks*, NETS OF AM. (Sept. 21, 2018), <https://netsofamerica.com/baseball-nets-catch/> [https://perma.cc/C7P5-YGTH] (explaining that there are plenty of safety precautions that go into each game, such as security and nets that protect fans from balls and bats that could come into the crowd each game).

44. Berg, *supra* note 33 (explaining the difficulty of officiating a game); Anthony Centore & Jason Crosby, *Sports Fan Depression is Real: Did Your Team Lose Last Night?*, THRIVEWORKS (Nov. 13, 2024), <https://thriveworks.com/blog/sports-fan-depression-is-real-did-your-team-lose-last-night/> [https://perma.cc/4V76-ETUQ].

baseball.⁴⁵ This would in turn impact the umpire profession, whose job responsibilities are nearly two centuries old.⁴⁶

The history of umpiring in baseball dates back to the 1800s.⁴⁷ In 1845, William McLean, a lawyer from Philadelphia, officiated the first recorded modern baseball game.⁴⁸ One of the teams McLean umpired for was the Knickerbocker Club of New York, which was the first organized baseball club.⁴⁹ The rules of the Knickerbocker Club of New York, which eventually transformed into the modern day baseball rules, stated that “[w]hen assembled for exercise, the President, or in his absence, the Vice-President, shall appoint an Umpire, who shall keep the game in a book provided for that purpose, and note all violations of the By-Laws and Rules during the time of exercise.”⁵⁰

By the Civil War, in 1861, umpires received no compensation for their services; instead, umpires only received the honor of being the “sole judge of fair and unfair play.”⁵¹ However, as baseball’s popularity grew across the nation, umpires started to receive more recognition for their services.⁵² For instance, in the late 1870s, the National League of Professional Baseball Clubs, which is the country’s oldest professional major-league and which would be later known as just the “National League,”⁵³ instructed all home teams to compensate each umpire five dollars per game.⁵⁴ The first umpire staff was formed, encompassing twenty individuals, from which teams could choose an arbiter.⁵⁵ Although the umpires received increased recognition and compensation, the profession was still considered to be stressful and difficult.⁵⁶ Umpires would not only receive physical and verbal abuse from fans, but it was also not uncommon for a player

45. Buster Olney, *Sources: All AAA Parks to Use Electronic Strike Zone in '23*, ESPN (Jan. 12, 2023, 7:21 PM), https://www.espn.com/mlb/story/_/id/35434317/sources-all-aaa-parks-use-electronic-strike-zone-23 [https://perma.cc/B3JJ-7YDE]; Ishan R, *Is It Finally Time for the MLB to Use Robot Umpires?*, MEDIUM (May 21, 2023), <https://medium.com/the-press-box/is-it-finally-time-for-the-mlb-to-use-robot-umpires-7cd85edcfad3> [https://perma.cc/2QJG-NMCL].

46. Larry Gerlach, *History of Umpiring*, STEVE O’S BASEBALL UMPIRE RES., http://www.stevetheump.com/umpiring_history.htm [https://perma.cc/8NH6-8AUV] (last visited Sept. 17, 2023).

47. *Id.*

48. *Id.*; *Umpiring Timeline*, MLB, <https://www.mlb.com/official-information/umpires/timeline> [https://perma.cc/H8ZZ-8U42] (last visited Oct. 2, 2023). Larry Gerlach, an Emeritus Professor of History at the University of Utah, has served as the President of Society for American Baseball Research (SABR) and founder of the Umpires and Rules Committee. *See, e.g., Larry Gerlach*, SABR, <https://sabr.org/authors/larry-gerlach/> [https://perma.cc/5MKU-PNBH] (last visited Oct. 2, 2023) (explaining the background of Larry Gerlach).

49. *Knickerbocker Base Ball Club of New York*, BASEBALL REF., https://www.baseball-reference.com/bullpen/Knickerbocker_Base_Ball_Club_of_New_York [https://perma.cc/ESA3-T7CW] (last visited Oct. 7, 2023).

50. Gerlach, *supra* note 46; *Knickerbocker Rules*, BASEBALL ALMANAC, <https://www.baseball-almanac.com/rule11.shtml> [https://perma.cc/8WG7-TB9J] (last visited Oct. 2, 2023).

51. Gerlach, *supra* note 46.

52. *Id.*

53. Adam Augustyn, *National League*, BRITANNICA, <https://www.britannica.com/topic/National-League> [https://perma.cc/WAG7-XHCT] (Oct. 6, 2023).

54. Gerlach, *supra* note 46.

55. *Id.*

56. *Id.*

in the game to kick, spike, spit, or curse at them during a game.⁵⁷ These sort of issues were so prevalent that umpires would sometimes breathe a sigh of relief whenever they had a police escort to games.⁵⁸

The early baseball games would only have one umpire on the field at a time, which is quite a different sight than today's modern game.⁵⁹ John Gaffney, a former major league umpire who was known as the "King of Umpires,"⁶⁰ created the technique of positioning himself behind home plate and then moving behind the pitcher when a runner reached a base.⁶¹ It was not until 1890 that the first four-man umpire crew emerged in the sport.⁶² The other professional baseball league, the American Association of Base Ball Clubs, used a two-man umpire crew instead of the one-man crew used in the National League of Professional Baseball Clubs.⁶³ In 1890, the four-man umpire crew was established.⁶⁴ Two two-man umpire crews accidentally arrived at a game, and instead of sending one crew home, one umpire positioned himself behind home plate and the other umpires positioned themselves behind each base.⁶⁵ This is in fact how MLB games are umpired in the modern day games.⁶⁶

In today's game, one umpire is placed behind home plate and is responsible for calling balls and strikes, as well as certain plays that happen near or at home plate, such as catcher's interference, pitches hitting the batters, and running lane violations.⁶⁷ A home plate umpire is also responsible for keeping the official line-up cards, which gives them the responsibility of determining whether a substitution was legal or whether a hitter batted out of order.⁶⁸ The other three umpires, known as the base umpires, are each placed by a base (first-base, second-base, third-base) and have the responsibility of calling plays at their assigned base, or in the outfield.⁶⁹

57. *Id. See, e.g.,* Greg Hand, *In 1887, Cincinnati Fans Really Did Try to Kill the Umpire*, CINCINNATI MAGAZINE (Apr. 7, 2020), <https://www.cincinnati.com/article/in-1887-cincinnati-fans-really-did-try-to-kill-the-umpire/> [<https://perma.cc/YX78-SKLV>] (explaining the intense reaction of Cincinnati fans toward an umpire, necessitating a police escort for his safety).

58. Gerlach, *supra* note 46.

59. *Id.*; *Umpire*, BASEBALL REF., <https://www.baseball-reference.com/bullpen/Umpire> [<https://perma.cc/TDP8-K9SD>] (last visited Oct. 7, 2023) (explaining that in the modern professional game, there are four umpires on the field, with one umpire positioned behind home plate and three other umpires behind each base).

60. Gerlach, *supra* note 46; *John Gaffney*, BASEBALL REF., https://www.baseball-reference.com/bullpen/John_Gaffney [<https://perma.cc/8AN8-Q63C>] (last visited Oct. 7, 2023).

61. Gerlach, *supra* note 46.

62. Admin, *The Evolution of Umpiring*, UMP JUNK (Sept. 25, 2023), <https://umpjunksa.com/the-evolution-of-umpiring/> [<https://perma.cc/NXR8-Z2FR>].

63. Gerlach, *supra* note 46.

64. *Id.*

65. *Id.*

66. *Umpire*, *supra* note 59.

67. *Id.*; *Umpire Roles (two-man)*, UMPIREBIBLE, <https://www.umpirebible.com/index.php/mechanics/umpire-roles-two-man> [<https://perma.cc/3CX3-34F7>].

68. *Umpire*, *supra* note 59.

69. *Id.*

*B. The Emergence of Technology-Assisted Umpiring and
Relevant Technology Involved*

In 2019, Major League Baseball and the MLB Umpires Association agreed to a five-year labor deal that will run through the 2024 season.⁷⁰ As part of the agreement, the umpires agreed to cooperate with MLB on plans to adopt an automated strike zone in the professional level throughout the deal's duration.⁷¹ Even before the agreement was made with the umpires, MLB approved the implementation of an automated strike zone in the independent Atlantic League and the Arizona Fall League, suggesting that it was a significant part of the labor deal that must have been agreed upon.⁷²

Unlike a home plate umpire's responsibilities since the mid-1800s, with an automated strike zone, an umpire will no longer be relying on their own best judgment to determine if a pitch is a ball or a strike.⁷³ Instead, with an automated system, in practicality, the home plate umpire could slip a designated iPhone in their back pocket and put an earbud in one of their ears.⁷⁴ After every pitch thrown by the pitcher, the system will signal either ball or strike and that signal will be transferred to the umpire's earbud who will then make the call on the field.⁷⁵

To speed up the game by making the determination of pitches more accurate and faster, MLB announced that all thirty of the AAA Minor League Baseball (MiLB) ballparks would be using an electronic zone in the 2023 season.⁷⁶ The first electronic strike zone was created by TrackMan, an existing

70. Andrew Cohen, *MLB and the MLB Umpires Association Reach New Five-Year Deal That Includes Plans for Robot Umpires*, SPORTS BUS. J. (Dec. 23, 2019), <https://www.sportsbusinessjournal.com/Daily/Issues/2019/12/23/Technology/mlb-umpires-association-five-year-deal-robot-umpires/> [https://perma.cc/FX84-KL58].

