Law, AI and robotics: Brazil

[WP4 – AI and robotics]

Lead contributor	Dr. Marcelo de Araujo, Universidade Federal do Rio de Janeiro Email: marceloaraujo@direito.ufrj.br
Other contributors	Dr. Maria Clara Dias, Universidade Federal do Rio de Janeiro
	Fabiana Pompermayer, Universidade Federal do Rio de Janeiro
Reviewer	Dr. Eduardo Magrani, Coordinator of the Institute for Internet and Society of Rio de Janeiro (ITS-Rio)
	Amanda Olivo – Lawyer and Post-Graduate Student in Philosophy, State University of Rio de Janeiro (UERJ)

Due date	29 March 2019
Delivery date	29 January 2019
Type	Report
Dissemination level	PU = Public

Keywords	Legal analysis, artificial intelligence, AI law, AI regulation, robotics, robotics regulation, Brazil country report

The SIENNA project - *Stakeholder-informed ethics for new technologies with high socio-economic and human rights impact* - has received funding under the European Union's H2020 research and innovation programme under grant agreement No 741716.

Abstract

This report analyses the Brazilian regulatory framework for robotics and AI. The regulatory framework examined in this report consists of legislation enacted by the Brazilian government, Bills for the creation of new legislation, and recommendations issued by non-governmental bodies. The report also examines "Resolutions" issued by regulatory bodies that do not have legislative power, but whose decisions are binding within a specific area. The report focuses on three specific regulatory bodies, i.e., the Federal Medical Council, or CFM (*Conselho Federal de Medicina*); the Brazilian National Traffic Council (*Port.: Conselho Nacional de Trânsito*, or CONTRAN); and Order of Attorneys of Brazil (*Port: Ordem dos Advogados do Brasil*, *OAB*). It examines the legal issues pertaining to AI and robotics. For AI: (i) algorithmic bias and discrimination (including automated decision-making systems), and (ii) intellectual property issues related to works created by AI. For robotics, (i) creation of a specific legal status for robots and (ii) safety and civil liability issues: who is liable for damage caused by robots. The report also includes a brief analysis of gaps and challenges.

Table of contents

Executive summary

Brazil does not stand out as a leading country in the development of cutting-edge technologies. Recent cuts in public funding for research in science and technology have been a major setback in the attempt to attenuate the contrast between the current stage of technological development in Brazil and the technological development achieved by countries such as, for instance, the United States, Japan, and some European countries.[1]

On the other hand, Brazil is a huge market for goods such as mobile phones, computers, and cars. According to the BRASSCOM (Brazilian Association of Information Technology and Communication Companies), companies in the technology sector registered a growth of 5.4% in 2017 when compared to the previous year.[2] Brazil has an estimated number of 116.000.000 internet users[3], and as of 2018 approximately 53.885.000 car owners.[4] Portuguese is reported to be the 7th most used language for content page in the internet, preceded only by English, German, Russian, Spanish, French, and Japanese.[5]

This report shows that there is a growing number of articles published on Brazilian websites on topics related to AI and robotics, both in the mainstream press and in academic journals; this suggests that the public at large seems to be aware that emerging technologies in this domain have the potential to affect society in a variety of ways. On the other hand, as is clear from the legal analysis, the Brazilian government has been slow to regulate the use of these technologies. Only recently (September 2018), for instance, Brazilian policymakers set up a special commission to address the implications of widespread adoption of AI systems for Brazilian society.

[1] Angelo, Claudio, "Brazilian scientists reeling as federal funds slashed by nearly half", *Nature*, 3 April 2017. https://www.nature.com/news/brazilian-scientists-reeling-as-federal-funds-slashed-by-nearly-half-1.21766; Gibney, Elizabeth, "Brazilian science paralysed by economic slump", *Nature*, 30 September 2015. https://www.nature.com/news/brazilian-science-paralysed-by-economic-slump-1.18458; Angelo, Claudio, "Scientists plead with Brazilian government to restore funding", *Nature,* 4 October 2017. https://www.nature.com/news/scientists-plead-with-brazilian-government-to-restore-funding-1.22757

[2] Gallindo, Sergio Paulo, *BRASSCOM: 3º Seminário Brasscom Políticas Públicas & Negócios Abertura e Dados Setoriais*, 14 March 2018. https://brasscom.org.br/wp-content/uploads/2018/03/14-03-2018-PPN-2018-Sergio-Paulo-Gallindo-Abertura-e-Dados-Setoriais.pdf

[3] Instituto Brasileiro de Geografia e Estatística (IBGE), "Acesso à internet e televisão e posse de telefone celular móvel para uso pessoal", *Pesquisa Nacional por Amostra de Domicílios Contínua*, 2016. https://biblioteca.ibge.gov.br/visualizacao/livros/liv101543.pdf

[4] Departamento Nacional de Tráfico (DENATRAN), "Frota de Veículos 2018", 27 March 2018. https://www.denatran.gov.br/estatistica/635-frota-2018

[5] Internet World Stats - Usage and Population Statistic, "Internet world users by language: Top 10 languages", 31 December 2017. https://www.internetworldstats.com/stats7.htm

List of tables

List of acronyms/abbreviations

Abbreviation	Explanation
AI	Artificial intelligence
ANAC	Agência Nacional de Aviação Civil
CCTCI	Committee for Science and Technology, Communication and Information (*Port.: Comissão de Ciência e Tecnologia, Comunicação e Informática)*
D	Deliverable
GDPR	General data protection regulation
IARA	Intelligent Autonomous Robotic Automobile
LGPDP	Brazilian General Law for *the Protection of Personal Data (Port.: Lei Geral de Proteção de Dados Pessoais, Law No. 13.709)*
Port.	Portuguese language
STF	Supreme Federal Court
STJ	Superior Court of Justice
TRFs	Federal Regional Courts
WP	Work package

Table 1: List of acronyms/abbreviations

Glossary of terms

Term	Explanation
Artificial intelligence	The science and engineering of machines with capabilities that are considered intelligent (i.e., intelligent by the standard of *human* intelligence). Major applications of AI technology are in transportation, education, finance, industry, healthcare, marketing, management, telecommunications, entertainment and defence, amongst other fields. Important subfields of AI were found to include: knowledge representation and automated reasoning, artificial neural networks, machine learning, computer vision, computer audition, natural language processing, expert systems, data mining, intelligent agent systems and automated planning, evolutionary computation. [SIENNA D4.1]
Robotics	The field of science and engineering that deals with the design, construction, operation, and application of robots. Major applications of robots are in transportation, industry, healthcare, education, entertainment, space exploration, defence, retail, companionship, housekeeping and other areas. Important subfields of robotics were found to include: robot mechanics, robot sensing, robot control (including many subareas, such as robot learning, adaptive control, developmental robotics, evolutionary robotics, cognitive robotics, behaviour-based robotics, robotic mapping and planning), robot locomotion, bio-inspired

Term	Explanation
	and soft robotics, humanoid robotics, microrobotics, nanorobotics, beam robotics, cloud robotics, swarm robotics, telerobotics, social robotics and human-robot interaction. [SIENNA D4.1]
Automated decision-making	Decision based solely on automated processing, including profiling, which produces legal effects concerning a data subject or similarly significantly affects him or her (GDPR, Article 22 (1). It refers to individual decision-making made by automated means without any human involvement. Examples include: an online decision to award a loan; and a recruitment aptitude test, which uses pre-programmed algorithms and criteria.[6] (Information Commissioner's Office)
Machine learning	A set of approaches within AI where statistical techniques and data are used to "teach" computer systems how to perform particular tasks, without these systems being explicitly programmed to do so. (SIENNA D4.1, p. 11.)

[6] ICO Information Commissioner's Office, *Guide to the General Data Protection Regulation (GDPR)*, https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/rights-related-to-automated-decision-making-including-profiling/

1. Introduction

The objective of this report is to review the state of the law and current legal responses to developments in AI and robotics in Brazil and determine how some specific issues are addressed in the Brazilian legal system as a whole. The primary methods used in preparing this report are desk research, as described in the Sienna Handbook (*D1.1: The consortium's methodological handbook*).

Brazil is a federative republic that encompasses 26 states, and 1 Federal District[7], with a population of *ca.* 210 million inhabitants. Each state contains a number of municipalities. Brazil currently has 5.570 municipalities. The municipalities, within the states, and the states, within the federation as a whole, have a degree of autonomy to produce laws, regulations, amendments, and decrees. But all normative acts issued by states and by the municipalities must ultimately accord with the 1988 Federal Constitution (henceforth simply Constitution). The Constitution provides the legal framework for the enactment of laws, decrees, regulations, and amendments both at a federal level and at the level of the states and municipalities. The Constitution also contains instructions for the enactment of provisional measures, which are issued by the President of the Republic in exceptional and urgent situations. Provisional measures have force of law, but only for a limited period of time. After being examined by the National Congress, the provisional measures are converted into ordinary laws, if approved. If rejected, they lose effectiveness and the National Congress must regulate the matter.

The Judiciary is divided into Federal Judiciary and State Judiciary. The Federal Judiciary is composed by the Supreme Federal Court (STF), Superior Court of Justice (STJ), Federal Regional Courts (TRFs) and the Federal Court. There are also specialized courts that deal with electoral, labour and military matters. The Brazilian legislative process generally begins with a bill (*Port.: projeto de lei*) in one of the Houses of Congress, namely the Chamber of Deputies (the Lower House) and the Federal Senate (the Upper House). The bill is either approved or rejected by voting. After a bill has been approved by both Houses (the Chamber of Deputies and the Federal Senate), it is sent to the President of the Republic to be sanctioned or vetoed, in its totality or only in part.

