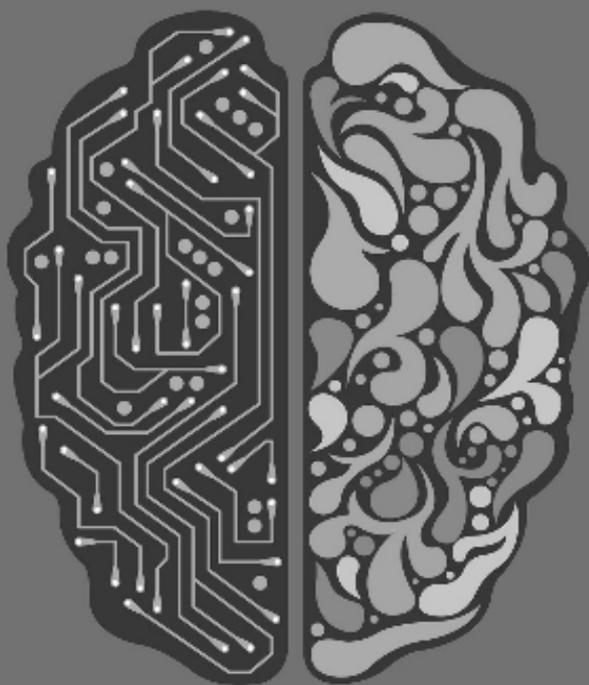


IP and Artificial Intelligence Information Note

I?OS

INTELLECTUAL PROPERTY
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AI SINGAPORE



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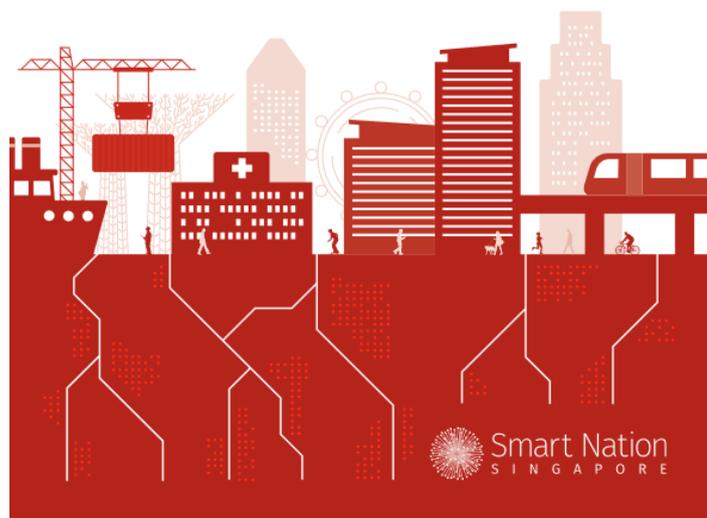
Introduction

Singapore's National Artificial Intelligence (AI) Strategy

The Singapore National AI Strategy ("NAIS") was launched in November 2019, with the objective of building Singapore as a global hub for developing, test-bedding, deploying and scaling AI solutions. The NAIS also maps out how Singapore can develop and use AI innovations to transform our economy and improve the lives of citizens.



The NAIS recognises the crucial role of the **intellectual property ("IP")** regime.¹ The IP regime is a critical enabler of AI innovation as it allows innovators and creators to protect their competitive advantage, and maximise returns from their investments. Innovators often need to rely on a combination of different IP rights to secure meaningful protection for their AI inventions, as well as elements such as data or algorithms that support these inventions. They also need a clear and effective IP strategy to successfully deploy and scale their AI solutions, particularly internationally.



The Intellectual Property Office of Singapore ("IPOS") supports the objective and implementation of the NAIS. Looking ahead, IPOS ensures that our IP regime, expertise and networks will be able to support and drive Singapore's future growth as a hub for AI solutions.

Purpose of information note

This information note explains the key IP issues that AI innovators should be aware of, and provides an overview of how different types of IP rights can be used to protect different AI inventions. It also describes various initiatives that IPOS has to support AI innovators on their journey.

¹ See in particular Key Thrust 4.2: Provide a top-class IP regime and accelerated patent initiatives for AI.

Section 1: Patents

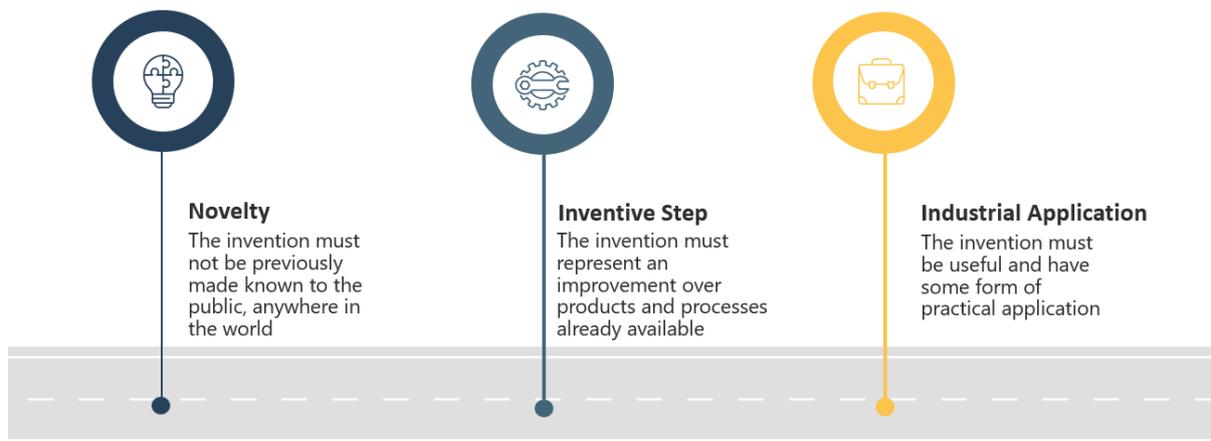
What are patents?

