World Applied Sciences Journal 34 (3): 376-382, 2016
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2016.34.3.15669

Artificial Intelligence Governance: A Heads up from Driverless Cars

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Abstract: Human's driving experience and competency are anticipated to be gradually replaced by cars equipped with Artificial Intelligence software. The Artificial Intelligence technique imitates human perceptual and decision making processes, allowing navigation without human intervention. Driverless cars developed by Audi, BMW, Ford, Google, General Motors, Volkswagen and Volvo have traversed across North America, Europe, Latin America, Middle East and Africa. Adopting Artificial Intelligence software in various domain are proven to be commercially promising and has triggered global market demand, including Malaysia. In Malaysia, the Expert System application is evident in providing financial management software through leading banking institutions. This article projects an attempt of describing briefly the development of a promising branch of Artificial Intelligence and to examine ways in which the torts theory of liability will expand to accommodate this technology. A comparative and analogy analysis formed an integrated qualitative approach adopted by this article to select the deployment of driverless cars with Artificial Intelligence feature and the bearing it has on the imposition of liability in the United States. Understanding the repercussion of technological advances to the legal realm is pivotal to policymakers, industrial players and the public to ensure a massive development and adoption of Artificial Intelligence-based solution and techniques in Malaysia.

Key words: Artificial Intelligence Torts Liability Driverless Vehicles

INTRODUCTION

The journey towards realizing the dream of true robocars – the self – driving cars has periled from science fiction sheets to science fact [1]. Toole's policy analysis of the implication of autonomous vehicle set forward Google's ambitious claim that the company expects such cars to meet the consumers possibly in 2017 [2]. Other companies such as Nissan have announced the placement of a highly autonomous vehicle in the market by 2020. In the modern days, James M. Anderson, Nidhi Kalra, Karlyn D. Stanley, Paul Sorenen, Constantine Samaras divide the research on robotic vehicle into three phases [3]. From 1980s to 2003, the parameter of the research focused on two visions; "developing automated highway system" or as Scribner indicates as "infrastructure-reliant highway vehicle automation" that has begun from early 1960s and other groups operated on autonomous vehicle without special road [4].

Second phase of the research was initiated by the passing of the National Defense Authorization Act (NDAA) for Fiscal Year 2001 by the Congress with emphasis on Section 220 of NDAA FY 2001 providing the Defense Advanced Research Projects Agency (DARPA) $100 million to advance the '"unmanned advanced capability combat aircraft and ground combat vehicles" [5]. The first two DARPA Challenges were held in a rural environment and the third was conducted in an urban environment, where each of these honored the milestone in developing robotic vehicle and spurred university team to further advance the technology. Toole's policy analysis of the implication of autonomous vehicle set forward Google's ambitious claim that the company expects such cars to meet the consumers possibly in 2017 [6].

R O'Toolealso notes the increasingly active involvement of the private sector in further advancing the autonomous vehicle technology as what defined the third

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phase of the research on autonomous vehicle. Driverless cars represent a hybrid of advanced software and hardware sophistication, proposing the utility of the next generation of Advanced Driver Assistance System (ADAS) [7]. The system comprehensively established a sensor-based solution to intensify vehicle safety and conveniences at every possible speed zone where driver error is evident.

Combining stereo cameras, short and long range RADAR, light or laser radar (LIDAR), actuators, control units and incorporating Artificial Intelligence algorithm, ADAS allows the vehicle to decipher collective data from sensory hardware from the surrounding for decision making [8]. Sophisticated algorithm or Artificial Intelligence technique deployed by driverless vehicles enables the interpretation of the sensory input accumulated by the hardware to understand the vehicle's surrounding, to foresee upcoming events and compute the required respond and subsequently ordering the hardware components to execute the actions [9].

Needless to say, the integration of autonomous vehicles brings about impacts to the society [10].Hanley affirms the impact of autonomous vehicle on refining traffic safety, car accidents mitigation, improving mobility for the elderly and the disabled, solution to traffic congestion and a better fuel consumption. Godsmark outlines the bearing that autonomous vehicles have on eliminating human error and thus reducing accident rate and societal cost, scaling down emissions by enhancing driving efficiency and reducing numbers of vehicle operating on the road and maximizing road capacity [11].