Recent developments in AI and robotics worldwide have not fostered ample parliamentary debates in Brazil. The legal academic discourse on the use of AI & robotics is only starting to emerge. It has focused thus far on the relationship between AI and unfair discrimination (algorithmic bias). The implications of AI systems for the judiciary branch, and the widespread use of AI by law firms, have also attracted the attention of some legal scholars.

2. Scope and limitations of the report

This report has a limited scope, as demarcated by the SIENNA task 4.2 workplan. It does not comprehensively cover all aspects of AI and robotics, neither does it cover all relevant regulation and all legal issues arising from such technologies. As we intend to demonstrate in this report, although AI and robotics gradually take roots in Brazil, both in the private and public sectors, there has not been much legal debate on this topic. We have not been able to find new legislation on AI and robotics that

[7] The Federal District (*Port.: Distrito Federal*) is a federal territory formed by the capital city, Brasilia, and satellite-cities that function as a regional administrative area. The Federal District has a differentiated status in the federation, with features both of states and of municipalities.

addresses the implications of these technologies in areas where human rights and the dignity of the individual are at stake.

We do report, for instance, some concern expressed by ITS-Rio (a think-tank) on the discrimination and violation of the basic right to privacy resulting from the use of AI by financial institutions in Brazil. But, thus far, this kind of concern seems not to have fostered much parliamentary debate nor stimulated proposals for constitutional amendments.

3. Legal developments

Have developments in AI (i.e., automated decision-making systems, algorithmic systems, machine learning) and robotics led to amendments in constitutional or human rights and/or legislation bearing on constitutional or human rights?

As mentioned in the previous topic, recent developments in AI and robotics worldwide have not fostered ample parliamentary debates in Brazil. But a new piece of legislation on data protection law is worth mentioning for the purpose of this report, even though it does not directly mention AI or robotics.

After two years of parliamentary debate, the Brazilian General Law for the Protection of Personal Data (*Port.: Lei Geral de Proteção de Dados Pessoais,* Law No. 13.709, or *LGPDP*), was approved both the in the Chamber of Deputies and in the Federal Senate. It was sanctioned by the President of the Republic in August 2018. LGPDP provides protection of personal data in digital databases and amends "The Brazilian Civil Rights Framework for the Internet" (*Port.: Marco Civil da Internet*, Law No. 12.965, from 23 April 2014).[8] It will enter into force within eighteen months of its approval so that companies have time to adapt to the new legislation. LGPDP, as stated in its first article, aims "to protect the fundamental rights to freedom and privacy as well as the free development of the person." Foreign companies that operate in Brazil will also have to comply with the new data protection law.[9]

Although LGPDP does not explicitly mention AI, it is clear that it has implications for the use of AI systems in Brazil. AI systems, frequently, have to rely on vast amounts of data, including personal data, in order to decide, for instance, which persons are eligible to apply for a loan, which regions of a city the police will patrol on any given day, or who will obtain a kidney for transplantation.[10] This can lead to unfair discrimination, especially if the procedure is not accountable or transparent. LGPDP addresses these issues by firstly defining the "operator" (*Port.: controlador*) as *"the natural or juridical person, according to either public or private law, who is responsible for decisions relative to handling of personal data"* (cf. Art. 3, VI). LGPDP, then, goes on to state:

[8] Brasil (Presidência da República), Law No. 13.709, 14 August 2018. http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/L13709.htm

[9] Monteiro, Renato Leite, "The new Brazilian General Data Protection Law – A detailed analysis", *International Association of Privacy Professionals* (IAPP), 15 August 2018. https://iapp.org/news/a/the-new-brazilian-general-data-protection-law-a-detailed-analysis/

[10] See for instance Briceño, J. et al. "Use of artificial intelligence as an innovative donor-recipient matching model for liver transplantation: results from a multicenter Spanish study", *J Hepatol.*, Vol. 61, No. 5, November 2014, pp. 1020-1028. https://www.ncbi.nlm.nih.gov/pubmed/24905493

> Article 20
> § 1º The operator shall provide, whenever requested, clear and adequate information regarding the criteria and procedures used for the automated decision, observing the commercial and industrial secrets.
> § 2º In case of non-compliance with the requirement established in § 1 of this Article, based on observance of commercial and industrial secrecy, the national authority may perform an audit to verify discriminatory aspects in automated processing of personal data.

As it happens, though, rendering advanced AI systems transparent and accountable is a notoriously difficult task[11], as even the "operators" themselves may not be in a position to understand and explain clearly "the criteria and procedures used for the automated decision" (see quotation above). For this reason, compliance with the new law may turn out to be a difficult task (if not an impossible one) for the operator. In like manner, an audit performed by the national authority may also turn out to become a difficult problem to solve.

Have there been/are there attempts or plans to create or adopt new legislation in response to developments in AI and robotics (e.g., granting legal personhood to robots, prescribing civil or criminal liability for harms caused), or to regulate[12] how AI and robotics applications are designed, set up, commissioned or used? (e.g., regulation of algorithmic development or restrictions on the use of robots in certain conditions or sectors).

The response of Brazilian government to recent developments in AI and robotics has been generally slow. In the absence of specific legislation, regulatory agencies must step in and issue new rules so that new cases, related to the use of AI and robotics which are not clearly covered by current legislation, can be settled on legally acceptable grounds. In what follows, we will review three cases, i.e.:

- The enactment of a new legislation on the use of drones for both commercial and recreational use.
- Research and regulation of autonomous cars.
- The use of chatbots to provide information relative to administrative procedures in the state of São Paulo, and the use of chatbots in social networks to provide legal advice.

Drones

Drones are used in Brazil for both recreational and commercial purposes. As far as its commercial use is concerned, drones have been used mainly by professional photographers. Drones can represent a threat to the bodily integrity of nearby persons, which is protected by the Constitution, Art. 5, III. Drones can damage electrical power grids and cause blackouts, or even more serious accidents if they clash, for instance, with an airplane or other flying objects. This may occur due to drone's malfunctioning, due to the user's negligence or incapacity to operate the drone properly.

[11] Castelvecchi, David, "Can we open the black box of AI?", *Nature*, Vol. 538, 5 October 2016, pp. 20-23. https://www.nature.com/news/can-we-open-the-black-box-of-ai-1.20731. See also *The Economist*, "Humans may not always grasp why AIs act. Don't panic", 15 February 2018. https://www.economist.com/leaders/2018/02/15/humans-may-not-always-grasp-why-ais-act-dont-panic .

[12] This could be to restrict or advance the development or use of such applications.

In order to address these issues, the National Civil Aviation Agency of Brazil (*Agência Nacional de Aviação Civil*, or ANAC), which is a branch of the Federal Ministry of Transportation (*Port.: Transportes, Portos e Aviação Civil*), enacted on May 2017, a new law for the civil use of drones.[13] The new legislation applies to any unmanned aircrafts that weigh between 250 grams and 150 kilograms. The operation of drones that weigh 25 kilograms or more requires now a license, issued or recognized by ANAC. For the operation of drones that weigh less than 25 kilograms, the license is compulsory only if the user intends to operate the device at an altitude higher than 120 meters. The drone must not be operated at a distance of less than 30 meters (horizontally) from persons without their consent. One important point worth mentioning for the purpose of this report is that, according to Section IV, § C of the new law, the operation of "autonomous" drones is forbidden: *"Unattended operation of unmanned aircraft is prohibited"*. The user, therefore, must constantly monitor the device visually and control it from the ground. Although drones can represent a threat to individuals' basic right to privacy, especially when drones carry cameras, the law enacted by ANAC does not address this issue. The reason for this is that, as stated in the "Preamble" (p. 3), issues related to "inviolability of intimacy, privacy, honor and the image of people" are already regulated by other laws such as the Constitution, Preamble, Title II, Chapter I, Art. 5th: *"X - the intimacy, private life, honor and image of persons are inviolable, being assured the right to indemnity for the material or moral damage resulting from its violation."*

It is also worth mentioning that the new regulation does not apply to drones deployed for the purpose of military operations. In early 2018, the Brazilian military police started using drones for aerial surveillance of larger urban areas and for the purpose of giving logistic support to police operations on the ground. These drones, however, do not carry weapons.