71. *Id.*

72. *Id.*; See Savannah McCann, *2023 Arizona Fall League: Everything You Need To Know*, BASEBALL AM. (Oct. 2, 2023), <https://www.baseballamerica.com/stories/2023-arizona-fall-league-everything-you-need-to-know/> [https://perma.cc/Z5NT-B48X] (describing the Arizona Fall League as a developmental league that runs from October through November and consists of some of the top major league prospects); *About Us*, ATLANTIC LEAGUE, <https://www.atlanticleague.com/about-us/about-us/> [https://perma.cc/2SCS-UEM2] (last visited Oct. 7, 2023) (describing the independent Atlantic League of Professional Baseball, a high level of professional baseball league and in 2016 became the first independent league to sign a working agreement with Major League Baseball); See Thomas Barrabi, *Robot Umpires: MLB's Trial Run Set To Hit Minor League Baseball Stadiums in 2020*, FOXBUSINESS (Nov. 7, 2019, 5:07 AM), <https://www.foxbusiness.com/sports/robot-umpires-mlb-automated-strike-zone-2020> [https://perma.cc/9PLK-U6MG] ("The program will build on trial runs MLB conducted in its offseason Arizona Fall League and the independent Atlantic League in 2019, where the league tested TrackMan radar tracking technology to call balls and strikes during in-game play. Commissioner Robert Manfred expressed optimism about advances in automated strike zone technology during an appearance on "MLB Network" last week.")

73. See Gerlach, *supra* note 46 (explaining that a home plate umpire would call balls and strikes by crouching directly behind the catcher and looking over his head).

74. David Pierce, *Robot Umpires Could be Coming to Major League Baseball in 2024*, THE VERGE (June 30, 2022, 9:35 AM), <https://www.theverge.com/2022/6/30/23189572/robot-umpires-major-league-baseball-2024> [https://perma.cc/TP39-Z322].

75. *Id.*

76. Olney, *supra* note 45; See, e.g., *How the Minor Leagues Work?*, MiLB, <https://www.milb.com/news/gcs-173407668> [https://perma.cc/7H7N-V6LJ] (last visited Oct. 10, 2023) (explaining that AAA or Triple-A Ball is the closest minor league level to the MLB. AAA is filled with players full of major league experience and includes some of the sport's most talent prospects).

technological system and company that also develops high-tech ball-tracking systems for professional golfers.⁷⁷ TrackMan, which is sometimes confusingly referred to as “robot umps,”⁷⁸ is positioned above home plate, connecting to a part of the ballpark structure.⁷⁹ TrackMan uses a three-dimensional doppler radar dish that appears to be just a black box hanging above the backstop to an ordinary fan.⁸⁰ However, the system is as high-tech as they come in the sports world;⁸¹ the TrackMan system uses each hitters’ size to calibrate and determine an accurate and appropriate strike zone for that specific hitter.⁸² In other words, a 6-foot-7 player like New York Yankees’ Aaron Judge, would not have the same electronic strike zone as Houston Astros’ Jose Altuve who measures in at 5-foot-6.⁸³ If TrackMan ever made a blatant mistake, the minor league umpires were given the authority to override the system, such as if the system called a strike and the ball clearly bounced a foot in front of home plate, which clearly means the pitch was a ball.⁸⁴

More recently, MiLB teams have switched to a different system, known as the Hawk-Eye tracking system.⁸⁵ Hawk-Eye will attain similar metrics as TrackMan, but Hawk-Eye is an optical technology, which is different from TrackMan’s radar-based tracking system.⁸⁶ According to some studies, Hawk-Eye is much more accurate than TrackMan, and the system does not fail to read certain batted events that TrackMan failed to measure, such as pop-ups or certain groundballs.⁸⁷ The way an umpire will call a pitch a strike or a ball—through an earpiece—is the same with Hawk-Eye as it was with TrackMan.⁸⁸

77. Pierce, *supra* note 74; *About Us*, TRACKMAN, <https://www.trackman.com/baseball> [<https://perma.cc/P64L-AH39>] (last visited Oct. 9, 2023) (explaining that TrackMan is the global leader in baseball tracking technology and is used by all professional teams in the United States and Japan, and nearly all professional teams in Korea, Taiwan, and Latin America).

78. Merrit Kennedy, *Minor League Baseball to Experiment with Robotic Umpires*, NPR (Mar. 12, 2021, 8:21 AM), <https://www.npr.org/2021/03/12/976383147/minor-league-baseball-to-experiment-with-robotic-umpires> [<https://perma.cc/2VJC-8RUF>] (for purposes of this note, “robot umps” means fully automated robots that completely replace umpires in the future, not the use of TrackMan or Hawk-Eye).

79. Katherine Acquavella, *Robot Umpires: How It Works and Its Effect on Players and Managers in the Atlantic League, Plus What’s to Come*, CBS SPORTS (Aug. 27, 2019, 5:31 PM), <https://www.cbssports.com/mlb/news/robot-umpires-how-it-works-and-its-effect-on-players-and-managers-in-the-atlantic-league-plus-whats-to-come/> [<https://perma.cc/PC3F-8HK9>].

80. *Id.*

81. Matt Hamblen, *Robo-Ump Calls Balls and Strikes in Atlantic League*, FIERCE ELECS. (Jul. 17, 2019, 6:20 PM), <https://www.fierceelectronics.com/electronics/robo-ump-calls-balls-and-strikes-minor-atlantic-league> [<https://perma.cc/99SW-542C>].

82. Acquavella, *supra* note 79.

83. *Id.*; Aaron Judge, ESPN, https://www.espn.com/mlb/player/_id/33192/aaron-judge [<https://perma.cc/EGV7-W3YE>] (last visited Oct. 9, 2023); Jose Altuve, ESPN, https://www.espn.com/mlb/player/_id/31662/jose-altuve [<https://perma.cc/7NKN-9542>] (last visited Oct. 9, 2023).

84. Acquavella, *supra* note 79.

85. *E.g.*, Eno Sarris, *Sarris: MLB Moving from Trackman to Hawk-Eye Tracking System*, THE ATHLETIC (May 14, 2019), <https://theathletic.com/975903/2019/05/14/sarris-mlb-moving-from-trackman-to-hawk-eye-tracking-system/> [<https://perma.cc/S833-73DL>].

86. *Id.*

87. *Id.*

88. Kyle Glaser, *The Automated Strike Zone Is Slightly Different At Triple-A in 2023*, BASEBALL AM. (May 5, 2023), <https://www.baseballamerica.com/stories/the-automated-strike-zone-is-slightly-different-at-triple-a-in-2023/> [<https://perma.cc/66SK-245P>].

C. Discussion of Technology-Assisted Officiating in Other Professional Sports

As technology advances, other professional sports leagues besides baseball are making strides to assist its referees in officiating games.⁸⁹ In 2022, FIFA, the international governing body of association football, announced that it would be using artificial intelligence powered cameras to assist its referees in making calls, such as offsides, at the 2022 World Cup.⁹⁰ In other words, the technology that FIFA introduced did not involve actual robots officiating its games.⁹¹ The technological system includes a sensor in the soccer ball that transfers its position 500 times a second, and twelve tracking cameras throughout a stadium, which uses machine learning to track individual players.⁹² While FIFA explained that the technology would lead to faster and more accurate decisions, it emphasized that humans—not robots—were still in charge of the game.⁹³

Additionally, professional tennis has been using the Hawk-Eye system long before baseball decided to transition from TrackMan to Hawk-Eye.⁹⁴ In 2006, the U.S. Open was the first Grand Slam event to feature the Hawk-Eye system.⁹⁵ In 2020, in response to the COVID-19 pandemic, the U.S. Open was able to replace human line judges in fifteen out of the seventeen match courts.⁹⁶ Throughout the seventeen courts at the U.S. Open, there are over 200 cameras tracking the tennis ball and players.⁹⁷ The Hawk-Eye cameras track the ball at 340 frames per second and are able to send the images instantaneously to the Hawk-Nest, where in and out calls can be determined.⁹⁸ According to the Director of Tennis at Hawk-Eye Innovations, the “accuracy of Hawk-Eye is millimeter accurate.”⁹⁹

III. ANALYSIS

Robots are changing the way jobs are performed in many different industries and are requiring those industries to have effective systems in place

89. E.g., James Vincent, *FIFA Will Track Players' Bodies Using AI to Make Offside Calls at 2022 World Cup*, THE VERGE (Jul. 5, 2022, 4:59 AM), <https://www.theverge.com/2022/7/5/23195009/fifa-ai-automated-offside-ball-body-tracking-2022-qatar-world-cup> [https://perma.cc/U7ER-UVTJ]; Sydney Boyo, *How Sony's Hawk-Eye Electronic Line-Calling System Transformed the U.S. Open*, CNBC (Sept. 9, 2023, 8:00 AM), <https://www.cnbc.com/2023/09/09/how-sonys-hawk-eye-works-at-the-us-open.html> [https://perma.cc/8MCM-W3HS].

