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Are Robots Human? A Review of the Legal Personality Model

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Abstract: The present days robots equipped with Artificial Intelligence technique demonstrate human sentient traits. With presumed human intelligence, these robots are capable of executing rational, independent and responsive actions. Adopting Artificial Intelligence technique in various domains are proven to be commercially promising and has triggered a global market demand, including Malaysia. Although robots in Malaysia are equipped with a primitive Artificial Intelligence, a high end Expert System application is evident in providing a financial management software through leading banking institutions. This article aims at analyzing the legal personhood model as one of the recommended resolutions concerning the issues of robots and liability by conferring legal personality to intelligent robots. Jurisprudential analysis was adopted in this article to analyze "rationality" as the criteria for the conferment of legal personality and mapping it onto robot's goal-achieving mechanism. It is suggested that in the Malaysian context, implementing human related law to robots is a flawed approach.

Key words: Artificial Intelligence and law · Robotics · Legal personality model

INTRODUCTION

The Neo-Luddism movement robustly assume the advancement of technology as producing psychological disturbance, abandoning social communication and loss of integrity as well as creating economical and politic disparity. These concerns are threats to humanity [1]. One of the listed technologies that calls for a ban by the Neo-Luddism is the assumed skilled artificial intelligence robot possessing a level of sentience and predicted to surpass human intelligence [2]. Haselagar supposed that robotics serve to facilitate humans in understanding various aspects of autonomy and intelligence [3].

Historically, robotics development is concentrated on technical interpretations of autonomy until its development was extended to entail the philosophical analysis of autonomy focusing on the ability of the robot to select its own goals, choosing the manner of which the goals are to be executed, or simply what exactly dictates the robot's intelligence. It is by merging together these two aspects of robotic development that futuristic ideologies are derived. It is through the understanding of robotic autonomy as an ever-evolving technology that one may perceive the idea of technological singularity.

This statement is consistent with Ray Kurzweil's Law of Accelerating Return and Vernor Steffen Vinges's hypothesis of exponential growth of technology, both speculating the point where technological acceleration will be of no reach for human expectations; the technological singularity [4]. Robots are moving from science fiction sheets to science fact, with the ability to do things that we previously imagine: moving and reproducing; predicting and choosing; learning; understanding and interpreting; analyzing (translating, abstracting and indexing); deciding; perceiving; feeling [5].

Thus it is rightful to contend that the future ability of AI robots along with the possibility of the technological singularity is contended to be uncertain [6]. During the era of technological singularity, Kurzweil decribes the irreversibly transformed human life where technology will encompass all human knowledge leading to existential risk. The existential risk simply refers to situations where human values will be eliminated [7]. Muehlhauser and Salamon note the possibility of intelligent machines destroying valued structures including humans eventually [8].

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However, these are not to the advantage of this research as they possess a far reaching understanding on intelligence explosion and technological singularity. Imperative to this research is simply the contradicting theories by experts on technological acceleration which proves Vinge's assumption that we cannot even contemplate the consequences of future technology [9]. The Neo-Luddism concern though comprehensible, is oblivious to the incalculably large betterment from new technologies [10]. Modern intellectual dialogues, therefore, employ the regulation system modalities as a platform to provide a balance between feasible threats and anticipated benefits of technology.

Law in this context, experiences an imminence of adaptation in the old-fashioned law-making, thus an in-depth analysis of the impact carried upon by the technology of this sort to the legal fabric is imperative [11]. With tremendous contribution from the field of artificial intelligence, robotic technology is moving towards an automated development of action [12]. This can only mean, exposing human user to the unpredictable and unknown behavior of robots in a close proximity. Hence, safety requirements of uncertain autonomous robot behavior require a different approach and a higher demand in law and safety.

Palmerini notes the urgency from industrial players for an evident analysis of robotic regulation ranging from the early stage of robotic development until its industrial release to better perceive the associated obligation and risk [13]. Different opinions are delivered relating to the repercussion of regulation in dealing with technological advancement [14]. Gifford contends the fostering or the stifling implication of legal rules as a form of interaction between law and technology [15]

Palmerini again identifies that leaving the plea for regulatory intervention causes entities involved being in an undefined environment where "rights and responsibilities" are not clearly attributed nor anticipated. On the other hand, abrupt legal regime might hinder technological innovation. Intervention is however, significant to safeguard interest against unpredictable risk. This paper aims to analyze the relevancy of the legal personhood model to resolve the question of liability for harm or injury arising from robot's actions.