The Brazilian Armed Forces have been investing in the development of their own drones. One model, developed by Avionics Services for the Brazilian Armed Forces, has been named "Caçador". It has already been tested for the surveillance of forests in the state of São Paulo.[14] There is another model called the "200FH", developed by FT Sistemas. During the 2016 Olympics in Rio de Janeiro, model 200FH was deployed for homeland security operations.[15] To the best of our knowledge, though, the Brazilian Armed Forces are not currently pursuing any projects for the development of autonomous

[13] Agência Nacional de Aviação Civil (ANAC), "Regulamento brasileiro da aviação civil especial - RBAC-E No. 94: Requisitos gerais para aeronaves não tripuladas para uso civil", Resolution No. 419, from 2 May 2017. http://www.anac.gov.br/assuntos/legislacao/legislacao-1/rbha-e-rbac/rbac/rbac-e-94-emd-00

[14] Avionics Services, "Avionics Services faz missão com o Caçador para a Polícia Militar Ambiental de São Paulo", 15 March 2018. http://www.avionics.com.br/noticias/ver/t/Avionics+Services+faz+miss%C3%A3o+com+o+Ca%C3%A7ador+para+a+Pilicia+Militar+Ambiental+de+S%C3%A3o+Paulo/I/42; Pinto, E. M., "Drone de alta tecnologia para apoio militar e civil é lançado em Botucatu", *Plano Brasil: Defesa e Geopolítica*, 1 July 2016. http://www.planobrazil.com/drone-de-alta-tecnologia-para-apoio-militar-e-civil-e-lancado-em-botucatu/; Rafale High Performance (blog), "Drones militares: saiba como eles são usados pelo Exército Brasileiro", 21 June 2018. http://blog.rafalecalcados.com.br/drones-militares-como-sao-usados/

[15] FT System. FT-100 FH: http://ftsistemas.com.br/en/; Alves, Paulo, "Drone 'espião' brasileiro pode prevenir situações de perigo; conheça", *Techtudo*, 20 June 2017. https://www.techtudo.com.br/noticias/2017/06/drone-espiao-brasileiro-pode-prevenir-situacoes-de-perigo-conheca.ghtml; Amazing Drones, "Successful test flight for the FT-100 FH", 14 August 2018. http://amazing-drones.com/2018/08/14/successful-test-flight-for-the-ft-100fh/

drones or autonomous weapons. This is in line with Brazil's official endorsement of a campaign against the use of autonomous weapons, also known as "Campaign to Stop Killer Robots".[16]

Autonomous cars

At least two independent teams have been working on projects for the development of autonomous cars in Brazil since at least 2010. One car, named IARA (Intelligent Autonomous Robotic Automobile), was developed at the Laboratory of Computation for High Performance, or LCAD (*Port.: Laboratório de Computação de Alto Desempenho*) at the Federal University of Espírito Santo.[17] In May 2017, IARA drove 74km in the autonomous mode along with other conventional cars, at night, in a road trip within the state of Espírito Santo.[18] The other car is called "Carina II" (*Port.:Carro Robótico Inteligente para Navegação Autônoma*), which is a Fiat model turned into a fully autonomous car. Carina II was preceded by Carina I,an electric golf car built as a preliminary step toward the development of Carina II. The development of Carina II involved the joint effort of a number of researchers working at the USP (University of São Paulo), Federal University of São Carlos, Federal University of Minas Gerais, and Federal University of Espírito Santo.[19]

Most researchers involved in these projects (engineers, computer scientists, mathematicians and physicists) are aware of issues related to the safety of persons (both inside and outside of the vehicle) and damage to private property in the surrounding environment. On the other hand, there seems not to be much debate on the broader ethical questions resulting from the development of autonomous cars. Should a utilitarian approach prevail over a deontological approach as far as the training of the relevant algorithms is concerned? Is the so-called "trolley problem" an adequate model for an in-depth analysis of the ethical issues that the use of autonomous cars elicits? Who should be legally responsible in the case of an accident involving an autonomous car? Who owns the data generated by autonomous

[16] Human Rights Watch, "Statement by the Campaign to Stop Killer Robots to the Convention on Conventional Weapons Group of Governmental Experts on Lethal Autonomous Weapons Systems, Geneva", 29 August 2018. https://www.hrw.org/news/2018/08/29/statement-campaign-stop-killer-robots-convention-conventional-weapons-group See also Campaign to Stop Killer Robot. "Country Statements on Killer Robots", 2014. http://www.stopkillerrobots.org/wp-content/uploads/2013/03/KRC_CountryStatus_14Mar2014.pdf. See also Human Rights Council (23th session), "Permanent Mission of Brazil to the United Nations Office and Other International Organization in Geneva, Brasil, 2013. http://www.stopkillerrobots.org/wp-content/uploads/2013/05/HRC_Brazil_09_30May2013.pdf. See also International Committee of the Red Cross (ICRC), "Autonomous weapon systems: Technical, military, legal and humanitarian aspects. Expert meeting", Geneva, March 2014, pp. 26-28.

[17] High Performance Computing Lab (LCAD), "Intelligent Autonomous Robotic Automobile – IARA", 17 March 2018. http://www.lcad.inf.ufes.br/wiki/index.php/IARA

[18] High Performance Computing Lab (LCAD): http://www.lcad.inf.ufes.br/. See also Laboratório de Computação de Alto Desempenho (ICAD), 13 July 2017. http://www.lcad.inf.ufes.br/index.php?option=com_content&task=view&id=43&Itemid=66 See also http://www.ufes.br/conteudo/carro-aut%C3%B4nomo-da-ufes-realiza-viagem-in%C3%A9dita-at%C3%A9-guarapari. See footage at https://www.youtube.com/watch?v=eTtBR_wX7ys&feature=youtu.be and https://www.youtube.com/watch?v=zE7np6tgCHc&list=UUsQuY9t5ss3jwHBiRaEEFFg

[19] ICMC USP. Mobile Robotics Laboratory. http://conteudo.icmc.usp.br/Portal/Pesquisa/pesquisaDinamico.php?id_laboratorio=73. See also FAPESP Virtual Library. "Projeto CARINA - Carro Robótico Inteligente para Navegação Autônoma". http://www.bv.fapesp.br/pt/auxilios/45200/projeto-carina-carro-robotico-inteligente-para-navegacao-autonoma/; Oliveira, Marcos de, "Carro sem motorista Projetos brasileiros de veículos autônomos trazem contribuições para o futuro da mobilidade urbana", Pesquisa FAPESP, November 2013. http://revistapesquisa.fapesp.br/2013/11/18/carro-sem-motorista/

cars: developers, car owners, car makers, or the state? These are pressing questions. But, for the time being, they seem not to have been overtly addressed by researchers working in the field. This lack of in-depth ethical debate may possibly explain why there has also been so little parliamentary debate on this topics, and lack of appropriate regulation for the operation of autonomous cars in Brazil.

Another point worth mentioning is a sort of mismatch among different sectors of Brazilian government. CARINA II, the first fully autonomous car developed in Latin America, hit the road as early as 2013 in São Carlos, Brazil.[20] Although the project was mostly developed by means of public funding, Brazilian government itself has been slow in thinking of strategies for adapting its road networks for the introduction of autonomous cars in the next years. According to a 2018 study published by KPMG International, Brazil ranks as one of the least prepared countries for the introduction of autonomous cars. The study surveyed a total of 20 countries, and Brazil holds the 17th position ahead only of Russia, Mexico, and India.[21]

In November 2017, the Brazilian National Traffic Council (*Port.: Conselho Nacional de Trânsito*, or CONTRAN) published a Resolution to "[e]stablish a chronogram for technical studies and proposals for the regulation of items related to safety in vehicles", including 'autonomous vehicles'." A working group is expected to deliver the study within 48 months of publication of the Resolution.[22] But the Resolution itself does not make it explicit whether the commissioned study should also include proposals for changes in the Brazilian road networks.

Chatbots

Early in 2017, the state of São Paulo launched a virtual attendant called Poupinha (*Time-Saver*) on one of its internet platforms.[23] The chatbots was developed by NAMA Inteligência Artificial.[24] Inhabitants of São Paulo can interact with the chatbot in order to obtain information and fix appointments for services such as, for instance, unemployment insurance, driver licenses, or to file a complaint against

[20] For a footage of the first trip of an autonomous car in Latin America, see G1 Globo, "USP faz teste inédito com carro sem motorista pelas ruas de São Carlos", 22 October 2013. http://g1.globo.com/sp/sao-carlos-regiao/noticia/2013/10/usp-faz-teste-inedito-com-carro-sem-motorista-pelas-ruas-de-sao-carlos.html. See also G1 Globo, "Carro autônomo já é realidade na USP de São Carlos", 2015. http://g1.globo.com/videos/v/carro-autonomo-ja-e-realidade-na-usp-de-sao-carlos/4554376/

[21] KPMG International, "Autonomous Vehicles Readiness Index: Assessing countries' openness and preparedness for autonomous vehicles", 2018. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2018/01/avri.pdf; See also: Auto Sport G1, "Brasil é um dos últimos no ranking de adequação de carros autônomos", 15 March 2018. https://g1.globo.com/carros/noticia/brasil-e-um-dos-ultimos-em-ranking-de-aptidao-para-carros-autonomos.ghtml

[22] Conselho Nacional de Trânsito (CONTRAN), "Resolução No. 717", 30 November 2017. https://www.denatran.gov.br/images/Resolucoes/Resolucao7172017.pdf Source page: Departamento Nacional de Trânsito (Denatran), Resoluções. http://www.denatran.gov.br/resolucoes

[23] Service available at the right hand bottom corner of the website: https://www.poupatempo.sp.gov.br/ See also Portal do Governo de São Paulo, "Poupinha: mais de 13 milhões de mensagens enviadas e recebidas", 10 May 2017. http://www.saopaulo.sp.gov.br/spnoticias/robozinho-poupatempo-mais-de-13-milhoes-de-mensagens-enviadas-e-recebidas/

[24] Nama: https://nama.ai/

a commercial establishment. The chatbot is reported to have fixed over 348.000 appointments in the first 4 months of service.[25]

Most chatbots designed in Brazil have been deployed to provide a variety of services both in the private and public sectors. A community of chatbot developers launched in 2017 its own internet platform and created the "Bots Brasil Awards" with the intention of exchanging expertise and awarding the best chatbots every year.[26]

Now, as chatbots become widespread and user-friendlier, some issues relative to their legal status start to surface. We address this issue later on in section 4.2.1 of this report.