90. Vincent, *supra* note 89.

91. *Id.*

92. *Id.*

93. *Id.*

94. *Hawk-Eye Line-Calling System*, TOPEND SPORTS, <https://www.topendsports.com/sport/tennis/hawkeye.htm> [https://perma.cc/P6JV-WA5F] (last visited Oct. 9, 2023); Sarris, *supra* note 85.

95. TOPEND SPORTS, *supra* note 94.

96. *Id.*

97. See Boyo, *supra* note 89 (discussing the use of cameras in professional tennis).

98. *Id.*

99. *Id.*

to prepare for the robots in the workforce.¹⁰⁰ While there are various considerations an industry should consider when bringing robots into the workforce,¹⁰¹ this Note will be focusing on those legal considerations most relevant to robots in MLB: labor & employment law, data privacy & security, and the impact on how the sport is played.

A. Labor & Employment Law

Labor and employment law is a broad area of law that handles the rights and duties between employers and workers.¹⁰² In 1935, Congress passed the National Labor Relations Act (NLRA), which encourages collective bargaining by protecting workers' full freedom of association.¹⁰³ More simply, under the NLRA, employees have the right to form or join unions.¹⁰⁴ This section of the Note will discuss the past and current umpire unions and potential ramifications of humanoid robot baseball umpires with respect to the current union.

1. Discussion of the Past and Current Umpire Unions

The MLB Umpires Association (MLBUA) is the union that currently represents MLB umpires in labor negotiations.¹⁰⁵ During the 1963 Winter Meetings,¹⁰⁶ there was the first movement of umpires and unionization.¹⁰⁷ John J. Reynolds, an attorney representing the National League umpires, presented on umpire working conditions, specifically pensions and health insurance matters.¹⁰⁸ After the MLB barely adjusted either of those matters, the umpires

100. William Austin, *What It's Like to Work With a Robot*, BUILT IN (Dec. 14, 2022), <https://builtin.com/robotics/what-its-like-to-work-with-a-robot> [<https://perma.cc/A48X-PXY3>]. See Jacky Han, *How Should We Prepare for a Robot-Filled Society?*, ROBOTICS BUS. REV. 1, 2 (Sept. 30, 2019), <https://web.archive.org/web/20231128172552/https://www.roboticsbusinessreview.com/news/how-should-we-prepare-for-a-robot-filled-society/#> [<https://perma.cc/YD4Z-52Y4>] (advocating for governments to offer expanded access to education, mid-career job retraining, and to improve social safety nets in advance of robotic adoption).

101. Ira Wolfe, *How to Prepare Your Organization for Robot Workers*, CORNERSTONE, <https://www.cornerstoneondemand.com/resources/article/how-prepare-your-organization-robot-workers/> [<https://perma.cc/J6HX-RK3D>] (last updated Dec. 13, 2024).

102. *Employment/Labor Law*, GEO. L., <https://www.law.georgetown.edu/your-life-career/career-exploration-professional-development/for-jd-students/explore-legal-careers/practice-areas/employmentlabor-law/> [<https://perma.cc/L4ET-6FXE>] (last visited Oct. 10, 2023).

103. *National Labor Relations Act*, NAT'L LAB. RELS. BD., <https://www.nlrb.gov/guidance/key-reference-materials/national-labor-relations-act> [<https://perma.cc/4GC6-72AR>] (last visited Oct. 10, 2023).

104. Nat'l Lab. Rel. Act, 29 U.S.C. § 157.

105. *Major League Baseball Umpires Associations*, BASEBALL REFERENCE, https://www.baseball-reference.com/bullpen/Major_League_Baseball_Umpires_Association [<https://perma.cc/WKJ6-L33M>] (last visited Oct. 10, 2023).

106. The annual Winter Meetings are a time for MLB league executives, major and minor league team representatives, and other individuals in the baseball industry to meet to discuss league issues, negotiate trades, and host the Rule 5 draft. See, e.g., Rachael Millanta, *What are the MLB Winter Meetings?*, BETMGM (Nov. 28, 2022, 3:40 PM), <https://sports.betmgm.com/en/blog/mlb/what-are-the-mlb-winter-meetings-bm15/> [<https://perma.cc/U9HW-NBMH>].

107. Chris Williams, *Major League Umpires and Unionization*, SOC'Y FOR AM. BASEBALL RSCH., <https://sabr.org/journal/article/major-league-umpires-and-unionization> [<https://perma.cc/PKD3-JZFJ>] (last visited Sept. 17, 2023).

108. *Id.*

informed the league that the umpires would strike until their voices were more effectively heard.¹⁰⁹ The league did not take this threat too lightly and countered with its own threat, warning of mass umpire terminations unless the association ended.¹¹⁰ However, after a second presentation by the umpires' attorney, MLB improved pensions and health insurance, leading to the formation of the National League umpires' union, chartered in Illinois in 1964.¹¹¹

In 1969, the Major League Umpires Association (MLUA), which was later replaced by the MLBUA, asked the National Labor Relations Board (NLRB) to hold an election between the American League umpires to decide whether there should be a union in place.¹¹² Relying on its antitrust exemption on the basis that interstate commerce was not affected,¹¹³ MLB opposed any union.¹¹⁴ However, agreeing with the umpires, the NLRB recognized the MLUA as the first official bargaining agent for the American League umpires, which would later expand to include all umpires.¹¹⁵ Despite a union in place that would allow umpires to have stronger bargaining power, it was not an easy road for the umpires to receive any reasonable contracts or agreements.¹¹⁶ For example, in 1984, the National League umpires threatened to walk out of the National League playoffs because the contractual discussions were not moving forward between its union and the league president.¹¹⁷ The ominous situation was not resolved until the league caved and offered more agreeable terms to the umpires.¹¹⁸ Around fifteen years later, the umpires again felt that MLB was not respecting the workforce relationship after MLB sent a memorandum to the umpires, informing them that it was changing a strike's definition.¹¹⁹ The umpires believed that the change was not only against the official rules (of what a strike is), but they also felt disrespected by MLB since it asked for no input by any umpire, even though it was a rule substantially affecting their work responsibilities.¹²⁰ Throughout the MLB and the umpire union's relationship, there has been some tension to say

109. *Id.*

110. *Id.*

111. *Id.*

112. *Id.*

113. *E.g.*, *Fed. Baseball Club of Baltimore v. Nat'l League of Pro. Base Ball Clubs*, 259 U.S. 200, 207 (1922); *Toolson v. N.Y. Yankees, Inc.*, 346 U.S. 356, 356 (1953).

114. *See Williams, supra* note 107 (noting the MLB's argument "that baseball did not involve interstate commerce").

115. *Id.*

116. *Id.*

117. Thomas Boswell, *Talks Break Off*, WASH. POST (Oct. 2, 1984), <https://www.washingtonpost.com/archive/sports/1984/10/02/talks-break-off/059ac5dd-ca2a-40f4-8f6b-13a3fd035d66/> [<https://perma.cc/MV7P-NRSF>].

118. *See Williams, supra* note 107 ("To avoid a strike, Peter Ueberroth, who had been commissioner since March of that year, took a hand in the negotiations and offered terms that were more liberal than those [previously] offered.").

119. *Id.*

120. *Id.*; Buddy Thomas, *It's About Time the Umpires Got Called Out*, SOUTHCOAST TODAY, <https://www.southcoasttoday.com/story/sports/1999/08/26/it-s-about-time-umpires/50518995007/> [<https://perma.cc/XP6L-9JGE>] (last updated Jan. 11, 2011, 12:32 PM); *Strike Zone*, MLB, <https://www.mlb.com/glossary/rules/strike-zone> [<https://perma.cc/25YW-QXJE>] (last visited Nov. 4, 2023).

the least.¹²¹ The unionization has led to strikes throughout the relationship, as well as new agreements favoring the umpires, such as an improved salary structure, a two-week in-season vacation, travel accommodations, and per-diem expense money.¹²²

2. *Implications for the Umpire Workforce and a Potential Strike*

In 2013, two scholars from Oxford University conducted a study to determine how easily over seven hundred jobs in the United States could be automated.¹²³ The study, which was ironically conducted using machine learning, found that nearly fifty percent of the jobs could be done by machines over the next decade.¹²⁴ Many studies found that the jobs most susceptible to automation are the ones that require low-skills and are placed in structured and predictable settings.¹²⁵ In contrast, if a job requires decision-making, problem-solving, and a flexible mindset, that job is likely to be safer.¹²⁶ While MLB is a structured environment with limited possible outcomes, professional players and experts admit umpiring is a very challenging job.¹²⁷ Even though there is a definition of what a strike is, a human umpire must assess where a ball crosses the plate and where that ball lands in the imaginary zone that is determined after identifying the hitter's height.¹²⁸ In fact, these assessments are so difficult that they are not always accurate even when an electronic strike zone calls balls and strikes.¹²⁹ Additionally, unlike some paralegal or accounting work, there actually needs to be some sort of physical presence at the field with robotic umpiring in a baseball game.¹³⁰ In other words, machine learning replacing an accountancy role will not actually need a humanoid robot in the workforce; it is intangible.¹³¹ Since this Note is focusing on robots completely replacing human

121. E.g., Evan Woodbery, *Umpires Protest MLB's 'Lenient' Response to Ian Kinsler's Critical Comments*, MLIVE, https://www.mlive.com/tigers/2017/08/umpires_union_ian_kinsler.html [https://perma.cc/FAK5-VDTC] (last updated Aug. 19, 2017, 9:08 PM); see also Williams, *supra* note 107 (explaining conflicts between MLUA and MLB).