Literature Review: More often than not, the discussions on law and robotics are associated with the realm of Artificial Intelligence. The aim of producing thinking machines has spurred the dialogue between legal scholars, precisely on the imposition of liability for harm or damages arising from the employment of such technology. Robot is a unique artefact with exceptional significance. The courts are compelled to resolve the question of the status of robots, extend of which robot is claimed to have represented, being imitative to or absolved people [16]. Unknowingly, robots have impacted the working operation of contemporary laws.

The analysis made from past cases revealed the evolution of human perception towards robotics [17]. Unknowingly, humans are acknowledging the social valence of the present days' robots. Social valence involving robots relates to the social response invoked for any robots physically responding to the environment with the ability to sense and think [18]. Robots are also claimed to establish a new "ontological category" where human refuse to acknowledge them as objects, neither alive. This changing of perception is rightfully derived from both the physical appearance and the ability of robots.

The infamous Frankenstein Unbound has initiated the discussion on legal categories presented on a gradual scale, as the technology advances from the AI robot as a piece of property to a fully legally responsible entity in his own right [19]. These categories were selected to extract those legal principles which may be relevant for the state of the art AI robot. The legal categories include product liability, dangerous animals, slavery, diminished capacity, children, agency and person.

Lehman recommends that these legal theories are sufficient to govern AI robots, however AI robots involve an incremental process of which "no red line can be drawn between present and future worries". Vladeck verifies that once machines are conceivably considered as "agents" or a representation of some legal person, the existing product liability laws are adequate to address the legal issues associated with the machines without relevant modifications. Nevertheless, the law is not certain in its application to inevitable future events whereby these machines causes injury; the actions are not attributable to any "principal" [20].

These classical journal articles, however, stopped at highlighting the incompatibility of the traditional rules of liability with robotic devices. Recommendations on the existing laws were not evident. It is imperative to highlight that, the trend of tracing "fault" or "wrong" for the imposition of liability for intelligent robots has extended towards mapping computer system with the borderline case of personhood like the comatose people and minor, as well as the application of the law of agency [21]. These platforms are utilized for the purpose of explaining the human centric features like will, intentionality and rationality imperative in the fault theory of liability.

To the extreme end, to solve the imposition of liability based on fault or wrong, argument appears as to accord artificial agents with constitutional rights and be considered as a legal person. This approach finds its base on the willingness of the legal system to recognize ship, religious building, corporation and other non-human subject as legal person [22]. Willick, advocates constitutional acknowledgment of computer system as a "legal person" by the American constitution [23]. Emre on the same hand, provides insights on legal consequences, which have been derived from the function of intelligent agent and its method of operation and thus, proposed the most appropriate legal status [24].

The relevancy of this model, was not proven to be efficient, given the state of the art of the technology does not suggest that legal personality should be conferred to intelligent machines. The question to accord intelligent machine with a legal status however possesses a meaningful insight. The preliminary argument stands that the basis of human intelligence is computation and thus can be taken as a program operating on a computer [25].

This model is what Artificial Intelligence seek to develop. The dawn of legal personhood was initiated through a discussion that says "In books of the Law, as in other books and in common speech, 'person' is often used as meaning a human being, but the technical legal meaning of a 'person' is a subject of legal rights and duties." [26]. Therefore, the legal personhood of an agent, in principle is the question of entitlement of rights and duties. Column also notes that recognizing a legal person a "person" is no more than a fiction tale unless the notion of "intelligence" and "will" are associated with the said entity. These two attributes are claimed to be the essence in the debate of the personhood of intelligence machines [27].

> "Intelligence" is then associated with the competency of the intelligence machines to execute complex tasks whereas intentionality and consciousness are equated with "will". Both subjects are analyzed to confer intelligent machines with more rights and duties. Despite the evidence of intelligent machines competency in various domains, there exists an assertion that intelligent machines are not able to be held responsible for the loss or harm they caused in the execution of their duties: Column called this the "responsible objection" [28]. Further, intelligent machines however advanced and possess a complex system of rule, are not capable of establishing judgments and exercising discretion; the "judgement objection".