Hars confirms the realizing of the optimal integration of private and public transport, significant reduction of mobility cost via car-pooling and providing alternative fuel trough autonomous vehicle [12]. Automated driving is a technology that is gaining the public imagination with various prototypes driving on European, the United States and Japanese roads. First signs of the direction of technological development are becoming clear. However, as Smith concurs "'Rapid progress means self-driving cars are in the fast lane to consumer reality. Is the law up to speed too?' [13].

The development of autonomous vehicle is claimed to have surpassed the legal extant and policy treatment. The interplay between technology and legal perspective is ignited again by the development of this newly generation of vehicle capable of operating on the road without direct human intervention. All of the abovementioned technologies elude the existing presumption of the legal regime that there will always be a person behind every liability involving vehicles. Aon Risk Solution mentioned on the changing risk management landscape particularly on the allocation of responsibility and liability regarding accidents and, responsibility of the vehicle owner and shifting of responsibility from the owner to the manufacturer. Therefore, this article aims at examining ways in which the torts theory of liability will expand to accommodate this technology.

MATERIALS AND METHODS

Adopting adoctrinal legal research, data collection of this article deliberates on the discovery or the development of legal doctrines, construes and organizes relevant laws and other legal disciplines [14]. This research has selected the area of legal liability pertinent to Artificial Intelligence agents as a central focus. Comparative analysis has been subsequently undertaken by analyzing the United States perspective of torts theories of liability. This decision is made to overcome doctrinal approach's national and territorial limitation, in this context, technological and governance constraint in Malaysia [15].

This research utilizes as well, the analogy approach by selecting driverless cars in producing reasoning from one specific case to another Artificial Intelligence agents analysis. Knight notes that analogy approach is often of assistance to delve into seemingly identical cases before the courts in the presence of uncertain situations of whether a particular factual situation falls within the ambit of a rule. Said approach has shed light in understanding the interaction between the law and Artificial Intelligence agents as a whole. This understanding can be achieved via the concerns and criticism brought forward by scholars on the driverless cars, given the absence of any technology specific legislation concerning Artificial Intelligence in Malaysia or elsewhere in the world.

RESULTS AND DISCUSSION

The increasing pace of intelligent machines has been offering tremendous challenges to social values and stand in need for a comprehensive adaption towards human intelligent machines co-existence in the near future. Legal realm as one of the control mechanisms for the society is

not an exception. Scholars have been searching for the nexus between intelligent machines and the existing legal treatment in various principles of law. In this context, Neil's elaboration on the interaction between intelligent robots and law is imperative of which, intelligent robots is one of the prominent Artificial Intelligence domains. Neil notes that understanding robot regulation as a new paradigm is still in infancy [16]. Abundant of literatures advocate two routes to start thinking about robot regulation. Firstly, by perceiving robot as a mere tool will lead us to analyze the existing theories of liability and its extent of applicability to robot.

Secondly, by acknowledging robot as an intelligent machine that seeks for a relevant status and calls for a shift of paradigm in accruing legal perspective [17]. While the former hypothesis has been explained in the previous section, the latter suggests an exploration of other bodies of law resembling the same theme; the intersection between law and technology. This foundation theme forces a battle of balancing benefits from technology innovation and threats detrimental to human. Neil suggests the quantum leap of cyber law experience in adapting with the intersection of law and technology as a benchmark for law and robotic project [18].

One of the raised lessons from cyber law in dealing with the emerging digital technology is the importance of metaphor [19]. Legal theory draws its relevancy from metaphors as an important methodological tool [20]. Borrowing from the philosophy of language, metaphor drives a presupposition of similarity between two distinct realms. This subsequently allows us to bring into play our understanding of existing phenomena to other novel areas [21]. In this frame of reference, cyber law nurtures the importance of getting the right metaphor when it first encounter with the flow of global information infrastructure [22]. Cyber law in its early stage, struggled to pioneer the right metaphor for regulating the flow of digital information crossing national borders with several negative implications relating to privacy, copyright, legal transaction and even cybercrime. Global network information represents defiance from traditional legal theories based on geographical location where local authority asserts their control over territorial right.