Are there new regulatory bodies being set up to regulate AI and robotics? What are the developments on this front? (e.g., AI watchdogs, AI commission, Robotics commission)

Over the last few years a number of non-governmental bodies have been founded in Brazil to promote the public debate on the legal implications resulting from widespread use of AI systems. They are not, strictly speaking, regulatory bodies, but they foster the public discussion of themes related to AI and robotics in order to provide guidance to policy-makers, or in the attempt to pressure legislators to create new laws (or to revoke old ones) in this area. In what follows, we briefly review the activities pursed by three such bodies.

ITS Rio – Instituto de Tecnologia e Sociedade. This is a non-profit organisation based in Rio de Janeiro. ITS regularly publishes reports on diverse aspects of digital technologies and law. Some of its founding members are university professors who have been engaged in the public debate about topics such as net neutrality, freedom of speech online, and data protection law.[27] ITS has also been fostering the public debate on the legal and ethical implications information technology, including AI systems.[28] Moreover, ITS has acted as *amicus curiae* before the Brazilian Supreme Federal Court (STF) on a number of occasions.

Lawgorithm. This is a non-profit organisation based in São Paulo. Its members are also professors at USP (University of São Paulo) with a background in law, computation, engineering, or philosophy. Lawgorithm aims to foster the public debate on topics related to AI and law.[29] Lawgorithm also seeks to promote a closer relationship between the private and public sectors by mentoring a variety of projects.

Instituto Igarapé. This think-tank based in Rio de Janeiro promotes evidence-based public policies in areas such as cyber-security.[30] The institute developed a service called CrimeRadar in order to provide

[25] São Paulo, "Poupinha: mais de 13 milhões de mensagens enviadas e recebidas", *Portal do Governo*, 10 May 2017. http://www.saopaulo.sp.gov.br/spnoticias/robozinho-poupatempo-mais-de-13-milhoes-de-mensagens-enviadas-e-recebidas/
[26] Medium Corporate. Bots Brazil. https://medium.com/botsbrasil
[27] Instituto de Tecnologia e Sociedade do Rio (ITS Rio). https://itsrio.org/pt/institucional/
Instituto de Tecnologia e Sociedade do Rio (ITS Rio). "Inteligência Artificial: construindo uma agenda para garantir impactos positives", 17 April 2018. https://feed.itsrio.org/intelig%C3%AAncia-artificial-construindo-uma-agenda-para-garantir-impactos-positivos-4e488da4c6ec
[29] See Lawgorithm. http://www.lawgorithm.com.br
[30] See Instituto Igarapé. https://igarape.org.br/en/

the population with nongovernmental reports on crime rates in Rio de Janeiro.[31] Ordinary citizens can use their mobile phones to feed CrimeRadar with real time information on shootouts in Rio de Janeiro. CrimeRadar employs, then, machine-learning based tools in order to predict crime rates across the city.[32] The UK newspaper *The Guardian* and American technology magazine *WIRED* published recently feature articles on Instituto Igarapé's CrimeRadar project.[33]

Identify any significant case law or judgments[34] addressing human rights challenges[35] of AI and robotics (if there are no judgments, you can refer to legal doctrine)

Although the report researchers used a variety of terms (in Portuguese) in Google, and asked for advice from legal scholars, they were not been able to find any relevant cases in this regard.

Highlight any other relevant, potential future legal developments relating to AI and robotics identified in authoritative legal sources in your country

In 2017, Brazil had over 1 million registered lawyers and 18 thousand judges.[36] These figures notwithstanding, according to a report published by the National Justice Council (*Port.: Conselho Nacional de Justiça*, CNJ) in 2017, the Brazilian judiciary system had an estimated 80 million cases waiting to be resolved in 2016. It may sometimes take as many as ten years to settle a dispute.[37] For this reason, the Brazilian Association of Federal Judges (*Port.: Associação dos Juízes Federais do Brasil*, AJUFE) launched in 2015 a research paper contest called "Robotization in the Judiciary" (*Port.: Robotização no Poder Judiciário*).[38] The prizes were given out in May 2016.[39]

[31] See Radar Crime. https://rio.crimeradar.org/
[32] See Instituto Igarapé. Radar Crime: https://igarape.org.br/en/apps/crimeradar/
[33] Milhorance, Flávia, "The apps that map violence – and keep Rio residents out of the crossfire", *The Guardian*, April 2018. https://www.theguardian.com/cities/2018/apr/05/the-apps-that-map-violence-and-keep-rio-residents-out-of-the-crossfire; Griffiths, Sarah, "CrimeRadar is using machine learning to predict crime in Rio". *Wired*, August 2016. https://www.wired.co.uk/article/crimeradar-rio-app-predict-crime
[34] Limited only to decisions in the highest courts – unless going further in depth is warranted.
[35] For example, discrimination, inequality, privacy infringements, unfavourable work conditions, harm to life, bodily integrity, human safety and welfare, liability etc.
[36] Ordem dos Advogados do Brasil (OAB). "Quadro de Advogados regulares e recadastrados". http://www.oab.org.br/institucionalconselhofederal/quadroadvogados
[37] D'Agostino, Rosanne and Ramalho Renan, "Ações não atendidas crescem em ritmo mais lento, mas chegam a 80 milhões em 2017, Segundo relatório do CNJ", *G1Globo*, 27 August 2018. https://g1.globo.com/politica/noticia/2018/08/27/processos-sem-solucao-na-justica-crescem-em-ritmo-menor-mas-atingem-80-milhoes-em-2017-aponta-levantamento-do-cnj.ghtml; Garcia-Navarro, Lulu, "Brazil: The land of many lawyers and very slow justice", *NPR*, 5 November 2014. https://www.npr.org/sections/parallels/2014/11/05/359830235/brazil-the-land-of-many-lawyers-and-very-slow-justice
[38] Associação dos Juízes Federais do Brasil (AJUFE), "Concurso de artigos, *Robotização no Poder Judiciário*", 2015. http://www.ibrajus.org.br/pdf/Edital_Concurso_de_Robotica.pdf
[39] Consultor Jurídico (CONJUR), "Juízes premiam projeto que propõe criar robôs para analisar petições", 3 May 2016. https://www.conjur.com.br/2016-mai-03/juizes-premiam-projeto-criar-robos-analisar-peticoes

In May 2018, the Brazilian Supreme Federal Court (STF) announced that a machine learning based system called VICTOR was being trained to speed up some of its procedural legal steps.[40]

The adoption of AI systems in the Brazilian judiciary has been generally hailed as a bold step to modernise the courts. On the other hand, there seems to be little public concern over issues such as algorithmic bias and transparency. At this stage, though, it is not yet clear to the general public, for instance, how the AJUFE or STF intend to address these issues, or whether the further development, training, and implementation of AI systems in the judiciary will rely on the support of ad hoc ethics committees or involve a public debate on issues relative to transparency and accountability.[41]

Provide any additional information that might be relevant (and not considered above).

It is also worth mentioning that the widespread use of AI capabilities in the Brazilian legal system as a whole might also possibly lead to an increase in the number of judicial disputes. This would defeat the purpose of deploying AI systems in the first place. The number of judicial disputes is likely to increase if law firms start to use massively AI system both in order to speed up their work and to attract new clients. AI systems in this area can, indeed, work quicker, at lower costs, and with tools that will enable them to search social networks for prospective clients who might not otherwise be willing to file a complaint. We address this particular topic later on, in section 4.2.1 which addresses the legal status of chatbots.

4. Specific legal issues

This section explores selected specific legal issues related to AI and robotics. We explore, for AI, two critical issues:

- Algorithmic bias and discrimination (including automated decision-making systems), i.e., how does the law deal with issues of algorithmic bias and discrimination?
- Intellectual property issues related to works created by AI i.e., does the law ascribe intellectual property rights (e.g., copyright, patent right, design rights, trademarks etc) for AI generated works or inventions? Who owns such intellectual property rights?

For robotics, we will explore:

- Creation of a specific legal status for robots i.e., legal personhood or electronic personality, i.e., has the law created/does the law recognise a specific legal status for robots? Are there any movements in this direction?
- Safety and civil liability issues: who is liable for damage caused by robots?

[40] Supremo Tribunal Federal (STF), "Inteligência artificial vai agilizar a tramitação de processos no STF", *Notícias STF*, 30 May 2018. http://www.stf.jus.br/portal/cms/verNoticiaDetalhe.asp?idConteudo=380038; Correia, Nilton, "Notas iniciais sobre a evolução dos algoritmos do *Victor*: O Primeiro projeto de inteligência artificial em supremas cortes do mundo", *Tecnologia Jurídica & Direito Digital: II Congresso Internacional de Direito, Governo e Tecnologia – 2018*. (ed.) Fernandes, R. V. C.; Carvalho, A. G. P. (*forthcoming*).

[41] Lemos, Ronaldo, "Ninguém sabe como funciona o algoritmo do STF", *Consultor Jurídico*, 6 February 2017. https://www.conjur.com.br/2017-fev-06/ronaldo-lemos-falta-auditabilidade-algoritmo-supremo

4.1. Artificial intelligence

4.1.1. Algorithmic bias and discrimination (including automated decision-making systems)

ITS-Rio, to which we have already alluded in section 3 above, published in 2017 a study entitled "Transparency and governance in algorithms: A case study on the credit bureau sector".[42] The study examines how the so-called credit bureaus, i.e., private institutions that attribute credit scores to prospective borrowers in Brazil, deal with personal data. The scores are attributed with a risk analysis algorithm that assesses, for a given individual, the probability that he or she will pay a debt. The automated assessment requires as much information as possible from potential clients, including, for instance, personal information on life habits, current economic situation, health, genetic data, etc. As the report shows, the algorithm can easily generate a risk-profile that leads to unfair discrimination, as individuals in the target group often do not have the power or opportunity to prove that his or her particular case has been wrongly handled by the algorithm.