This objection is based on the difficulties of intelligent machines when encountering the problem of shifting of circumstances [29, 30, 31], moral of choice and deciding legal options [32, 33]. There is also related argument on the objection to confer intelligent machines with constitutional rights. This objection is based on the notion that only natural persons are entitled to such right. Secondly, intelligent machines are claim to appear lacking of some essential elements of personhood such as souls, consciousness, intentionality, or feelings [34, 35]. Lastly, the objection is derived from the perception that as a human creation, intelligent machines should remain nothing more than a property.

As Lehman-Wilzig notes on the acceptance of the personhood model, that no certain answers are conceivable. The future are expected to maneuver beyond the philosophers, theologian, biologist, psychologist and others with the reality that may be hard to comprehend. He went further on quoting:

> "What is it to be a person? It can hardly be argued that it is to be human. Could an artifact be a person? It seems to be the answer is clear and the first R.[Robot] George Washington to answer 'Yes' will qualify. A robot might do many of the things we have discussed: moving and reproducing; predicting and choosing; learning; understanding and interpreting; analyzing (translating, abstracting and indexing); deciding; perceiving; feeling– and not qualify. It could not do them all and be denied the accolade."

RESULT AND DISCUSSION

Legal personality is often related to the acquisition of legal capacity by human. Kelsen's theory of legal personality refers a status awarded by the law as opposed to legal capacity being the natural trait of human being [36]. This theory deciphered the changing of atmosphere in the conferment of legal recognition given to various unnatural entities, accruing rights and obligation. Likewise, Smith supposed that an individual, apart from being God's creation of flesh and blood, is an artificial identity brought into being by the government [37]. This is done through the conferment of legal personality and hence, subjected to the law of the government. His opinion was academically denied and replaced by better criteria of a legal personality – an abstraction of which legal relations are anticipated.

Therefore, series of legal recognition to various non-human entities together with Kelsen Theory of legal personality creates a possibility of conferring robots with a legal personality. Now that there is a probability for legally recognizing the status of robots, inquiry follows as to the determination of criteria possessed by robots to further justify such conferment. Literatures shared the same communality on the unique development of assumed human-level intelligence of intelligent machines as being the most profound basis for legal recognition [38].

A comparative analysis was suggested relating to robot's higher intelligence abilities than a certain category of person recognized by the law, such as minors, comatose and brain dead people, as well as fetuses [39]. The irony is that the legal system recognizes them as a legal subject but restrained certain rights that would have been stored to other fully-fledged legal person. On the other end, it denies the legal recognition to robots exhibiting higher intelligence ability. If given a closer look, an obvious manifestation of intelligence crucial to the legal realm is through a decision making process or reasoning.

For instance, the doctrine of *dolly incapax* relating to criminal conduct precisely on the exception of criminal liability for minors below the age of 10 is relatively connected to the ability of reasoning by minors [40]. Provision in the Penal Code summarizes the protection given to a minor committing a crime at the age exceeding 10 years but below the age of 12 – without attaining sufficient maturity of understanding [41]. The age of criminal responsibility provided in the Act is relatively distinguished on the basis of the minor's ability of reasoning between right and wrong.

On the same hand, Hutter notes that there have been numerous attempts of defining intelligence, but imperative to the discussion at hand is the equation of rationality with intelligence and the ability to achieve goals in the real world environment [42]. Rationality is interlinked with achieving goals in the manner where rationality may not stand without the notion of a goal [43] In this sense, robots are envisioned to have not only an anthropomorphic form, but also the ability of optimization power to achieve goals of which it is programmed to perform [44].

Rationality as the basis of reasoning ability within the robot system is confined to the decision made in order to execute actions [45]. These actions aim at accomplishing goals based on the program inserted within the system. Thus, if human centric notion of intelligence can easily be measured by robot's goal-achieving mechanism, then the mapping of such definition of intelligence to robot is proper. Considering that robots comply with such broad definition of intelligence through a simple task means, as opposed to other predicates, such as consciousness, religious, faith, emotions and human spirit, there will be an urgency of getting down to brass tacks of responsibilities and liabilities accrued from the conferment of legal personality. Apart from getting the right definition of robot for identification of status, purpose and nature of legal precept, governing robot must first be put into place.