122. See Williams, *supra* note 107 (discussing MLUA strikes and related contract negotiations with the MLB).

123. The Data Team, *A Study Finds Nearly Half of Jobs Are Vulnerable to Automation*, THE ECONOMIST (Apr. 24, 2018), <https://www.economist.com/graphic-detail/2018/04/24/a-study-finds-nearly-half-of-jobs-are-vulnerable-to-automation> [https://perma.cc/8G3U-NBSX].

124. See *id.* (concluding that 47% of jobs could be done by machines "over the next decade or two.").

125. Sarah Gonser, *Ten Jobs That Are Safe from Robots*, THE HECHINGER REP. (Sept. 18, 2018), <https://hechingerreport.org/ten-jobs-that-are-safe-from-robots/> [https://perma.cc/5HRY-H63S].

126. *Id.*

127. Gabe Lacques, *'Perfectly Imperfect:' Here's Why Players Are Coming to the Defense of MLB Umpires*, USA TODAY (June 9, 2022, 6:41 AM), <https://www.usatoday.com/story/sports/mlb/2022/06/09/mlb-umpires-baseball-robo-umps-strike-zone/7513121001/?gnt-cfr=1> [https://perma.cc/26S7-VKLLH].

128. See *Strike Zone*, *supra* note 120 (explaining what the official strike zone is in baseball).

129. Tom Hanslin et al., *Joe West: MLB Robo Umps 'Not As Accurate As They're Making It Out to Be'*, AUDACY (Apr. 26, 2022, 5:11 PM), <https://www.audacy.com/cbssportsradio/sports/mlb/joe-west-the-problem-with-mlbs-robotic-umpires> [https://perma.cc/MRK7-8SLD].

130. Gonser, *supra* note 125; see *id.* ("Although this technology doesn't completely eliminate a human umpire's role and presence, former umpire Joe West remains skeptical about its efficacy.")

131. Gonser, *supra* note 125.

umpires, this will likely not be a realistic possibility within the next decade, like the Oxford study found, but it will probably take some more time.¹³²

Traditionally, the most prominent role of a union is to bargain for better wages and jobs for its members.¹³³ However, with the automation and technological changes that have entered the workforce, labor unions must also protect their constituency's jobs.¹³⁴ Because technological changes will continue to exist, the International Trade Union Confederation (ITUC) took a stance that unions should support innovation and automation in the workforce.¹³⁵ Explaining that there is no one correct way to react to the changing workforce, unions must continually anticipate and adapt to their collective bargaining strategies in order to stay relevant.¹³⁶ The ITUC explains that the automation of production, compared to digitization, is a long-lasting union challenge that will have to be considered for a lengthy period of time.¹³⁷ Thus, the MLBUA, should have been anticipating a possible change involving robotic umpiring for some time now.¹³⁸

B. Data Privacy & Security

1. Cybersecurity Considerations

Cybersecurity concerns the protection of networks, devices, and data from impermissible access or criminal use.¹³⁹ While there are various ways to improve cybersecurity, even with the best precautions there is no guarantee that someone will not be able to hack into your network or device.¹⁴⁰ MLB is no stranger to

132. The Data Team, *supra* note 123; Jennifer A. Kingson, *Meet Your New Colleague: Apollo, the Humanoid Robot*, AXIOS (Sept. 4, 2023), <https://www.axios.com/2023/09/04/humanoid-robot-labor-warehouse-jobs-apollo-apptronik> [<https://perma.cc/6XLA-UWZG>] (explaining that human form factor of robots is enormously challenging because the robots will require physical intelligence, cognitive intelligence, and will need to be able work longer than the one or two-hour bursts that they are currently working before a recharge is needed).

133. See Professor Ron Brown, *Robots, New Technology, and Industry 4.0 in Changing Workplaces. Impacts on Labor and Employment Laws*, 7 AM. U. BUS. L. REV. 349, 373 (2018). (“Labor unions have been involved in automation and technological changes for decades. Their interest is to protect the wages, working conditions, and jobs of their constituency in the face of change.”).

134. *Id.*

135. *Id.* at 361; International Trade Union Confederation, INT’L LAB. ORG., <https://www.ilo.org/resource/international-trade-union-confederation> [<https://perma.cc/XFY5-JJ8L>] (last visited Mar. 3, 2025) (explaining that the ITUC works to ensure that the Fundamental Workers’ Rights promoted by the ILO are enforced, such as the right to organize in a trade union, the right to collective bargaining).

136. Brown, *supra* note 133, at 362.

137. *Id.*

138. See generally Dave Briggs, *The Next Job at Risk of Being Marginalized by Robots: Major League Baseball’s Umpires*, CNBC (Oct. 25, 2016, 6:18 PM), <https://www.cnbc.com/2016/10/25/the-next-job-at-risk-of-being-marginalized-by-robots-major-league-baseball-umpires.html> [<https://perma.cc/8KK3-FK52>] (discussing the umpire automated technology and how it has been in the sports sphere for some time).

139. *What is Cybersecurity?*, CYBERSECURITY & INFRA. SEC. AGENCY, <https://www.cisa.gov/news-events/news/what-cybersecurity> [<https://perma.cc/V5LY-6762>] (last visited Mar. 3, 2024).

140. *Id.*

impermissible technology use by teams trying to gain advantages.¹⁴¹ For example, in 2017, the Houston Astros were involved in one of the most well-known cheating scandals in sports history.¹⁴² The Astros used cameras positioned in center-field to steal their opponents' signs; once the sign was stolen, an Astros' employee hit a trash can near the team's dugout a certain number of times to indicate to the hitter which pitch (e.g., fastball, breaking-ball, off-speed) was coming in his direction.¹⁴³ In a different incident, the FBI and Justice Department found that the St. Louis Cardinals' scouting director hacked into the Houston Astros' internal database to gain an advantage.¹⁴⁴ In this instance, the scouting director was sentenced to nearly fifty months in prison for corporate espionage.¹⁴⁵ While both examples concern an MLB team performing the impermissible act, both insiders (MLB teams) and outsiders can hack into robots and create technological problems.¹⁴⁶

Most people would probably not immediately think of MLB when discussing security issues and vulnerabilities involving robots.¹⁴⁷ However, AI-powered humanoid robots—those that mimic human behavior movement and interaction—can be risky and potentially dangerous for any industry that uses them.¹⁴⁸ While a robot intended for use on a military field has a higher likelihood of becoming what most people consider to be “killer robots,” protections need to be set in place in all industries using human-like robots.¹⁴⁹ There are various threats that will be present with humanoid robot umpires, and these threats may originate from insiders, such as MLB employees, or outsiders, such as competitors or cybercriminals.¹⁵⁰ As mentioned before, even robots with the most protective features are not completely safe from hacking, but incompetent

141. See Neil Vigdor, *The Houston Astros' 2017 Cheating Scandal: What Happened*, N.Y. TIMES (Oct. 25, 2022), <https://www.nytimes.com/article/astros-cheating.html> [<https://perma.cc/V8WB-VAEN>] (discussing the Houston Astro's sign-stealing scheme); see also Betsy Reed, *St Louis Cardinals Docked Two Draft Picks and Fined \$2m for Hacking Astros*, THE GUARDIAN (Jan. 30, 2017, 3:24 PM), <https://www.theguardian.com/sport/2017/jan/30/st-louis-cardinals-hacking-scandal-punishment-houston-astros-mlb> [<https://perma.cc/TE6Y-SAJA>] (discussing the St. Louis Cardinals hacking the Houston Astros).

142. Vigdor, *supra* note 141.

143. Max Molski, *How the Houston Astros Cheated in 2017, 2018 MLB Seasons*, NBC SPORTS PHILA. (Oct. 28, 2022, 3:56 PM), <https://www.nbcsportsphiladelphia.com/mlb/philadelphia-phillies/how-the-houston-astros-cheated-in-2017-2018-mlb-seasons/258616/> [<https://perma.cc/45L3-A8AQ>].

144. Mike Axisa, *We Now Know Extent of Cardinals Hack and the Unprecedented Penalties from MLB*, CBS SPORTS (Jan. 30, 2017, 2:29 PM), <https://www.cbssports.com/mlb/news/we-now-know-extent-of-cardinals-hack-and-the-unprecedented-penalties-from-mlb/> [<https://perma.cc/2B79-5VCL>].

145. See *id.* (“Former Cardinals scouting director Chris Correa was sentenced to 46 months in prison last July for what amounted to 12 counts of corporate espionage.”).