Without an appropriate data protection law, it is difficult to address this kind of unfair discrimination. The ITS-Rio report calls attention, then, to other relevant laws that might enable citizens to deal with this issue, namely the "Consumer Protection Code" (*Port.: Código de Defesa do Consumidor*, Law Nº 8.078, from 11 September 1990.)[43]; the "Positive Registration Law" (*Port.: Lei do Cadastro Positivo*, Law Nº 12.414, from 9 June 2011)[44]; the "Law on Access to Information" (*Port.: Lei de Acesso à Informação*, Law Nº 12.527, from 18 November 2011)[45]; and the "Brazilian Civil Rights Framework for the Internet" (*Port.: Marco Civil da Internet*, Law Nº 12.965, from 23 April 2014).[46] The report states:

> Considering that Brazil does not have a specific legal norm on the subject, the second chapter of this study will cover standards such as the Consumer Protection Code (CDC), the Positive Registration Law, the Law on Access to Information (LAI) and the Brazilian Civil Rights Framework for the Internet, among others.[47].

Now, it is important to notice that this report was published in 2017, before the creation of "a specific legal norm on the subject", namely the recently approved "Data Protection Law" (*Port.: Lei Geral de Proteção de Dados Pessoais,* Law No. 13.709, or *LGPDP*), from August 2018, which was reviewed at the outset of this report (Section 3). Although ITS-Rio itself is not a regulatory body, it has been very active

[42] Institute of Technology and Society of Rio (ITS Rio). "Transparência e Governança em Algoritmos: um estudo de casosobre o setor de agências de crédito" https://itsrio.org/wp-content/uploads/2017/05/algorithm-transparency-and-governance-pt-br.pdf
De Oliveira, C. E. G., "*Credit scoring* e *big data* no regime jurídico brasileiro". (ed.) Fernandes, R. V. C.; Costa, H. A.; Carvalho, A. G. P. *Tecnologia Jurídica e Direito Digital: I Congresso Internacional de Direito e Tecnologia*, 2017. Belo Horizonte, Forum, p. 223-240. (ISBN: 978-85-450-0453-0).
[43] Brasil (Presidência da República), Law No. 8.078, 11 September 1990. http://www.planalto.gov.br/ccivil_03/Leis/L8078.htm
[44] Brasil (Presidência da República), Law No. 12.414, 9 June 2011. http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/L12414.htm
[45] Brasil (Presidência da República), Law No. 12.527, 18 November 2011. http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/l12527.htm
[46] Brasil (Presidência da República), Law 12.965, 23 April 2014. http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12965.htm
[47] ITS-Rio, op. cit. p. 2. (Original text in Portuguese).

in campaigning for legal advancements and public debate on matters related to digital technologies, including AI and algorithmic bias and discrimination.

4.1.2. Intellectual property issues related to works created by AI

Intellectual property rights are regulated by Law Nº 9.279, from 14 May 1996.[48] This law does not address issues related to works created by AI. This issue, and the issue relative to the authorship of works written by AI systems, has been discussed thus far by Brazilian legal scholar and philosophers rather than legislators or policymakers.[49] It is important to mention, though, that the Chamber of Deputies (Brazilian Lower House) has a permanent Committee for Science and Technology, Communication and Information (*Port.: Comissão de Ciência e Tecnologia, Comunicação e Informática, CCTCI*). Starting in September 2018, CCTCI has been promoting a series of public hearings in order to gather information on the social implications of widespread application of AI systems. The public hearings promoted by CCTCI constitute a preliminary step towards the regulation of AI systems in Brazil. In 15 October 2018, the CCTCI defined its mission in this area as follows:

> The objective [of CCTI] is to discuss, in particular, the legal implications of adopting technology resources in the productive sector.
> Artificial intelligence is one of the most promising fields in the area of technology, as it applies to innumerable industrial activities and different aspects of human life. It is found, for example, in autonomous vehicles, virtual assistants, marketing and advertising, stock exchanges, social networks, traffic, defence and medicine, among many other fields.
> It has also been scheduled for discussion its stage of development in the great nations and companies, risks, consequences (philosophical, economic, social, political) of human-machine interfaces, legal issues raised by this new reality [i.e. AI], such as *copyright* and civil and criminal liability for algorithms.[50] [emphasis added]

The text published by the CCTCI makes it clear that the Brazilian legal system does not yet have specific laws for the regulation of AI systems. On the other hand, the text also suggests that legislators are aware of this issue, and that this matter is expected to be regulated in the near future.[51]

---

[48] Brasil (Presidência da República), Law No. 9.279, 14 May 1996 http://www.planalto.gov.br/ccivil_03/Leis/L9279.htm.

[49] Magrani, Eduardo, *A internet das coisas*, FGV Editora, Rio de Janeiro, 2018.
Araujo, Marcelo de. "O uso de inteligência artificial para a geração automatizada de textos acadêmicos: plágio ou meta-autoria?" *Logeion: Filosofia da* Informação, Vol. 3, No. 1, 2016, p. 89-107.

[50] Almeida, Gilmar, "CCTCI promove audiência pública sobre inteligência artificial", *Comissão de Ciência e Tecnologia, Comunicação e Informática (CCTCI)*, 5 October 2018.
http://www2.camara.leg.br/atividade-legislativa/comissoes/comissoes-permanentes/cctci/noticias/noticias-2018/cctci-promove-audiencia-publica-sobre-inteligencia-artificial

[51] See the minutes of the meeting held at CCTCI on 16 October 2018 entitled "As implicações legais da adoção de recursos de inteligência artificial no setor produtivo, Requerimento No. 288/18.
http://www2.camara.leg.br/atividade-legislativa/comissoes/comissoes-permanentes/cctci/audiencias-publicas/2018/2018-10-16-ap-inteligencia-artificial/resultado-da-reuniao/view.

4.2. Robotics

4.2.1. Creation of a specific legal status for robots

The word "robot" usually evokes the image of machines moving objects around and carrying out tasks such as building cars or performing surgeries. We review some legal aspects of this kind of robot in Section 4.2.2 below, which deals with "robotic surgery". In present section, though, we review the current legal debate on another kind of robots, namely "chatbots" i.e., software and AI systems that are deployed for natural language interaction with persons. The use of chatbots by law firms in Brazil has recently sparked a legal debate on the status of "robot lawyers", i.e., chatbots (and other AI systems) that have been used to perform a number of activities that, until recently, could only be carried out by professional lawyers. The authors of this report do recognize, indeed, that this topic might as well have been reviewed in the previous section (on AI) of this report. On the other hand, the authors also understand that as AI and robotics technologies continue to advance, it becomes increasingly hard to draw a clear-cut line between both fields.

As we have pointed out earlier, Brazil has *ca.* 80 million cases pending before the courts. The introduction of AI systems in the judiciary is expected to help judges to speed up their decisions and, thus, lead to a decrease in the amount of pending cases. On the other hand, massive use of AI systems by law firms might also possibly aggravate the current crises, leading to even more lawsuits. The balance between settled cases and new cases may partially depend on the regulation of "robot lawyers" in Brazil, that is AI systems developed for the purpose of legal services.

An increasing number of law firms advertise their AI capabilities in order to attract potential clients. In like manner, AI firms such as Hurst[52], Legal Labs[53] and Convex[54] are offering a variety of AI tools to both the private and public sectors in Brazil. Legal Lab, for instance, has developed an AI system called "Dra. Luzia". The name deliberately sounds as the name of a woman lawyer. Dra. Luiza can analyse the relevant documents and automatically draft a petition, which enables professional lawyers to commence a lawsuit.[55] Hurst has developed a series of Facebook based chatbots that interact with Facebook users in need of legal advice. Each chatbot works on a specific branch of law. "Haroldo" offers advice on consumer law.[56] "Leopold" works with tax law.[57] "Valentina" deals with labour law.[58] Each chatbot is personified with a B&W photo of a smiling human face. The business model adopted by Hurst is legal financing. Hurst acquires from Facebook users their right to sue a third party. If Hurst

[52] Hurst: https://hurst.capital/
[53] Legal Labs: https://legalabs.com.br/
[54] Convex: http://convex.la/
[55] See Legal Labs short video on Dra. Luiza. https://www.youtube.com/watch?v=X28pXZOthnY
See also Fernandes, R. V. C.; Mendes, D. B.; Ferreira, H. H.; Guedes, A. B. S., "Inteligência artificial (IA) aplicada ao direito: Como construímos a Dra. Luzia, a primeira plataforma do Brasil com *machine learning* utilizado sobre decisões judiciais". (ed.) Fernandes, R. V. C.; Costa, H. A.; Carvalho, A. G. P., *Tecnologia Jurídica e Direito Digital: I Congresso Internacional de Direito e Tecnologia*, Forum, Belo Horizonte, 2017, pp. 39-68. (ISBN: 978-85-450-0453-0).
[56] Haroldo - Robô do Consumidor. https://www.facebook.com/HaroldoBot/
[57] Leopoldo - Robô do Contribuinte. https://www.facebook.com/LeopoldoBot/
[58] Valentina - Robô do Trabalhador. https://www.facebook.com/ValentinaRoboDoTrabalhador/

wins the case, the firm is entitled to retain part of the compensation; if the firm loses the case, the Facebook user does not have to pay for the service.[59]

The use of chatbots by law firms has recently attracted the attention of the Order of Attorneys of Brazil (*Port: Ordem dos Advogados do Brasil*, *OAB*).[60] OAB argues that chatbots represent a violation of Article 34, §5 of the association's by-law, which forbids a lawyer to sign a petition that has not been drafted by himself or herself.[61] For this reason, in July 2018, the OAB set up an internal commission to propose norms for the regulation of "robot lawyers" and AI at large in Brazil.[62] What is at stake here is the legal status of "robot lawyers", that is whether they might be considered authors or co-authors of a legal petition, or whether law firms might advertise the use of AI systems as though these entities were a real lawyer rather than robots. As of September 2018, the OAB had not publish further information on this topic. Academic discussion on this matter in Brazil has tended to cover the current debate in countries such as the UK and USA, where these technologies have already been deployed.