The legal dictums have objectives to achieve. Say in this context, for corrective justice to be served by allocating risk of loss between parties upon whom injuries or damages are inflicted [46]. Conferring legal personality robots intrigues the question of whether robots will personally bear the legal liabilities or there will always be a natural person holding the liabilities. Unlike humans or corporation, the defaulting robot, by far, has no accumulative assets to compensate its wrongdoing to restore damage for a civil lawsuit [47]. Now, if legal personalities for a quasi-person like minors, brain dead or comatose people or even as an agent for its owner based on the law of agency are mapped onto robots on a higher-intelligent basis, the lack of legal capacity in certain legal arrangements of this category of person will also be connoted to robots.

For example, a minor's wrongdoing to a certain extent will be borne by his legal guardian, the same manner with legal liability of an employer for an agent's misconduct. Other entities will bear the legal liability. The lack of legal capacity of future legally recognized robots projects the idea of maintaining the status of robot as a machine without bearing a legal personality. While the legal personality approach gives a meaningful insight for future regulation of sophisticated robot, however abandonment is evident towards the type of robots equipped with pre-programmed setting exposed to "emergent behavior" problem, but perhaps on the low end, such as those foreseeably going to be adopted in Malaysia.

What more to expect, for instance, legal recognition of robots under the constitution for a developing country like Malaysia with medium or low innovation drive in the robotic field. Understanding robotic development as according to the nature decided by particular jurisdictions is important. For instance, Japanese Robotic Policy Committee predicts the active co-existence between human and robotic by the year 2030, supported by its employment of almost ten thousands of robotic system to homes and social institutions [48].

The Japanese Ministry of Economy, Trade and Industry (METI) also reported that Next Generation Robots will generate up to 7.2 trillion yen (approximately 64.8 billion USD) of economic activity by 2025, with 4.8 trillion (43.2 billion USD) going to production and sales and 2.4 trillion (21.6 billion USD) to applications and support. Generating economic prosperity via robotic application is not just that, the Japanese persistency in progressive development of robotic technology is understandable to overcome the problem of the declining of birth rate and the growing number of the elderly people, hence inviting robots as an alternative to human labor massively. These are among the drive behind the rapid development of robotic technology in Japan that has somehow molded the government's presumption whereby governance may no longer involves external monitoring.

The rigid principles of law are perhaps becoming insignificant to constrain the evolving intelligent robots behavior that they opted to extend the legal rights to robots. The Japanese government believes on the embedded ethical robot behavior within the robot system that will ensure correct performance of robots [49]. They are currently on the move to determine the set of embedded ethics to warrant friendly robotic behavior with human-safety centric regulation in mind [50]. In this perspective, the Japanese government is consistent with the extensive effort conceded by the Korean government via its technology specific Korean Robot Ethics Charter that has shifted the human-safety centric regulation to balancing rights between human and robot [51].

To the contrary of Japan's prediction for future co-existence between human and robot, the United States has long held tight to the sole purpose of robots derived from the first definition of robot; labor or tool designed to assist human. Although the discussion on moral machines, embedded ethics, or even robot rights under the constitution is evident, the United States government is persistent in adhering to the existing legislation or analyzing possible doctrinal expansion relating to robotic governance and thus, thus clarifies the treatment towards robotic as a utility than a co-habitant in the society. The United States preference for safety regulations is observed through its extensive effort in addressing machine standard risk through the developing of national standards and participation in international standardization. The treatment towards robots by the Malaysian government is somewhat expected to be similar to the United States.

CONCLUSION

A robot's ability to perform a wide range of tasks while assuming human level intelligence is evident. Nevertheless, the subject of robot personhood is relatively a far-reaching matter with inappropriate application of human-centric legal regime onto robotic system; some may be counter-productive, others may amplify the problems at hand and some are just inappropriately applied [52]. In contrary to other scholars, Hubbard persistently considers that, in dealing with the complexity of intelligent robots, doctrinal changes relating to the burden of proof as well as other realm of doctrines such as the requirement of skill and knowledge will appear, emphasizing the relevancy of the traditional laws.

As opposed to the legal personhood model, a more practical recent trend has witnessed the taking of intelligent machines in analogous to other platforms in other to attract relevant liability rules or legislation. For instance, the imposition of liability for damages arising from a robocar has involved a change of liability paradigm from the operator of the vehicle to the manufacturer [53]. Analogy approach has been adopted to associate robocars with abundance of case law encompassing transportation system equipped with autonomous technology that causes harm or injury such as elevator, airplane autopilot, sea vessel autopilot and autonomous train [54].