146. Molski, *supra* note 143; Axisa, *supra* note 144; Jean-Paul A. Yaacoub et al., *Robotics Cyber Security: Vulnerabilities, Attacks, Countermeasures, and Recommendations*, 21 INT'L J. OF INFO. SEC. 1, 121 (Mar. 19, 2021).

147. See Brad Dress, *Why the Pentagon's 'Killer Robots' Are Spurring Major Concerns*, THE HILL (Sept. 28, 2023, 6:00 AM), <https://thehill.com/policy/defense/4225909-why-the-pentagons-killer-robots-are-spurring-major-concerns/> [<https://perma.cc/B9WL-XSE7>] (explaining that critics of the Pentagon's use of robots is due to the risk of destruction, nuclear war, and civilian casualties).

148. Elazar Avramovits, *AI Powered Humanoid Robots Could Be Dangerous for the World*, LINKEDIN (Feb. 27, 2023), <https://www.linkedin.com/pulse/ai-powered-humanoid-robots-could-dangerous-world-elazar-avramovits> [<https://perma.cc/4YXE-ZH7Q>].

149. *Id.*; Dress, *supra* note 147.

150. Jean-Paul A. Yaacoub et al., *supra* note 146.

developers and incompetent operators of the robot umpires can drastically increase the likelihood of issues in MLB.¹⁵¹

Moreover, there are numerous types of possible attacks that can take place on a firm's hardware and firmware, some being more dangerous than others.¹⁵² For example, a hardware trojan¹⁵³ has become a more common type of cybersecurity concern in recent years due to the amount of data theft and backdoor insertions into the electronics industry supply chain.¹⁵⁴ Additionally, worm attacks on a robot's firmware exploit the network's vulnerabilities and primarily functions to self-replicate and infect the network.¹⁵⁵ A well-known worm attack—created during the President George W. Bush and President Barack Obama administrations—was called Stuxnet, which was a computer worm designed by the United States and Israel to disable a component of Iran's nuclear program.¹⁵⁶ Attacks on cybersecurity are a threat, so without cybersecurity measures in place, humanoid robot umpires are improbable and dangerous.¹⁵⁷

2. *Ethical and Bias Concerns Regarding Robotic Umpiring*

Hank Snowdon, a Claremont McKenna College student, performed a large study on pitches thrown from 2008 to 2020.¹⁵⁸ Snowdon discovered that the data suggests that some part of the calling of balls and strikes depended on the race

151. See *id.* (explaining that manufacturers and programmers need to take into consideration the essential safety and security requirements upon the development of software for robots and machines).

152. *Id.*; Hardware refers to the physical components of a system, such as the motherboard or hard drive, while firmware is responsible for booting the system and low-level tasks. See *What is the Difference Between Hardware, Firmware and Software?*, DSL, <https://web.archive.org/web/20240720210150/https://www.dsl-ltd.co.uk/what-is-the-difference-between-hardware-firmware-and-software/> [<https://perma.cc/ZD33-TC6M>] (last visited Mar. 3, 2025).

153. *Hardware Trojan*, GEEK FOR GEEKS (Aug. 23, 2022), <https://www.geekforgeeks.org/hardware-trojan/> [<https://perma.cc/GXP7-LHWE>] (“A Hardware Trojan or HT is something, a piece of hardware, which is hiding inside another larger piece of hardware. It wakes up at unpredictable times and does something malicious which is again unpredictable with respect to user.”).

154. *Hardware Trojans or the Threat of Malicious Circuits*, SECURE-IC (July 8, 2021), <https://www.secure-ic.com/blog/hardware-trojans/hardware-trojans> [<https://perma.cc/76Z7-QFWJ>]; see generally Tyler McGill, *Hardware Trojans and Supply Lines*, U.S. NAVAL INST. (Apr. 2021), <https://www.usni.org/magazines/proceedings/2021/april/hardware-trojans-and-supply-lines> [<https://perma.cc/DT9F-LY2Y>].

155. Crystal Bedell et al., *Computer Worm*, TECHTARGET, <https://www.techtargget.com/searchsecurity/definition/worm> [<https://perma.cc/5UE6-AQ5C>] (last visited Jan. 3, 2024).

156. Josh Fruhlinger, *Stuxnet Explained: The First Known Cyberweapon*, CSO (Aug. 31, 2022), <https://www.csoonline.com/article/562691/stuxnet-explained-the-first-known-cyberweapon.html> [<https://perma.cc/L8LY-TTC8>].

157. See Jean-Paul A. Yaacoub et al., *supra* note 146 (explaining the numerous measures that are essential to reduce any threats with robots).

158. Hank Snowdon, *Would “Robot Umpires” Reduce Discrimination? Measuring Racial Bias in Major League Baseball Umpires*, CMC SENIOR THESIS, https://scholarship.claremont.edu/cmcs_theses/2677 [<https://perma.cc/53P9-2CWK>] (last visited Sept. 17, 2023); see also David Burke, *Fastest MLB Pitchers in the Pitch Tracking Era, 2008 – Today*, SPORTS-STATISTICS.COM, <https://sports-statistics.com/mlb/fastest-mlb-pitchers-in-baseball-pitch-tracking-era> [<https://perma.cc/4AZK-A25F>] (last visited Jan. 3, 2024) (stating that pitch tracking become the standard in MLB beginning in 2008, allowing any person to analyze numerous metrics in baseball).

of the pitcher or the hitter.¹⁵⁹ In his study, Snowdon found that mistaken calls were about 0.3 percentage points more likely due to race effects.¹⁶⁰ Snowdon's results led him to consider whether robot umpires would reduce racial bias.¹⁶¹ Because "race has played a significant role in how umpires call balls and strikes," and since baseball is a difficult game to officiate due to its thin margins, Snowden suggested for robot umpires in MLB.¹⁶²

While it is certainly realistic that a robot umpire will not factor race into its decision-making process,¹⁶³ which was possibly implicitly done by human umpires, there are various other possibilities of bias issues involving technology-assisted officiating.¹⁶⁴ For example, some players fear that ABS is not the same for taller players as it is for shorter players.¹⁶⁵ All of the ABS-powered leagues have used team-provided batter heights to set up the upper and lower-strike boundaries.¹⁶⁶ In other words, the current technology-assisted umpiring does not measure the player's height when they step up to the plate.¹⁶⁷ Moreover, some players crouch when they are up to the plate; Detroit Tigers prospect Justyn-Henry Malloy explained that his former teammate, who is 6-foot-7, appears to be 6-foot-1 when he is batting due to his stance.¹⁶⁸ However, according to people knowledgeable with Hawk-Eye, laser and wearable technology will likely be the solution to this concern if and when ABS reaches the MLB.¹⁶⁹

C. *Robotic Umpiring's Impact on Baseball*

Although sometimes people do not like change, change is needed to make progress in some cases.¹⁷⁰ In other words, the change from human umpires,

159. Robert Arthur, *A New Study Shows Umpire Discrimination Against Non-White Players*, BASEBALL PROSPECTUS (Aug. 13, 2021), <https://www.baseballprospectus.com/news/article/68963/moonshot-a-new-study-shows-umpire-discrimination-against-non-white-players> [<https://perma.cc/7MDY-HSHJ>] (also stating that "previous studies of biases have returned somewhat mixed results").

160. *See id.* ("Snowdon estimates that umpires called about 18,000 pitches differently over the 13-year period of the study because of racial bias, meaning a little more than a thousand changed calls per year.")

161. *Id.*

162. *Id.*

163. Grant Cole, *Robot Umpiring: The Future of Baseball?*, TALKNATS.COM (Oct. 24, 2024), <https://www.talknats.com/2024/10/24/robot-umpiring-the-future-of-baseball> [<https://perma.cc/P22N-V9KC>]. However, robots are not immune to bias purely because they are robots. While the fields of robotics and AI must increase diversity and involve ethics into product development, bias coding can disproportionality affect marginalized groups. *See* Carlotta A. Berry, *Freeing Robotics and AI From Bias*, SCIENCE (Aug. 26, 2021, 2:00 PM), <https://www.science.org/content/blog-post/freeing-robotics-and-ai-bias> [<https://perma.cc/3SL2-DC2Q>].

164. Arthur, *supra* note 159.

165. Jayson Stark, *Are Robot Umpires Ready for Their MLB Debut? Not So Fast.*, THE ATHLETIC (Aug. 25, 2023), <https://theathletic.com/4791440/2023/08/25/mlb-robot-umpires-future/> [<https://perma.cc/86HG-RAUU>].

166. Ben Lindbergh & Rob Arthur, *MLB Just Tried a Bunch of Experimental Rules in the Minors. How Well Did They Work?*, THE RINGER (Oct. 21, 2021, 8:04 AM), <https://www.theringer.com/mlb/2021/10/21/22736400/experimental-rules-atlantic-league-robo-umps> [<https://perma.cc/8JYP-ACFL>].