This is due to cyberspace inherent of non-existence of territorial based boundaries and depending solely on the location of the machines through the Internet Protocol for tracking purpose. However, locating attempt through Internet Protocol is to an extent, unavailing. Designing a new technology should be resting on the metaphor we use to understand about the new technology. It was by getting hold of this key aspect, cyber law grappled series of success by first establishing a new boundary for cyberspace – conceiving cyberspace as a place [23]. In the context of Artificial Intelligence, the consideration with regard to finding the right metaphor is crucial as how we think about, understand and conceptualize robot shall have the real bearing on the concept, engineering, consumer and of course, legal stage. When car crash features driverless cars, the principle of negligent and strict liability in the torts theories of liability are typically the platform of resolution [24]. Liability and legality matters are basically the two surrounding issues veiling the introduction of driverless vehicles in the society [25]. Legality on one end concentrates on the states initiatives to reform their state vehicle code and accelerate the testing and operating of driverless vehicles on the public road via statutory provisions [26]. Swanson despite acknowledging the sufficiency of product liability law to administer the integration of autonomous vehicle technology, recommends that instead of relying on to the lengthy delays in the expansion of principles from the introduction of a novel technology, the state should uphold regulatory framework, a scheme of which encouraging the implementation of autonomous vehicle technology in a safe and comprehensive environment. Pinto is on the same page with Swanson in directly citing Nevada's Driverless Car Legislation, Assembly Bill No 511 as a more refined podium in addressing the technological and non- technological liabilities relating to autonomous vehicle [27].

The earliest states in the United States permitting the operation and testing of driverless vehicles on the public road are Nevada, California and Florida which enacted legislations that are basically identical to each other. Among others, the legislations entail definition of driverless vehicle [28], "general standards" and "insurance requisite" [29] "safety standards" [30], "guidelines for the testing"[31] leaving flexible the likelihood of future standards to be developed and licensing requirements [32]. The District of Columbia maneuvers further in tackling the technological barriers of autonomous vehicles by requiring autonomous vehicle to be an overridable vehicle where operator can assume control over the car in time of necessary [26]. The State of Arizona on the other hand, necessitates a human operator to be on the seat, thus reflects the state's intention of focusing on the liability issue ranging from the operator to the manufacturer [26].

Most important progress in the legal sessions concerns the Oregon's legislation which attracts the State of Colorado and New York to follow the same drift [33]. Oregon issued a requirement of a system to disengaging the autonomous vehicle. Imperative is the inclusion of provisions providing for an easy manual override by utilizing the brake, the accelerator or the steering wheel and a self-pulling over of the autonomous vehicle upon discovering operator's failure to gain control or in the presence of a system failure.

Though most of the proposed legislations permit barely on the testing of the autonomous vehicle, a spreading trend of the states to enact a specific law on autonomous vehicle accurately reflects their treatment towards a new technology. A move away from the traditional laws of vehicle is demonstrated by promoting a novel legal regime specifying a comprehensive safety standard for further development of the technology. Liability issues on the other end, emphasize on the question of who is at fault in the occurrence of collision involving driverless vehicles of which, previously determined by the action or omission of the driver, defectiveness or malfunctioning of vehicle and inevitable natural circumstances [34]. Brock recognizes that the paramount concern remains to achieve a "delicate and meticulous balance" between consumer protection and manufacturer's liability [35].

Nevertheless, the recent trend has witnessed a shift of liability from the driver or the operator of the vehicle to the manufacturer, reflecting a concern of stifling innovation attempts [36]. In resolving the question of liability, scholars have taken driverless vehicles in analogous to technologies developed and introduced that enormously transformed and impacted the legal realm. Practical prediction of the court's deduction of driverless vehicles is facilitated by the evidence 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 [37].

The platform of strict liability and negligence claim were almost likely to attribute liability to the human operator unless a manufacturing defect has been present. Brock recommends two periods potentially forming an exemplary of liability model for driverless vehicle industry; the airline industry system of time limits and predictable pay-outs and the vaccine system of a mass compensation fund. This recommendation is made after acknowledging that the relationship between the vaccine, airline and automated vehicle industries are indirect but significant. Merchant and Lindor advocate industrial robots, autonomous vehicle technology and airplanes capable of operating on "autopilot" mode as being the analogous technologies to driverless cars.

These technologies have been the centre of litigation and can be of a valuable remarks as to the manner of the court's application of the product liability laws to the driverless vehicle [38]. In taking the same approach, Duffy and Hopkins contend 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 [39]. Nevertheless, Glancy emphasizes that these approaches may afford a basis of application, but far from definite.