Two liability models of liability concerning the airline industry system of time limits and predictable pay-outs and the vaccine system of a mass compensation fund were also incorporated in the discussion of resolving the liability issues of robocars [55]. The link between the vaccine, airline and automated vehicle industries are indirect however significant. Hubbard suggest industrial robots, autonomous vehicle technology and airplanes capable of operating on "autopilot" mode as being the comparable technologies to robocars [56].

The courts' propensity of resolving the liability issue involving these technologies can be of a great assistance. Duffy and Hopkins on the same page, concur that the existing law governing liability for automobile accidents lies primarily on the driver's action, similar to the laws regulating computer that impose liability on the operator of the computer whereas scant laws concerning autonomous computer system are applicable only to commercial transactions [57]. It is also imperative to note the role of science, technology and innovation (STI) that

is seen as the drive force in achieving the agenda of the Business Service National Key Economic Area (NKEA) aims to assist Malaysia towards emerging as a high income nation status by 2020 [58].

The government has guaranteed a full commitment to the private sector with clear emphasis of specific deliverables and outcomes to maintain private investment. The application of Artificial Intelligence and robotic solution is expected to be aligned and adopted by the Entry Point Projects in the ETP to boost up productivity and business opportunity. Therefore, participation in the international standardization and enhancing national standards are more imperative for Malaysia, given the nature of robot utility that will dominate in the future, as opposed to the legal personhood model

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REFERENCES

1. Bailey, R., 2014. "Rage against theMachines. "*Reason.com*., <http://reason.com/archives2001/07/01/rage-against-the-machines> accessed July 21, 2014 M. Davis, H. Putnam. A computing procedure for quantification theory. Journal of ACM, 7(3)(1960) 201-215.
2. Dechter, R. and I. Rish, 1994. Directional resolution: the davis-putnam procedure. Proceeding of 4th International Conference on Principles of KR&R, Bonn, Germany: Morgan Kaufmann, pp: 134-145.
3. Haselagar, W., 2005. Robotics, philosophy and the problems of autonomy. Pragmatic And Cognition, 13(3): 515-532.
4. Passig, D., 2010. Singularity The Accelerating Pace of Change. Presentation, Bar-llan University Israel.
5. David Feil-Seifer and Maja J, Matariæ, 2009. Human-Robot Interaction, Encyclopedia of Complexity and System Science.
6. Kurzweil, R., 2001. The Law of Accelerating Returns | KurzweilAI. *Kurzweilai.net*. Retrieved 2 December 2014, from http://www.kurzweilai.net/the-law-of-accelerating-returns. Vinge, V. (2009). Technology will transform human beings into 'superhumanly intelligent critters. *mechines like us*. Retrieved 11 November 2014, from http://machineslikeus.com/news/vernor-vinge-technology-will-transform-human-beings-superhumanly-intelligent-critters.
7. Kurzweil, R., 2010. How my predictions are faring — an update by Ray Kurzweil | KurzweilAI. *Kurzweilai.net*. Retrieved 22 June 2014, from http://www.kurzweilai.net/how-my-predictions-are-faring-an-update-by-ray-kurzweil.
8. Muehlhauser, L. and L. Helm, 2012. Intelligence Explosion and Machine Ethics. Machine Intelligence Research Institute, pp: 1-28.
9. Magee, C.L. and T.C. Devezas, 2015. "How Many Singularities Are Near And How Will They Disrupt Human History?" (2011) Technological Forecasting and Social Change, 78(8): 1365-1378. See also Mindstalk.net, (2015). Vernor Vinge on the Singularity. Retrieved 22 September 2015, from http://mindstalk.net/vinge/vinge-sing.
10. Krugman, P., 2013. Sympathy for the Luddites. *Nytimes.com*. Retrieved 13 March 2014, from http://www.nytimes.com/2013/06/14/opinion/krugman-sympathy-for-the-luddites.html?_r=0.
11. Lin, H., J.G. Sun and Y.M. Zhang, 2003. Theorem proving based on the extension rule, Journal of Automated Reasoning, 31: 11-21.
12. Behnke, S., 2008. Humanoid Robots – From Fiction to Reality?. Institute For Computer Science, 4(8): 5-9.
13. Palmerini, E. and E. Stradella, 2013. Law and Technology: the Challenge of Regulating Technological Innovation (pp: 37-57). Pisa: Pisa University Press. Asaro, P. (2012). A Body to Kick, but Still No Soul to Damn: Legal Perspectives on Robotics. In P. Lin, K. Abney & G. Bekey, Robot Ethics: The Ethical and Social Implication of Robotics (1st ed., pp. 169-185). MIT Press.
14. Koops, B., 2013. Law and Technology. A Taxonomy For Descriptive Research In Law And Technology, 37-57. See also Jasanoff, S. (1996). Science at The Bar: Law, Science and Technology in America. Harvard Journal Of Law And Technology, 9(2).
15. Gifford, D., 2007. Law and Technology?: Interactions and Relationships. Minnesota Journal Of Law, Science And Technology, 8(2): 571-587.
16. White V. Samsung, 971 F.2d 1395 (9th Cir. 1992), cert. denied, 508 U.S. 951 (1993), Wendt v. Host International, Inc. 125 F.3d 806 (9th Cir. 1997). Elnicky Enterprises v. Spotlight, Inc. 1981 WL 48202 (S.D.N.Y. 1981).