167. *Id.*

168. Stark, *supra* note 165.

169. *Id.*

170. James Brinsford, *MLB Fans Threaten to Boycott Over 'Robot Umpires'—'Will Ruin the Game'*, NEWSWEEK (Jan. 20, 2023, 9:10 AM), <https://www.newsweek.com/mlb-fans-threaten-boycott-robot-umpires-1775319> [<https://perma.cc/GYD3-L8KK>].

which has been part of the sport since its creation, to humanoid robots may not be an easy transition for some fans.¹⁷¹ MLB Commissioner Rob Manfred has consistently tried to attract more fans to the ballpark, specifically younger fans, because he rightfully thinks it is essential to baseball's future.¹⁷² To reach this goal, Manfred implemented new rules during the 2023 season, such as adding a pitch clock to speed up the game.¹⁷³ As a result, the average length of an MLB game was twenty-four minutes less than the average length in 2022.¹⁷⁴ Since increasing baseball's popularity has proven to be a priority for MLB, humanoid robot umpires may not be an easy transition for all fans, especially the older generations.¹⁷⁵ In fact, in 2022, only 48 percent of self-described MLB fans supported technology-assisted umpiring in baseball.¹⁷⁶

Moreover, implementing humanoid robot umpires may not just impact the sport's popularity, but it can have a drastic impact on how the sport has historically been played.¹⁷⁷ An effective pitcher has the ability to paint a corner, or throw pitches that come very close to the edge of the strike zone, and have his catcher frame that pitch.¹⁷⁸ In other words, a catcher in baseball has the ability to fool or trick the umpire in thinking a pitch was thrown in the strike zone, when in reality, it was thrown an inch or so off the plate.¹⁷⁹ This is called "pitch framing," and it is an important MLB skill for a catcher to have.¹⁸⁰ Some catchers are not the most effective hitters and most of their value to a team comes from their defensive skills, including the ability to frame pitches.¹⁸¹ According to Major League Baseball's own website, catcher framing effects can be dramatic since "in 2019, hitters had an .858 OPS after a 1-0 count, but just a .631

171. See Gerlach, *supra* note 46 ("From the creation of the modern game in the 1840s through the Civil War, the umpire was the personification of base ball (two words then) as an amateur sport played by gentlemen.").

172. Anne Rogers, *Commissioner Talks Attendance Boom, Diversity, More*, MLB (Aug. 17, 2023), <https://www.mlb.com/news/mlb-commissioner-rob-manfred-on-state-of-game> [https://perma.cc/5HS9-9XCJ].

173. *Id.*; Anthony Castrovince, *Taking Stock of Impact of New Rules as Second Half Begins*, MLB (July 12, 2023), <https://www.mlb.com/news/impact-of-mlb-rules-changes-halfway-mark> [https://perma.cc/SB3P-Z869].

174. Rogers, *supra* note 172; These changes make sense, since the younger generations have shorter attention spans, which has significant implications for every industry. See Thaís Roberto, *The First 8 Seconds – Capturing the Attention of Gen Z Students*, KEYSTONE EDUC. GRP. (Aug. 21, 2023), <https://www.keg.com/news/the-first-8-seconds-capturing-the-attention-of-gen-z-students> [https://perma.cc/7DZG-8DH2] ("Research conducted by Microsoft in 2015 found that the average attention span of Gen Z individuals was only about eight seconds...").

175. Rogers, *supra* note 172; Mack DeGeurin, *Baseball Fans Might Be Ready for Robo Umpires*, GIZMODO (July 15, 2022), <https://gizmodo.com/baseball-robo-umpires-robots-1849184228> [https://perma.cc/LP7A-WR3L] (stating that only "48% of self-described U.S. baseball fans said they support the implementation of a robotic umpire capable of automatically calling balls and strike," and that "32% opposed").

176. DeGeurin, *supra* note 175.

177. Brinsford, *supra* note 170 (fans arguing that "the human element is part of the game," while "Robot umpires is completely different. Part of the art of baseball is painting corners and framing. Automated zone destroys that").

178. *Id.*

179. *Id.*

180. Emma Baccellieri, *Beware, Catchers: The Robots Are Coming*, SPORTS ILLUS. (Mar. 28, 2023), <https://www.si.com/mlb/2023/03/28/pitch-framing-robo-umps-daily-cover> [https://perma.cc/5G7P-RY2D].

181. *Id.*

OPS after an 0-1 count.”¹⁸² Humanoid robotic umpiring will certainly impact at least one position, even if it brings more consistent results than a human umpire.¹⁸³

IV. RECOMMENDATION

A. *Labor & Employment Law*

The fear of strikes will cause some companies to do almost anything to prevent their employees from unionizing.¹⁸⁴ However, in MLB, this potential solution will not be attainable since the MLB umpires are already in a union.¹⁸⁵ The problem in MLB with respect to umpires is that human umpires are currently needed in games featuring technology-assisted umpiring in its beginning stages.¹⁸⁶ In other words, if humanoid umpires were ready to enter the big leagues, there would be no strike concerns since the humans could immediately lose their positions.¹⁸⁷ Hence, because humanoid umpires are not ready to be called up to the big leagues and may not be for some time, if MLB hopes to ever introduce humanoid umpires, it must figure out how to avoid a non-playable season due to having no available umpires due to a strike.¹⁸⁸

In order for a union to have any value, it must have power.¹⁸⁹ Unions need this power to command better wages, benefits, rights, and conditions for its union members.¹⁹⁰ The question with humanoid robot umpiring is how much

182. *Catcher Framing*, MLB, <https://www.mlb.com/glossary/statcast/catcher-framing> [<https://perma.cc/95EJ-Q2MU>] (last visited Sep. 17, 2023).

183. Baccellieri, *supra* note 180.

184. See Alana Semuels, *Some Companies Will Do Just About Anything to Stop Workers from Unionizing*, TIME (Oct. 13, 2022, 9:01 AM), <https://time.com/6221176/worker-strikes-employers-unions/> [<https://perma.cc/8N7R-UBRF>] (“[A] wave of workers – emboldened by a strong labor market and sick of feeling unappreciated – walked off their jobs, hastening what some in the media called Striketober. . . .”); see also *id.* (“[B]osses are pushing back, trying to convince workers to reject union overtures through means that violated the law, according to decisions by administrative law judges from the National Labor Relations Board (NLRB).”).

185. See *Major League Baseball Umpire Associations*, *supra* note 105 (“The Major League Baseball Umpires Association is the union representing Major League Baseball umpires in labor negotiations.”).

186. See Pierce, *supra* note 74 (“The existing system was developed by a company called TrackMan In practice, it’s quite simple: the umpires slip a dedicated iPhone into their back pocket and an earbud into their ear, and the system signals ball or strike into their headphone after every pitch.”); see also *id.* (“[E]ven with these automated systems in place, umpires still have plenty to do calling check swings, plays at the plate, and even occasionally overruling the robots.”).

187. *Id.*

188. *Id.*; see also *Major League Baseball Umpire Associations*, *supra* note 105 (“[I]n 1999 The former association had counselled umpires to submit their resignations *en masse*. . . . MLB decided to accept the resignations, and then rehired only some of the umpires . . . filling out the ranks with umpires promoted from the minor leagues.”).

189. See Teresa Ghilarducci, *How Do Economists Measure Worker Bargaining Power?*, FORBES (Apr. 18, 2022, 4:28 PM), <https://www.forbes.com/sites/teresaghilarducci/2022/04/18/is-worker-power-rising-despite-big-union-wins-the-answer-may-surprise-you/> [<https://perma.cc/3XPH-DWSG>] (“Combined with the overall decline in unionization for decades, employers’ greater bargaining power has kept American workers’ pay 20% lower than it otherwise would be.”); see also *id.* (“The minimum wage, which has not been raised since 2009, boosts wages for workers at the bottom and is a sign of unions’ and workers’ political power. The fact that the federal minimum wage is so low is a sign of labor weakness.”).

190. *Id.*

power the MLBUA holds.¹⁹¹ Umpires striking for better working conditions would not be a new sight for MLB since they have done it before.¹⁹² On the other hand, the level of bargaining power that MLB holds in a humanoid robot umpiring negotiation is debatable.¹⁹³ For example, during the 2012 National Football League (NFL) season, the NFL and its referees were in a lengthy disagreement about their contracts, which took place before and during the season.¹⁹⁴ Instead of pausing or delaying the NFL season, the NFL introduced replacement umpires, which included umpires from all levels of football, including from the National Collegiate Athletic Association (NCAA) and high school.¹⁹⁵ The results were not exactly ideal for the NFL, its teams, or its fans.¹⁹⁶ For example, during a Green Bay Packers and Seattle Seahawks game, the “Fail Mary” took place.¹⁹⁷ Instead of the Green Bay Packers winning on a last-second interception, the replacement referees called the play a touchdown, and the Seattle Seahawks won the game;¹⁹⁸ this is considered by some to be one of the worst calls in professional sports history.¹⁹⁹ Even if the MLBUA brings up

191. See *Major League Baseball Umpire Associations*, *supra* note 105 (“[I]n 1999 The former association had counselled umpires to submit their resignations *en masse*. . . . MLB decided to accept the resignations, and then rehired only some of the umpires . . . filling out the ranks with umpires promoted from the minor leagues.”); see also *id.* (“As a result, members of the association turned against Philips and formed a new and much less confrontational union.”); see also *id.* (“The [MLBUA] not only includes Major League umpires among its membership, but also umpires from the two AAA minor leagues – the International League and the Pacific Cost League – who are regularly called upon to fill temporary or permanent vacancies . . . as well as international umpires.”).