Given some recent legal debate in Brazil, such as for instance, the public hearings in the Parliament to regulate the use of AI systems and the commission for the establishment of rules for the use of "robot lawyers", it is reasonable to assume that policy makers are generally aware that the question relative to the legal status of robots has to be addressed soon. But for the time being robots do not possess a legal status of their own.

4.2.2. Safety and civil liability issues: who is liable for damage caused by robots?

In Brazil, only natural persons and legal entities are entitled to have legal personality. Legal personality is a requirement for civil liability. The relevant piece of legislation here is the Brazilian Civil Code.[63] As yet, Brazilian law does not grant legal personality to robots. A robot cannot be legally responsible for

[59] Farache, Arthur (founder of Hurst), "Aspectos jurídicos do financiamento de litígios na esfera judicial", *Consultor Jurídico (CONJUR)*, 24 July 2018. https://www.conjur.com.br/2018-jul-24/arthur-farache-aspectos-juridicos-financiamento-litigios; Miozzo, Julia, "'Procon particular': A partir de robô, empresa compra causa de consumidor e busca indenização", *InfoMoney,* 27 April 2018. https://www.infomoney.com.br/minhas-financas/consumo/noticia/7392061/procon-particular-partir-robo-empresa-compra-causa-consumidor-busca-indenizacao

[60] Wikipedia, "Order of Attorneys of Brazil": https://en.wikipedia.org/wiki/Order_of_Attorneys_of_Brazil

[61] Ordem dos Advogados do Brasil (OAB), "Estatuto dos Advogados da OAB", 4 July 1994. http://www.oab.org.br/arquivos/pdf/LegislacaoOab/estatuto.pdf; Radar do Futuro, "Inteligência artificial no direito: OAB avalia os impactos", 14 July 2018. https://radardofuturo.com.br/a-inteligencia-artificial-no-direito/ Possebon, Samuel, "Contra 'industrialização' do direito: OAB cria coordenação de inteligência artificial", *TI Inside Online*, 29 June 2018. http://tiinside.com.br/tiinside/home/internet/29/06/2018/contra-industrializacao-do-direito-oab-cria-coordenacao-de-inteligencia-artificial/; Teixeira, Matheus, "OAB cria coordenação de inteligência artificial para regulamentar tema", *Jota*, 5 July 2018. https://www.jota.info/jotinhas/oab-inteligencia-artificial-de-robo-polemica-05072018

[62] Ordem dos Advogados do Brasil (OAB/PR), "OAB cria coordenação para discutir regulamentação do uso de inteligência artificial", 3 July 2018. https://www.oabpr.org.br/oab-cria-coordenacao-para-discutir-regulamentacao-do-uso-de-inteligencia-artificial/; O Sul, "A OAB criou grupo para regular o uso da inteligência artificial no exercício da lei", 3 July 2018. http://www.osul.com.br/a-ordem-dos-advogados-do-brasil-criou-um-grupo-para-regulamentar-o-uso-da-inteligencia-natural-no-exercicio-do-direito/

[63] Port.: Código Civil Brasileiro, Law N. 10.406, of 10 January 2002. http://www.planalto.gov.br/ccivil_03/leis/2002/l10406.htm

its own performance or malfunctioning. Performance, in this case, will always be imputed to the robot's owners or, as the case may be, to its developers, or to the legal entity that required its development or put it on the market. Liability will ultimately depend on the terms of the contract that has been established for the robot's operation.

As stated in section 4 above, there is a new law, since May 2017, for the non-military use of drones in Brazil. The new law forbids the use of autonomous drones and establishes that the operator is legally responsible for damage caused by the drone. Otherwise, there has not been much legal or parliamentary debate on this topic in Brazil. But there is yet another field of robotics that has been in operation in Brazil for some time now and that required specific legislation, namely "robotic medicine".

A robot called Da Vinci Surgical System, developed by the American firm Intuitive Surgical, has been in use in Brazilian hospitals since at least 2008. Da Vinci must be operated by a professional surgeon. It can be used to perform a variety of surgical procedures. In 2017, CFM published a commissioned report on the ethics and legality of using Da Vinci for thyroidectomy (see document CFM Nº 31/2017 – Opinion CFM Nº 41/2017, referred to below). It was not clear to the CFM whether or not it should be considered illegal to use Da Vinci for this kind of surgery. The report suggests that it is unethical to employ in Brazil a procedure that has not been approved in the country where the technology was originally developed (USA). The report recommends, then, that Da Vinci should not be allowed to perform thyroidectomy surgeries in Brazil.

Regulation for the use of robots in hospitals in Brazil falls within the broader category of "telemedicine", which was first regulated in 2002 by the Brazilian Federal Council of Medicine (*Port.: Conselho Federal de Medicina* or CFM).[64] As technologies for diagnoses, communication, and storage of medical information developed further, the CFM had to update its current rules, or issue new ones, so as to render the use of telemedicine in Brazil legally feasible. The most important rules in this regard are:

***Resolution CFM Nº 2.178/2017* (*Port.: Resolução CFM Nº 2.178/2017*)**[65]
This document establishes general guidelines for the use of mobile phone apps that offer health consulting services. But it does not specifically address AI.

***CFM-commissioned report. CFM Nº 31/2017 – Opinion CFM Nº 41/* (*Port.: Processo-Consulta CFM Nº 31/2017 – Parecer CFM Nº 41/2017*)**[66]
This report assesses the ethics of using robot Da Vinci Surgical System (built and sold by Intuitive Surgical) for thyroidectomy. The report suggests that it is unethical to employ a procedure that has not been approved in its country of origin (USA).

***Resolution CFM Nº 2.107/2014* (Resolução CFM Nº 2.107/2014)**[67]
This document defines and regulates the practice of teleradiology in Brazil.

[64] Conselho Federal de Medicina (CFM), "Normatizado Uso da Telemedicina", 22 August 2002. https://portal.cfm.org.br/index.php?option=com_content&view=article&id=1087:&catid=3
[65] Conselho Federal de Medicina (CFM), Resolução No. 2.178, 1 March 2018. https://sistemas.cfm.org.br/normas/visualizar/resolucoes/BR/2017/2178
[66] Conselho Federal de Medicina (CFM), "Parecer No. 41", 2017. https://sistemas.cfm.org.br/normas/arquivos/pareceres/BR/2017/41_2017.pdf
[67] Conselho Federal de Medicina (CFM), Resolução CFM No. 2.107/2014 http://www.portalmedico.org.br/resolucoes/CFM/2014/2107_2014.pdf

Resolution CFM Nº 1.643/2002 **(Resolução CFM Nº 1.643/2002)**[68]
The document defines and regulates the use of technologies for telemedicine in Brazil.

4.3. Identify other key specific legal issues related to either AI and robotics that are at the forefront and how they are being addressed

We endeavoured cover as many legal issues, related to the use of AI and robotics in Brazil, as feasible within the scope of this study. AI and robotics are topics that, from a legal and political point view, are only emerging in Brazil. For this reason, at this stage there are no further relevant issues at the forefront that we might explore further here.

5. Brief analysis of gaps and challenges

Brazilian law does not directly address issues related to the use of robotics and AI systems. This situation, though, may change in the near future, as the Committee for Science and Technology, Communication and Information (*Port.: Comissão de Ciência e Tecnologia, Comunicação e Informática, CCTCI*), a branch of the Chamber of Deputies (Brazilian Lower House), started a series of public hearings in September 2018 in order to gather information on the social implications of the widespread application of AI systems. In the absence of federal regulation on this matter, some regulatory bodies have stepped in the attempt to regulate the use of AI systems in specific areas. The Order of Attorneys of Brazil (*Port: Ordem dos Advogados do Brasil*, *OAB*), for instance, set up a commission in July 2018 in order to assess the legal implications of the use of AI by law firms that operate in Brazil.

As far as human rights are concerned, the Brazilian General Law for the Protection of Personal Data (*Port.: Lei Geral de Proteção de Dados Pessoais,* Law No. 13.709, or *LGPDP*), approved in August 2018, provides protection of personal data in digital databases. Although LGPDP does not explicitly mention AI, it is clear that it has implications for the use of AI systems in Brazil. As we have mentioned above, AI systems gather vast amounts of data (including sometimes personal data), in order to decide, for instance, which persons are eligible to apply for a loan, which regions of a city the police will patrol on any given day, or who will obtain an organ for transplantation. This can lead to unfair discrimination, especially if the AI system is not accountable or transparent.