17. Calo, R., 2016. Robots in American Law. University Of Washington School Of Law Research Paper.
18. Calo, R., 2015. Robotic and the Lessons of Cyberlaw. California Law Review, 103: 102-147.
19. Lehman-Wilzig, Sam, 1983. "Frankenstein Unbound: Towards A Legal Definition Of Artificial Intelligence" Future, 13(6): 442-457.
20. Vladeck, D., 2014. Machines without Principals: Liability Rules and Artificial Intelligence. Washington Law Review, 89: 117-150.
21. Asaro, P., 2012. A Body to Kick, but Still No Soul to Damn: Legal Perspectives on Robotics. In P. Lin, K. Abney & G. Bekey, Robot Ethics: The Ethical and Social Implication of Robotics (1st ed., pp: 169-185). MIT Press.Zimmerman, Evan Joseph. 2015. "Machine Minds: Frontiers In Legal Personhood". SSRN Electronic Journal. doi:10.2139/ssrn.2563965.
22. Gray, J., 1909. The nature and sources of the law. New York: Columbia University Press See also Stone, C. (2010). *Should trees have standing?*. New York, N.Y.: Oxford University Press., van Bemmelen van Gent, E. Corporation as Legal Person. SSRN Electronic Journal. http://dx.doi.org/10.2139/ssrn.2212273.
23. Willick, S., 1983. “Artificial Intelligence: Some Legal Approaches and Implications,”. Al Magazine, 4(2): 5-16.
24. Emre, B., 2008. “Intelligent Agents and Their Legal Status, ”. Ankarabarreview, pp: 46-54.
25. Solum, Lawrence B., 1992. "Legal Personhood For Artificial Intelligence". North Carolina Law Review, 70: 1231.
26. Hicks, S., 2016. On the Citizen and the Legal Person: Toward the Common Ground of Jurisprudence, Social Theory and Comparative Law as the Premise of a Future Community and the Role of the Self Therein. Cincinnati Law Review, 59: 789-865.
27. Hubbard, P., 2016. Do Androids Dream?": Personhood And Intelligent Artifacts. Templelawreview, 83: 433-473.
28. Levy, L. and S. Bell, 2016. "Software Product Liability: Understanding and Minimizing the Risks" by Lawrence B. Levy and Suzanne Y. Bell. *Dx.doi.org*. Retrieved 31 March 2016, from http://dx.doi.org/doi:10.15779/Z38695K See also Abdullah, F., Jusoff, K., Mohamed, H., & Setia, R. (2009). Strict versus Negligence Software Product Liability. CIS, *2*(4). http://dx.doi.org/10.5539/cis.v2n4p81
29. KPMG’s Global Automotive, 2016. Self-driving cars: The next revolution (pp: 4-35). The Center for Automotive Research
30. Brock, C., 2015. Where We're Going, We Don't Need Drivers: The Legal Issues and Liability Implications of Automated Vehicle Technology. UMKC Law Review, 83(3): 769-788.
31. Morgan Stanley, 2013. Autonomous Cars Self-Driving the New Auto Industry Paradigm (pp: 23-99). Morgan Stanley & Co. LLC.
32. Weng, Y.H., 2007. “Beyond Robot Ethics: On a Legislative Consortium for Social Robotics” (2007) Advanced Robotics, 24(13): 1919-1926.
33. Weng, Y., C. Chen and C. Su, 2008. Safety Intelligence and Legal Machine Language: Do We Need the Three Laws of Robotics?. Service Robot Applications.
34. Zelazo, P., M. Moscovitch and E. Thompson, 2007. The Cambridge handbook of consciousness. Cambridge: Cambridge University Press.
35. Artificial Intelligence | Internet Encyclopedia of Philosophy, 2016. Iep.utm.edu. Retrieved 2 April 2016, from http://www.iep.utm.edu/art-inte/.
36. Recht, R., 2010. “Non-state actors from the perspective of the Pure Theory of Law”,
37. Smith, B., (n.d.). “Juristic personality of a corporation Juristic personality of a corporation.”, <http://www.lawteacher.net/free-law-dissertations/juristic-personality-of-a-corporation.php> Accessed June 26, 2014.
38. Jndjendenkdnekd.
39. Stradella, E., P. Salvini, A. Pirni, A. Carlo, C.M. Di, Oddo, P. Dario and E. Palmerini, 2012. “Robot Companions as Case-Scenario for Assessing the “Subjectivity” of Autonomous Agents. Some Philosophical and Legal Remarks” (2012) First Workshop on Rights and Duties of Autonomous Agents, pp: 24-31.
40. Lipscombe, S., 2012. “The age of criminal responsibility in England and Wales.”
41. Section 83 of Malaysian Penal Code 1936.
42. Hutter, M., 2012. “Can Intelligence Explode?” (1993), Journal of Consciousness Studies, 19: 1-20.
43. Legg, S. and M. Hutter, 2007. “Universal Intelligence: A definition of machine intelligence. Minds & Machines,” 2007. Minds & Machines, 17(4): 391-444.