192. See Williams, *supra* note 107 (“In October 1970 the first umpire strike occurred, on the first day of the League Championship Series. The umpires sought more pay for working the extra games created by the addition of the League Championship Series to the postseason.”).

193. See, e.g., *Major League Baseball Umpire Associations*, *supra* note 105 (“[I]n 1999 The former association had counselled umpires to submit their resignations *en masse*. . . . MLB decided to accept the resignations, and then rehired only some of the umpires . . . filling out the ranks with umpires promoted from the minor leagues.”); see also *id.* (“As a result, members of the association turned against Philips and formed a new and much less confrontational union.”); see also *id.* (“The [MLBUA] not only includes Major League umpires among its membership, but also umpires from the two AAA minor leagues – the International League and the Pacific Cost League – who are regularly called upon to fill temporary or permanent vacancies . . . as well as international umpires.”).

194. Rose Eveleth, *What’s the Deal with the NFL’s Replacement Referees?*, SMITHSONIAN MAG. (Sept. 17, 2012), <https://www.smithsonianmag.com/smart-news/whats-the-deal-with-the-nfls-replacement-referees-39338288/> [https://perma.cc/Y984-2RMJ] (“The dispute between the regular refs and the NFL is about compensation and benefits. The referees want to retain their pension program, while the league wants to move them over to a 401(k) structure. The union is also disputing what the NFL claims is a 5 to 11 percent increase in salary.”).

195. *Id.* (“The replacements . . . come from all over. Some of them are from the National Association of Intercollegiate Athletics. But none of them come from Division I college teams, and some of them are high school refs.”).

196. Rodger Sherman, *Ten Years Later, the Failed Lessons From the Fail Mary*, THE RINGER (Sept. 23, 2022, 5:10 AM), <https://www.theringer.com/nfl/2022/9/23/23366808/fail-mary-nfl-anniversary-green-bay-packers-seattle-seahawks> [https://perma.cc/R33T-UK9M] (“Distaste with the replacement refs slowly built over the first three weeks of the 2012 season as players and coaches recognized they were working with inferior officials.”).

197. *Id.* (“The embarrassing part of the Fail Mary wasn’t that the replacement refs got the call wrong. . . . [E]ven the game’s referee later admitted the Seattle Seahawk’s game-winning touchdown should have been a Green Bay Packers game-ending interception . . .”).

198. *Id.*

199. *Id.* (“A decade ago this weekend, replacement referees made one of the worst calls in pro sports history.”).

arguments connected to the issues the NFL saw with replacement umpires,²⁰⁰ MLB can have its own, equally-powerful arguments. Replacement umpires in baseball would not be performing the traditional umpiring role since ABS would at least be calling balls and strikes, and potentially more (if humanoid umpires reach MLB).²⁰¹ Hence, it would be less likely that MLB would see its own “Fail Mary” since the replacement umpires in MLB would have fewer responsibilities than the replacement referees in the NFL did, which in turn means a decreased chance of making game-changing mistaken calls.²⁰²

If MLB ever pursues humanoid umpires, the end could be near for human umpires in baseball.²⁰³ Nevertheless, unions must continually anticipate and adapt their collective bargaining strategies in order to stay relevant.²⁰⁴ Since the end of the traditional umpire’s role is certainly realistic,²⁰⁵ the MLBUA should look at the different ways that its umpires can keep an umpire-related job. The best way for the umpire union to survive with AI in baseball is to create a new position for themselves. In order for many individuals in the labor industry to survive the AI rush, there needs to be changes in educational and learning environments that will allow them to stay employable with robots as their co-workers.²⁰⁶ With MLB and robot umpires, the way to keep umpires employable is to have some of them working as designated head officials who will oversee games even with humanoid robot umpires on the diamond. Since officiating a baseball game is difficult due to the number of complex game results that may arise,²⁰⁷ and because the early technology-assisted umpiring is not exactly perfect,²⁰⁸ it may be reasonable to think that humanoid robot umpiring will not be completely accurate on all occasions, even if they are more accurate than its

200. *Id.* (“Distaste with the replacement refs slowly built over the first three weeks of the 2012 season as players and coaches recognized they were working with inferior officials.”).

201. Pierce, *supra* note 74 (“The existing system was developed by a company called TrackMan In practice, it’s quite simple: the umpires slip a dedicated iPhone into their back pocket and an earbud into their ear, and the system signals ball or strike into their headphone every pitch.”); *see also id.* (“[W]ith these automated systems in place, umpires still have plenty to do calling check swings, plays at the plate, and even occasionally overruling the robots.”).

202. *Id.*

203. *Id.* (“There are two ways the ‘Automated Ball-Strike System,’ . . . might be implemented. One is the fully automated version, in which the AI-powered system calls every pitch a ball or a strike and relays the call to the umpire.”).

204. Brown, *supra* note 133, at 373 (“Labor unions have been involved in automation and technological changes for decades. Their interest is to protect the wages, working conditions, and jobs of their constituency in the face of change.”).

205. *See Major League Baseball Umpire Associations, supra* note 105 (“There are two ways the ‘Automated Ball-Strike System,’ . . . might be implemented. One is the fully automated version, in which the AI-powered system calls every pitch a ball or a strike and relays the call to the umpire.”).

206. Lee Rainie & Janna Anderson, *The Future of Jobs and Jobs Training*, PEW RSCH. CTR. (May 3, 2017), <https://www.pewresearch.org/internet/2017/05/03/the-future-of-jobs-and-jobs-training/> [<https://perma.cc/XR9M-RVVP>] (“A 2016 Pew Research Center survey . . . found that 87% of workers believe it will be essential for them to get training and develop new job skills throughout their work life in order to keep up with changes in the workplace.”).

207. Berg, *supra* note 33 (“Umpires in 2016 face perhaps more scrutiny than ever before, especially when behind the plate. Fans and analysts armed with strike zone plots can immediately identify if an umpire called a strike an inch below the zone or squeezed a pitcher on a fastball that nipped the outside corner.”).

208. Hanslin et al., *supra* note 129 (“We don’t have an umpire . . . who’s scored less than 95 percent. There’s a couple that are off a little bit, but 95-percent is well above the average of what this thing is. . . . They’ve proven [the robotic umpires] misses 7-percent of the pitches.”).

human counterparts.²⁰⁹ Thus, a way to avoid these problems is to keep some umpires at each game to overlook everything and to make sure the game's integrity is still intact.²¹⁰ Moreover, MLBUA can strike a deal with MLB to allow some umpires to regularly be in contact with the robot developers to make sure the robots are fully prepared for each MLB game.²¹¹ It is likely unrealistic to assume that robot developers will have the required baseball knowledge to program the robot umpires without any assistance.²¹²

Moreover, another way to reduce that chance of a strike with respect to humanoid robot umpiring is to have effective communication.²¹³ Effective negotiations during the labor union discussions will be essential to humanoid robotic umpiring's smooth transition since it will allow the umpire's union and MLB to find common ground and to understand each other's perspective.²¹⁴ In 2019, the umpires agreed with MLB to develop and test an ABS system, which is a positive sign for the cooperation between the parties.²¹⁵ However, the umpires may feel differently about technology-assisted umpiring one day if they ever find out that instead of still being on the field with an earpiece, there is a threat of completely being replaced by humanoid umpires;²¹⁶ hence, they may feel differently about willingly cooperating with MLB.²¹⁷ Thus, effective communication and cooperation by both parties is required.

209. Pierce, *supra* note 74 (“[W]ith these automated systems in place, umpires still have plenty to do calling check swings, plays at the plate, and even occasionally overruling the robots.”).

210. *Id.*; see also Hanslin et al., *supra* note 129 (“We don’t have an umpire . . . who’s scored less than 95 percent. There’s a couple that are off a little bit, but 95-percent is well above the average of what this thing is. . . . They’ve proven [the robotic umpires] misses 7-percent of the pitches.”).

211. See *Major League Baseball Umpire Associations*, *supra* note 105 (“There are two ways the ‘Automated Ball-Strike System,’ . . . might be implemented. . . . Or the MLB could decide to use the AI as a review system . . . each side gets a certain number of challenges, which are then adjudicated by the automated system.”).

212. See Hanslin et al., *supra* note 129 (“We don’t have an umpire . . . who’s scored less than 95 percent. There’s a couple that are off a little bit, but 95-percent is well above the average of what this thing is. . . . They’ve proven [the robotic umpires] misses 7-percent of the pitches.”).

213. Tanveer Mohammad Noman, *Strategies for Success: Effective Communication in Negotiation*, LINKEDIN (Aug. 15, 2023), <https://www.linkedin.com/pulse/strategies-success-effective-communication-tanveer-noman-pmp-rhcsa> [<https://perma.cc/58WB-JZ5X>] (“Effective communication is the cornerstone of successful negotiation. It allows negotiators to express their interests, understand the other party’s perspective, and find common ground.”).