6. Conclusion

Throughout the report, we called attention to a sort of mismatch among different sectors of the Brazilian government. There is, indeed, a significant number of Brazilian researchers working on fields such as autonomous cars and AI. The first fully autonomous car developed in Latin America, for

Resolution CFM Nº 2.107/2014[68] Conselho Federal de Medicina (CFM), Resolução CFM No. 1.643/2002. https://sistemas.cfm.org.br/normas/visualizar/resolucoes/BR/2002/1643

instance, was shown in São Carlos, Brazil, as early as 2013. Although research in this area is more often than not funded by the government, the government itself has been slow in thinking of strategies to unleash the full potential of these technologies in the public sector, or to the benefit of the population at large. It was not until September 2018 that the Chamber of Deputies (Brazilian Lower House) held a series of public hearings aiming to gather information for the regulation of AI in Brazil.

To the best of our knowledge, the present report is the first one of its kind elaborated in Brazil. We believe, thus, that this report, to the extent that it calls attention to the mismatch and the regulatory gaps mentioned above, may eventually prove relevant both to researchers and legislators in Brazil.

References

Agência Nacional de Aviação Civil (ANAC), "Regulamento brasileiro da aviação civil especial - RBAC-E No. 94: Requisitos gerais para aeronaves não tripuladas para uso civil", Resolution No. 419, from 2 May 2017. http://www.anac.gov.br/assuntos/legislacao/legislacao-1/rbha-e-rbac/rbac/rbac-e-94-emd-00

Almeida, Gilmar, "CCTCI promove audiência pública sobre inteligência artificial", *Comissão de Ciência e Tecnologia, Comunicação e Informática (CCTCI)*, 5 October 2018. http://www2.camara.leg.br/atividade-legislativa/comissoes/comissoes-permanentes/cctci/noticias/noticias-2018/cctci-promove-audiencia-publica-sobre-inteligencia-artificial

Alves, Paulo, "Drone 'espião' brasileiro pode prevenir situações de perigo; conheça", *Techtudo*, 20 June 2017. https://www.techtudo.com.br/noticias/2017/06/drone-espiao-brasileiro-pode-prevenir-situacoes-de-perigo-conheca.ghtml

Amazing Drones, "Successful test flight for the FT-100 FH", 14 August 2018.

Angelo, Claudio, "Brazilian scientists reeling as federal funds slashed by nearly half", Nature, 3 April 2017. https://www.nature.com/news/brazilian-scientists-reeling-as-federal-funds-slashed-by-nearly-half-1.21766

Angelo, Claudio, "Scientists plead with Brazilian government to restore funding", Nature, 4 October 2017. https://www.nature.com/news/scientists-plead-with-brazilian-government-to-restore-funding-1.22757

Associação dos Juízes Federais do Brasil (AJUFE), "Concurso de artigos, *Robotização no Poder Judiciário*", 2015. http://www.ibrajus.org.br/pdf/Edital_Concurso_de_Robotica.pdf

Auto Sport G1, "Brasil é um dos últimos no ranking de adequação de carrosautônomos", 15 March 2018. https://g1.globo.com/carros/noticia/brasil-e-um-dos-ultimos-em-ranking-de-aptidao-para-carros-autonomos.ghtml

Avionics Services, "Avionics Services faz missão com o Caçador para a Polícia Militar Ambiental de São Paulo", 15 March 2018. http://www.avionics.com.br/noticias/ver/t/Avionics+Services+faz+miss%C3%A3o+com+o+Ca%C3%A7ador+para+a+Pilicia+Militar+Ambiental+de+S%C3%A3o+Paulo/I/42

Brasil (Presidência da República), Law 12.965, 23 April 2014.
http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12965.htm

Brasil (Presidência da República), Law No. 12.414, 9 June 2011.
http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/L12414.htm

Brasil (Presidência da República), Law No. 12.527, 18 November 2011.
http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/l12527.htm

Brasil (Presidência da República), Law No. 13.709, 14 August 2018.
http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/L13709.htm

Brasil (Presidência da República), Law No. 8.078, 11 September 1990.
http://www.planalto.gov.br/ccivil_03/Leis/L8078.htm

Brasil (Presidência da República), Law No. 9.279, 14 May 1996.
http://www.planalto.gov.br/ccivil_03/Leis/L9279.htm.

Briceño, J. et al. "Use of artificial intelligence as an innovative donor-recipient matching model for liver transplantation: results from a multicenter Spanish study", *J Hepatol.*, Vol. 61, No. 5, November 2014, pp. 1020-1028. https://www.ncbi.nlm.nih.gov/pubmed/24905493

Campaign to Stop Killer Robot. "Country Statements on Killer Robots", 2014.
http://www.stopkillerrobots.org/wp-content/uploads/2013/03/KRC_CountryStatus_14Mar2014.pdf.

Castelvecchi, David, "Can we open the black box of AI?", *Nature*, Vol. 538, 5 October 2016, pp. 20-23.
https://www.nature.com/news/can-we-open-the-black-box-of-ai-1.20731.

Comissão de Ciência e Tecnologia, Comunicação e Informática (CCTCI), "As implicações legais da adoção de recursos de inteligência artificial no setor produtivo, Requerimento No. 288/18".

Conselho Federal de Medicina (CFM), "Normatizado Uso da Telemedicina", 22 August 2002.
https://portal.cfm.org.br/index.php?option=com_content&view=article&id=1087:&catid=3

Conselho Federal de Medicina (CFM), "Parecer No. 41", 2017.
https://sistemas.cfm.org.br/normas/arquivos/pareceres/BR/2017/41_2017.pdf

Conselho Federal de Medicina (CFM), Resolução CFM No. 1.643/2002.
https://sistemas.cfm.org.br/normas/visualizar/resolucoes/BR/2002/1643

Conselho Federal de Medicina (CFM), Resolução CFM No. 2.107/2014
http://www.portalmedico.org.br/resolucoes/CFM/2014/2107_2014.pdf

Conselho Federal de Medicina (CFM), Resolução No. 2.178, 1 March 2018.
https://sistemas.cfm.org.br/normas/visualizar/resolucoes/BR/2017/2178

Conselho Nacional de Trânsito (CONTRAN), "Resolução No. 717", 30 November 2017.
https://www.denatran.gov.br/images/Resolucoes/Resolucao7172017.pdf Source page: Departamento Nacional de Trânsito (Denatran), Resoluções. http://www.denatran.gov.br/resolucoes

Consultor Jurídico (CONJUR), "Juízes premiam projeto que propõe criar robôs para analisar petições", 3 May 2016. https://www.conjur.com.br/2016-mai-03/juizes-premiam-projeto-criar-robos-analisar-peticoes

Convex: http://convex.la/

Correia, Nilton, "Notas iniciais sobre a evolução dos algoritmos do *Victor*: O Primeiro projeto de inteligência artificial em supremas cortes do mundo", *Tecnologia Jurídica & Direito Digital: II CongressoInternacional de Direito, Governo e Tecnologia – 2018*. (ed.) Fernandes, R. V. C.; Carvalho, A. G. P. (*forthcoming*).

D'Agostino, Rosanne, and Ramalho Renan, "Ações não atendidas crescem em ritmo mais lento, mas chegam a 80 milhões em 2017, segundo relatório do CNJ", *G1Globo*, 27 August 2018. https://g1.globo.com/politica/noticia/2018/08/27/processos-sem-solucao-na-justica-crescem-em-ritmo-menor-mas-atingem-80-milhoes-em-2017-aponta-levantamento-do-cnj.ghtml

De Oliveira, C. E. G., "*Credit scoring* e *big data* no regime jurídico brasileiro". (ed.) Fernandes, R. V. C.; Costa, H. A.; Carvalho, A. G. P. *Tecnologia Jurídica e Direito Digital: I Congresso Internacional de Direito e Tecnologia*, 2017. Belo Horizonte, Forum, p. 223-240. (ISBN: 978-85-450-0453-0).

Departamento Nacional de Tráfico (DENATRAN), "Frota de Veículos 2018", 27 March 2018. https://www.denatran.gov.br/estatistica/635-frota-2018

FAPESP Virtual Library. "Projeto CARINA - Carro Robótico Inteligente para Navegação Autônoma". http://www.bv.fapesp.br/pt/auxilios/45200/projeto-carina-carro-robotico-inteligente-para-navegacao-autonoma/

Farache, Arthur (founder of Hurst), "Aspectos jurídicos do financiamento de litígios na esfera judicial", *Consultor Jurídico (CONJUR)*, 24 July 2018. https://www.conjur.com.br/2018-jul-24/arthur-farache-aspectos-juridicos-financiamento-litigios

Fernandes, R. V. C.; Mendes, D. B.; Ferreira, H. H.; Guedes, A. B. S., "Inteligência artificial (IA) aplicada ao direito: Como construímos a Dra. Luzia, a primeira plataforma do Brasil com *machine learning* utilizado sobre decisões judiciais". (ed.) Fernandes, R. V. C.; Costa, H. A.; Carvalho, A. G. P., *Tecnologia Jurídica e Direito Digital: I CongressoInternacional de Direito e Tecnologia*, Forum, Belo Horizonte, 2017, pp. 39-68. (ISBN: 978-85-450-0453-0).

FT System. FT-100 FH: http://ftsistemas.com.br/en/

G1 Globo, "Carro autônomo já é realidade na USP de São Carlos", 2015. http://g1.globo.com/videos/v/carro-autonomo-ja-e-realidade-na-usp-de-sao-carlos/4554376/

G1 Globo, "USP faz teste inédito com carro sem motorista pelas ruas de São Carlos", 22 October 2013. http://g1.globo.com/sp/sao-carlos-regiao/noticia/2013/10/usp-faz-teste-inedito-com-carro-sem-motorista-pelas-ruas-de-sao-carlos.html.