44. Brooks, R.A., 2013. "Prospects for Human Level Intelligence for Humanoid Robots." Proceedings of the First International Symposium on Humanoid Robots (Japan) 1996. See also "Humanoid Robotic." (2013, December 1)., <https://inlportal.inl.gov> Accessed February 1, 2014.
45. Behnke, S., 2008. "Humanoid Robots – From Fiction to Reality?" KI, 22(4): 5-9.
46. Weinrib, E., 2002. Corrective Justice in A Nutshell. University Of Toronto Law Journal, 52: 349-356.
47. Company Law Book.
48. Weng, Y.H., C.H. Chen and C.T. Sun, 2009. Toward the Human–Robot Co-Existence Society: On Safety Intelligence for Next Generation Robots. (2009). International Journal of Social Robotics, 1(4): 267-282.
49. "Japan drafts rules for advanced robots" (2007, March 6 < http://www.upi.com/Science_News/2007/04/06/Japan-drafts-rules-for-advanced-robots/UPI-19051175865243/ > accessed 4 December 2014.
50. The Headquarters for Japan's Economic Revitalization, 2015. New Robot Strategy (pp: 3-90). Ministry of Trade, Economy and Industry.
51. Shim, H., 2007. Establishing A Korean Robot Ethics Charter. Presentation, Robot Division, Ministry of Commerce, Industry and Energy, Korea.
52. Asaro, P., 2012. Robots as Products: Responsibility and Liability. *robotics business review*. Retrieved 3 October 2014, from http://www.roboticsbusinessreview.com/article/robots_as_products_responsibility_and_liability/Robot_Law.
53. Aon.com, 2014. Autonomous Vehicles - The Risks and Rewards of the Future of Personal Transportation. Retrieved 28 January 2016, from http://www.aon.com/risk-services.
54. Colonna, K., 2013. Autonomous Cars and Tort Liability. Case Western Reserve Journal Of Law, 4(4): 81-130.
55. Brock, C., 2015. Where We're Going, We Don't Need Drivers: The Legal Issues and Liability Implications of Automated Vehicle Technology. UMKC Law Review, 83(3): 769-788.
56. Hubbard, F., 2015. "Sophisticated Robots": Balancing Liability, Regulation and Innovation. Florida Law Review, 66(5).
57. Duffy, S. and J. Hopkins, 2013. Sit, Stay, Drive: The Future of Autonomous Car Liability. SMU Science & Technology Law Review, 16: 101-127.
58. Performance Management & Delivery Unit, 2013. 12 National Key Economic Areas. Putrajaya, pp: 446- 471.