The ascription of liability to the manufacturer or the driver of the driverless car is dampened by the complexity of the technological features of the vehicle. Thus, distorting the previously clear separation of responsibility between the two entities. Ravid addresses the liability issue involving driverless vehicles based on the understanding of the term "unreasonable harm" observed by referencing the United States Restatement of Torts comments and illustration. The United States Restatement of Torts associates a negligent conduct with the creation of a recognizable harm and the multitude of foreseeability of the harm to occur [40].

With such illustration at the onset, the question of "unreasonable harm" in conjunction with the driverless car is likely to invite the discussion on the driver's inattentiveness or the elimination of human in the loop while the vehicle is operating to resolve the issue of liability as discussed in [40]. In this sense, an easier assessment of unreasonable harm can be derived from ordinary experience with traditional vehicles by tracing the human driver's conducts such as speeding tendency, ignoring relevant instructions or warnings, failure of the vehicle's mechanical parts due to poor maintenance and others [41].

Gurney on the same page, gives prominence to the degree of control that one have over an advanced operating driverless vehicles and elaborates on the inadequacy of the current methods of differentiating human error from malfunctioning vehicles sufficient to deal with autonomous vehicle crashes [42]. To assure manufacturers that they will not be unfairly held liable for negligence of drivers, initiatives must be taken to ensure that crash investigators are able to accurately determine the cause of an accident.

However, assessing accidents involving driverless vehicles are otherwise proven to be surrounded with ambiguity and complexity simply because the human driver nor the failure of particular parts of the vehicle can be attributable to the accidents as discussed elsewhere in [25] [37] [38] [39] [40]. If the human driver's conduct is ruled out altogether, will it be reasonable for the manufacturer to be held liable for the introduction of a vehicle with zero human involvement? Hence defeating the purpose of the driverless car being legally introduced to improve safety and efficiency of the society. Even with the requirement for a system to disengaging the autonomous mode of the vehicle in the presence of technical malfunctioning issued by state legislatures, the hurdle of identifying "unreasonable harm" is stretched even further [43] [44] [45]

Addressing the complicated situation for accidents caused by the autonomous mode of driverless cars, [25] recommends the partial liability between the manufacturer and the driver of the vehicle, assessed based on the four schemes of driver behind the wheel; Disabled Driver; Diminished Capabilities Driver; Distracted Driver; and Attentive Driver. Proposing a comparative fault approach by the court, the core of the four schemes assessment lies primarily on the failure of the driver to assume control of the defective vehicle to avoid the accident. The driverless car is a whole new ball game where the dysfunctional lies in the programming error or system failure that involve multiple roles of individuals, leading to the accident to be attributable to several entities; the manufacturer; the manufacturer of the component parts; the software engineer responsible for the designed algorithm; or even the road designer in an intelligent road system related case [46]. Thus, the difficulty to discern the overlapping of the role of individual in the developing and manufacturing process of driverless vehicles in the event of mishap is evident [47][48]. The attempt of separating the role of multiple individuals is only the tip of the iceberg once multi-vehicle crashes occurs [25].

CONCLUSION

Resolving the question of liability involving driverless vehicles marks the very beginning of a pool of legal issues surrounding the adoption of Artificial Intelligence in the future. Nevertheless the attempt discloses the core issue of AI before a massive release to the market takes place. Replacing human experience and knowledge with this novel technology could only mean shifting the attached responsibility to other entity than the individual previously holding the position, in this sense, the operator of the Artificial Intelligence agents.

The ascription of liability for a driverless car is being susceptible by the advanced technological features that the vehicle offer. The difficulty is further combined with the overlapping roles of multiple individuals involved in developing it. Regardless of the possibility where Artificial Intelligence is likely to cause a physical injury to materialize in Malaysia, the adoption of Artificial Intelligence solution in the domain of the administration of data is evident [49]. With such deployment dominating multitude of significant investment, technical error entailing software or hardware glitches are considerably possible of causing fatal damage.

Consequently, the question on the imposition of liability will be revamped. This concern is anticipated to magnify given the domain of the AI usage in Malaysia will conceivably dominate the contractual setting via consumers interface. Given such prediction of application domain, the determination of liability concerning Artificial Intelligence software will be tangled up with the ambiguous realm of software liability where the question of duty of care has yet to be resolved [50] [51].

ACKNOWLEDGMENTS

The authors would like to express their gratitude for the financial support from MOHE (Minister of Higher Education) under the Fundamental Research Grant Scheme (600-RMI/FRGS 5/3 (32/2015)given for this research

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