Gallindo, Sergio Paulo, *BRASSCOM: 3º Seminário Brasscom Políticas Públicas & Negócios Abertura e Dados Setoriais*, 14 March 2018. https://brasscom.org.br/wp-content/uploads/2018/03/14-03-2018-PPN-2018-Sergio-Paulo-Gallindo-Abertura-e-Dados-Setoriais.pdf

Garcia-Navarro, Lulu, “Brazil: The land of many lawyers and very slow justice”, *NPR*, 5 November 2014. https://www.npr.org/sections/parallels/2014/11/05/359830235/brazil-the-land-of-many-lawyers-and-very-slow-justice

Gibney, Elizabeth, “Brazilian science paralysed by economic slump”, Nature, 30 September 2015. https://www.nature.com/news/brazilian-science-paralysed-by-economic-slump-1.18458

Griffiths, Sarah, “CrimeRadar is using machine learning to predict crime in Rio”. *Wired*, August 2016. https://www.wired.co.uk/article/crimeradar-rio-app-predict-crime

Haroldo - Robô do Consumidor: https://www.facebook.com/HaroldoBot/

High Performance Computing Lab (LCAD), “Intelligent Autonomous Robotic Automobile – IARA”, 17 March 2018. http://www.lcad.inf.ufes.br/wiki/index.php/IARA

High Performance Computing Lab (LCAD): http://www.lcad.inf.ufes.br/

http://amazing-drones.com/2018/08/14/successful-test-flight-for-the-ft-100fh/

http://www2.camara.leg.br/atividade-legislativa/comissoes/comissoes-permanentes/cctci/audiencias-publicas/2018/2018-10-16-ap-inteligencia-artificial/resultado-da-reuniao/view.

Human Rights Council (23th session), “Permanent Mission of Brazil to the United Nations Office and Other International Organization in Geneva, Brasil, 2013. http://www.stopkillerrobots.org/wp-content/uploads/2013/05/HRC_Brazil_09_30May2013.pdf

Human Rights Watch, “Statement by the Campaign to Stop Killer Robots to the Convention on Conventional Weapons Group of Governmental Experts on Lethal Autonomous Weapons Systems, Geneva”, 29 August 2018. https://www.hrw.org/news/2018/08/29/statement-campaign-stop-killer-robots-convention-conventional-weapons-group

Hurst: https://hurst.capital/

ICO Information Commissioner’s Office, *Guide to the General Data Protection Regulation (GDPR)*, https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/rights-related-to-automated-decision-making-including-profiling/

Institute of Technology and Society of Rio (ITS Rio). “Transparência e governança em algoritmos: Uestudo de casosobre o setor de agências de crédito” https://itsrio.org/wp-content/uploads/2017/05/algorithm-transparency-and-governance-pt-br.pdf

Instituto Brasileiro de Geografia e Estatística (IBGE), “Acesso à internet e televisão e posse de telefone celular móvel para uso pessoal”, *Pesquisa Nacional por Amostra de Domicílios Contínua*, 2016. https://biblioteca.ibge.gov.br/visualizacao/livros/liv101543.pdf

Instituto de Tecnologia e Sociedade do Rio (ITS Rio). “Inteligência Artificial: construindo uma agenda para garantir impactos positives”, 17 April 2018. https://feed.itsrio.org/intelig%C3%AAncia-artificial-construindo-uma-agenda-para-garantir-impactos-positivos-4e488da4c6ec

Instituto de Tecnologia e Sociedade do Rio (ITS Rio). https://itsrio.org/pt/institucional/

Instituto Igarapé, “RadarCrime”. https://rio.crimeradar.org/

Instituto Igarapé. “Radar Crime”. https://igarape.org.br/en/apps/crimeradar/

Instituto Igarapé. https://igarape.org.br/en/

International Committee of the Red Cross (ICRC), “Autonomous weapon systems: Technical, military, legal and humanitarian aspects. Expert meeting”, Geneva, March 2014, pp. 26-28.

Internet World Stats - Usage and Population Statistic, “Internet world users by language: Top 10 languages”, 31 December 2017. https://www.internetworldstats.com/stats7.htm

KPMG International, “Autonomous Vehicles Readiness Index: Assessing countries’ openness and preparedness for autonomous vehicles”, 2018. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2018/01/avri.pdf

Laboratório de Computação de Alto Desempenho (ICAD), 13 July 2017. http://www.lcad.inf.ufes.br/index.php?option=com_content&task=view&id=43&Itemid=66

Lawgorithm. http://www.lawgorithm.com.br

Legal Labs short video on Dra. Luiza. https://www.youtube.com/watch?v=X28pXZOthnY

Legal Labs: https://legalabs.com.br/

Lemos, Ronaldo, “Ninguém sabe como funciona o algoritmo do STF”, *Consultor Jurídico*, 6 February 2017. https://www.conjur.com.br/2017-fev-06/ronaldo-lemos-falta-auditabilidade-algoritmo-supremo

Leopoldo - Robô do Contribuinte: https://www.facebook.com/LeopoldoBot/

Magrani, Eduardo, *A internet das coisas*, FGV Editora, Rio de Janeiro, 2018. Araujo, Marcelo de. “O uso de inteligência artificial para a geração automatizada de textos acadêmicos: plágio ou meta-autoria?” *Logeion: Filosofia da Informação*, Vol. 3, No. 1, 2016, p. 89-107.

Medium Corporate. Bots Brazil. https://medium.com/botsbrasil

Milhorance, Flávia, “The apps that map violence – and keep Rio residents out of the crossfire”, *The Guardian*, April 2018. https://www.theguardian.com/cities/2018/apr/05/the-apps-that-map-violence-and-keep-rio-residents-out-of-the-crossfire

Miozzo, Julia, “‘Procon particular’: A partir de robô, empresa compra causa de consumidor e busca indenização”, InfoMoney, 27 April 2018. https://www.infomoney.com.br/minhas-financas/consumo/noticia/7392061/procon-particular-partir-robo-empresa-compra-causa-consumidor-busca-indenizacao

Monteiro, Renato Leite, “The new Brazilian General Data Protection Law – A detailed analysis”, *International Association of Privacy Professionals* (IAPP), 15 August 2018. https://iapp.org/news/a/the-new-brazilian-general-data-protection-law-a-detailed-analysis/

Nama: https://nama.ai/

O Sul, "A OAB criougrupo para regular o uso da inteligência artificial no exercício da lei", 3 July 2018. http://www.osul.com.br/a-ordem-dos-advogados-do-brasil-criou-um-grupo-para-regulamentar-o-uso-da-inteligencia-natural-no-exercicio-do-direito/

Oliveira, Marcos de, "Carro sem motorista Projetos brasileiros de veículos autônomos trazem contribuições para o futuro da mobilidade urbana", *Pesquisa FAPESP*, November 2013. http://revistapesquisa.fapesp.br/2013/11/18/carro-sem-motorista/

Ordem dos Advogados do Brasil (OAB), "Estatuto dos Advogados da OAB", 4 July 1994. http://www.oab.org.br/arquivos/pdf/LegislacaoOab/estatuto.pdf

Ordem dos Advogados do Brasil (OAB). "Quadro de Advogados regulares e recadastrados". http://www.oab.org.br/institucionalconselhofederal/quadroadvogados

Ordem dos Advogados do Brasil (OAB/PR), "OAB cria coordenação para discutir regulamentação do uso de inteligência artificial", 3 July 2018. https://www.oabpr.org.br/oab-cria-coordenacao-para-discutir-regulamentacao-do-uso-de-inteligencia-artificial/

Pinto, E. M., "Drone de alta tecnologia para apoio militar e civil é lançado em Botucatu", Plano Brasil: Defesa e Geopolítica, 1 July 2016. http://www.planobrazil.com/drone-de-alta-tecnologia-para-apoio-militar-e-civil-e-lancado-em-botucatu/

Possebon, Samuel, "Contra 'industrialização' do direito: OAB cria coordenação de inteligência artificial", *TI Inside Online*, 29 June 2018. http://tiinside.com.br/tiinside/home/internet/29/06/2018/contra-industrializacao-do-direito-oab-cria-coordenacao-de-inteligencia-artificial/

Radar do Futuro, "Inteligência artificial no direito: OAB avalia os impactos", 14 July 2018. https://radardofuturo.com.br/a-inteligencia-artificial-no-direito/

Rafale High Performance (blog), "Drones militares: saiba como eles são usados pelo Exército Brasileiro", 21 June 2018. http://blog.rafalecalcados.com.br/drones-militares-como-sao-usados/

São Paulo [Government of the state of São Paulo], "Poupinha: mais de 13 milhões de mensagens enviadas e recebidas", 10 May 2017. http://www.saopaulo.sp.gov.br/spnoticias/robozinho-poupatempo-mais-de-13-milhoes-de-mensagens-enviadas-e-recebidas/

Supremo Tribunal Federal (STF). "Inteligência artificial vai agilizar a tramitação de processos no STF", *Notícias STF*, 30 May 2018. http://www.stf.jus.br/portal/cms/verNoticiaDetalhe.asp?idConteudo=380038

Teixeira, Matheus, "OAB cria coordenação de inteligência artificial para regulamentar tema", *Jota*, 5 July 2018. https://www.jota.info/jotinhas/oab-inteligencia-artificial-de-robo-polemica-05072018

The Economist, "Humans may not always grasp why AIs act. Don't panic", 15 February 2018. https://www.economist.com/leaders/2018/02/15/humans-may-not-always-grasp-why-ais-act-dont-panic

Valentina - Robô do Trabalhador.https://www.facebook.com/ValentinaRoboDoTrabalhador/