214. *Id.*

215. Ben Walker & Ronald Blum, *AP Exclusive: Computer Plate Umps Allowed in New Labor Deal*, AP NEWS (Dec. 21, 2019, 6:32 PM), <https://apnews.com/article/d8760e52b8ced5b8436c60891ea6e877> [<https://perma.cc/KG7R-U7K9>].

216. See e.g. Becky Sullivan, *Everything to Know About the MLB’s Ball-Strike Challenge System at Spring Training*, NPR (Feb. 20, 2025, 3:10 PM), <https://www.npr.org/2025/02/20/nx-s1-5304103/mlb-ball-strike-umpire-abs-challenge> [perma.cc/JM4-K5RS] (“The objection comes from what people in baseball call ‘the human element’ — in other words, the added dimensions to baseball that come from having a human behind home plate.”).

217. See *id.* (“A vocal group of players and umpires ‘really did not like that system,’ said Sword, the MLB baseball operations executive.”).

B. Data Privacy & Security

It is normal for some people to fear robots because they may lose their jobs, or even worse, the robots may turn into killer robots.²¹⁸ One way to resolve some of these worries is through regulation.²¹⁹ Many experts around the world believe that global cooperation will be required in order to have effective AI regulation.²²⁰ In the United States, any significant AI regulation will have to come from Congress, but the Biden Administration gave companies the leeway to voluntarily govern themselves for safety and security risks.²²¹ The White House, however, posted a blueprint for an AI bill of rights that gives companies suggestions on topics such as, safe and effective systems, discrimination protections, data privacy, notice and explanation, and human alternatives.²²² But in the end, companies such as Amazon, Google, and Meta, have agreed to self-regulate their systems.²²³

Since MLB itself did not create TrackMan or Hawk-Eye, it is safe to assume for purposes of this Note that it will also not create the humanoid robot umpires that one day could reach its diamonds.²²⁴ With this being said, it is more likely that companies such as TrackMan or Hawk-Eye or another will be the one who enters into discussions with MLB concerning robot umpires.²²⁵ In order to prevent both insiders or outsiders from hacking the humanoid robot system, MLB needs to serve as a gatekeeper, only allowing the companies that develop a humanoid robot umpire with a goal of being used in an MLB game if they followed the norm of AI regulation in the United States.²²⁶ Since as of right now, AI regulation in the United States is governed by self-regulation, MLB should make it a requirement that any robotic developer follows appropriate procedures, which includes looking to others in the AI industry for guidance.²²⁷ Without such assurance, the dangers of AI on the field is too substantial,²²⁸ and human umpires should stay put.

218. See generally Tom Porter, *We're a Long Way from Killer Robots, but AI Still a Serious Threat*, BOWDOIN (June 2, 2023), <https://www.bowdoin.edu/news/2023/06/were-a-long-way-from-killer-robots-but-ai-still-a-serious-threat.html> [<https://perma.cc/VJG5-B3TM>] (discussing concerns over AI).

219. Cecilia Kang & Adam Satariano, *Five Ways A.I. Could Be Regulated*, N.Y. TIMES (Dec. 6, 2023), <https://www.nytimes.com/2023/12/06/technology/artificial-intelligence-regulation.html> [<https://perma.cc/8VVS-Z63B>].

220. *Id.*

221. *Id.*

222. *Blueprint for an AI Bill of Rights*, THE WHITE HOUSE, <https://web.archive.org/web/20250104141952/https://www.whitehouse.gov/ostp/ai-bill-of-rights/> [<https://perma.cc/3ZZU-DGKG>] (last visited Jan. 8, 2024).

223. Kang & Satariano, *supra* note 219.

224. *E.g.*, Sarris, *supra* note 85.

225. See *id.* (describing pre-existing relationships with both companies).

226. See Kang & Satariano, *supra* note 219 (discussing the importance of AI regulation in the United States).

227. See *id.* (discussing self-regulation in the U.S. by prominent AI makers).

228. See Shannon Bickert, *Robotic Umpires Would Ruin Baseball*, HOFSTRA CHRONICLE (Sept. 26, 2024), <https://thehofstrachronicle.com/99561/opinion/robotic-umpires-would-ruin-baseball/> [perma.cc/GT5D-Z4FW] (discussing the drawbacks to using robot umpires in baseball).

C. *Impact on the Game*

Because attracting new fans, particularly younger fans, to the ballpark is a critical goal for MLB's long-term success, MLB needs to be careful to not quickly transition to humanoid umpires without understanding the effect that it will have on the game.²²⁹ The risks include impacting the way fans view the game due to its deep-rooted tradition and history²³⁰ and affecting the way certain position players are valued by teams.²³¹ The best way to handle this situation is to balance the benefits gained from using humanoid robot umpiring with the possible negatives that may result from it.²³² In other words, if baseball's traditionalism is valued highly by fans—namely not becoming too technologically advanced and still wanting humans to have the officiating responsibilities—or if MLB teams view the changes it has on catchers or any position too negatively, then MLB may have to reconsider a full rollout of humanoid robot umpires.²³³ Other alternatives exist than having zero human umpires on the field, such as having ABS (or some more advanced system) rule on obvious balls or strikes, and then the human umpire could stay behind home plate and call the pitches that are on the border and in the “zone of discretion.”²³⁴

V. CONCLUSION

Baseball is often referred to as “America’s National Pastime” since it had a substantial role in the United States’ development.²³⁵ Baseball reflects many areas of an American’s life.²³⁶ This is why any significant change to the historical sport, including a change to umpiring, should sometimes be second-guessed. There is no doubt that being an umpire in MLB is a difficult task because many of the calls an umpire has to make are considered judgment calls.²³⁷ However, sometimes an incorrect judgment call, while being difficult for any human to determine, can cause a historical sports moment to vanish from existence.²³⁸ Thus, the question becomes whether a human umpire can be completely replaced by a humanoid robot to call games and enhance baseball’s

229. Rogers, *supra* note 172.

230. Brinsford, *supra* note 170.

231. Baccellieri, *supra* note 180.

232. See Dean Ciriaco, *Robo Umps in Baseball: Pros and Cons of Automated Calls on the Field*, SKIPPERS VIEW (Feb. 19, 2023), <https://www.theskipperview.com/p/robo-umps-in-baseball-pros-and-cons> [perma.cc/SP29-YUG2] (discussing the pros and cons of robotic umpires in baseball); see also *supra* Part III.B.2 (describing bias reduction from implementing ABS); *supra* text accompanying note 202 (describing ABS improved call accuracy); *supra* Part III.A.2 (discussing workforce implications of implementing ABS); *supra* text accompanying notes 230–31 (discussing cultural impacts on baseball from implementing ABS).

233. See Ciriaco, *supra* note 232 (discussing how robotic umpires take away from the human element of baseball and other cons); Brinsford, *supra* note 170; Baccellieri, *supra* note 180.

234. Zach Helfand, *Invasion of the Robot Umpires*, THE NEW YORKER (Aug. 23, 2021), <https://www.newyorker.com/magazine/2021/08/30/invasion-of-the-robot-umpires> [perma.cc/LVY5-U8WR].

235. *Baseball History, American History and You*, BASEBALL HALL OF FAME, <https://baseballhall.org/baseball-history-american-history-and-you> [https://perma.cc/7CJW-4F2H] (last visited Jan. 9, 2024) (explaining the history of baseball).

236. *Id.*

237. See *Umpire*, *supra* note 5 (describing the job of an umpire to make judgment calls).

238. See, e.g., Nelson, *supra* note 8 (discussing the historic baseball moment with Armando Galarraga).

integrity by calling games more accurately.²³⁹ Because the Major League Baseball Umpires Association exists, the MLB needs to be careful to avoid any strikes due to umpires understanding that their position may be soon coming to an end.²⁴⁰ One way to avoid any strike is to give a new position to umpires, which would allow them to oversee the robots on the field.²⁴¹ Moreover, to make sure the robots will be safely rolled out on the diamond, MLB needs to make sure the robot developers follow the AI industry's norms.²⁴² Finally, MLB needs to be confident that humanoid robot umpiring will not drastically damage baseball's traditionalism with respect to its players and human aspect.²⁴³ With robot umpires' increased accuracy, we will hopefully have less rememberable and historical quotes such as, "[g]entlemen, he was out because I said he was out."²⁴⁴

239. See Sullivan, *supra* note 216 (discussing ABS in the context of the pressure on baseball to improve umpire accuracy).

240. See *Major League Baseball Umpire Associations*, *supra* note 105 (describing the NLRB-recognized umpire labor union).

241. Pierce, *supra* note 74.

242. See Kang & Satariano, *supra* note 219 (discussing current AI industry norms).

243. Brinsford, *supra* note 170.

244. *Bill Klem Quotes*, BASEBALL ALMANAC, <https://www.baseball-almanac.com/quotes/quoklem.shtml> [<https://perma.cc/YXR7-EFXA>] (last visited Sept. 17, 2023) (made by an umpire after he was shown a photo of an incorrect call).