Patents are rights granted for an invention, which can be a product or a process. This could be, for example, a smartphone that makes use of AI. Patent protection can be in force for up to 20 years from the date of filing. During the time the patent is in force, the patent holder can stop others from, among other things, making, selling, or using the patented product, or using the patented process.² As a result, the patent holder can better protect their competitive advantage in the marketplace. In return, the patent applicant must disclose their invention to the public, in a manner that allows the invention to be reproduced by someone familiar with the relevant field of technology.³

Obtaining a patent

Preparing a patent application can be technically and procedurally complex. Applicants are strongly encouraged to engage the services of a registered Patent Agent to assist with the process. The Register of Patent Agents can be found on IPOS' website at <https://ipos.gov.sg/resources/patent-agent>.⁴ Figure 1 outlines the three criteria applications must satisfy in order to have patent protection granted:

Figure 1: Criteria for Patent Eligibility



See **Box 1** for an example of an AI invention developed in Singapore, which is protected by a patent.

² Certain acts will not be considered infringement – for example, an act done privately and for non-commercial purposes, or using a patented product which has been produced by or with the consent of the patent holder. See Section 66(2) of the Patents Act for more information.

³ In the context of an AI invention, if the invention cannot be performed without the specific details of the algorithm or training dataset, such details would need to be disclosed in the patent application. Chapter 5F (“Sufficiency of disclosure”) of the Examination Guidelines for Patent Applications at IPOS (accessible at ipos.gov.sg/resources/patent) contains more information.

⁴ Professional fees for engaging a patent agent range from \$10,000 to \$30,000. The list of official fees (i.e. fees paid to IPOS) can be found on IPOS' website ipos.gov.sg/resources/patent, under “Forms and Fees for Filing in Singapore”.

Box 1

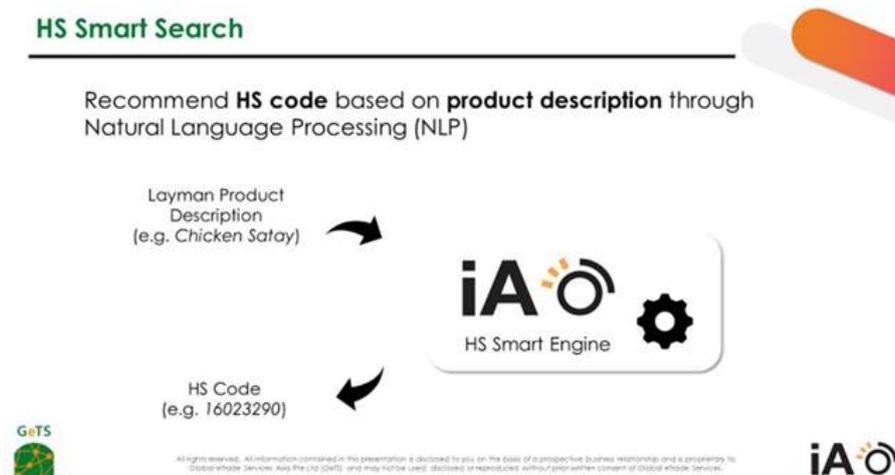


CrimsonLogic's Patent on Customs Tariff Code Classification Tool

The Harmonised Commodity Description and Coding System, or Harmonised System (“HS”) for short, is an international classification of goods developed by the World Customs Organisation (“WCO”). It is most commonly encountered and used by businesses dealing with cross-border trade. While most countries adopt the international HS classification, they also include additional suffixes that are specific to their own use. Businesses would have to identify the unique 8 to 13 digit HS code, that vary from one country to another, for each of the goods they handle for import and export.

Unfortunately, the process of selecting the appropriate HS code for each good, by referring to lengthy Code Descriptions armed with just the brand name or a description of the product, can be challenging especially for the layperson.

To address this, CrimsonLogic has developed a software that allows users to simply input the product description they are familiar with, and retrieve the appropriate HS code recommended by the software.



Application of AI

CrimsonLogic's search engine software uses a neural network to make HS code recommendations, based on historical data. Other AI tools used by the software include machine learning, natural language processing, and Exploratory Data Analysis. The AI model has been trained with a large set of data and is not only useful in Singapore – the same engine can provide the HS codes for more than 180 countries. The invention is protected by a patent in Singapore (“Customs Tariff Code Classification”; patent number 11201702192T).

HS Smart Search is incorporated in one of CrimsonLogic's key product offerings – CALISTA Intelligent Advisory (“CIA”). CIA can be used to obtain insights on freight options, free trade agreements, import/export formalities, and other value-added services. Today, CIA is used by customers in global supply chain management worldwide, from ASEAN, Japan, to Trinidad and Tobago.

However, not all inventions are eligible for patent protection (even if they meet the three key criteria above). For instance, mathematical methods i.e. algorithms *per se* are not considered to be inventions. On the other hand, where the patent application relates to the application of a machine learning method to solve a specific problem in a manner that goes beyond the underlying mathematical method, the application could be regarded as an invention.⁵ For example, solving a generic problem such as using the method in controlling a system is unlikely to cross the threshold; the application must be a specific one, such as using the method in controlling the navigation of an autonomous vehicle.

It is also possible to seek patent protection for certain aspects of electronic databases, if they satisfy the patentability criteria above. For instance, a potentially patentable invention could be a software that enables users to define, create, maintain, and control access to the database. Such an invention could be protected by a software patent with claims over the schema, structure of tables and relationships between tables. However, the patent would not cover the actual data *per se*.

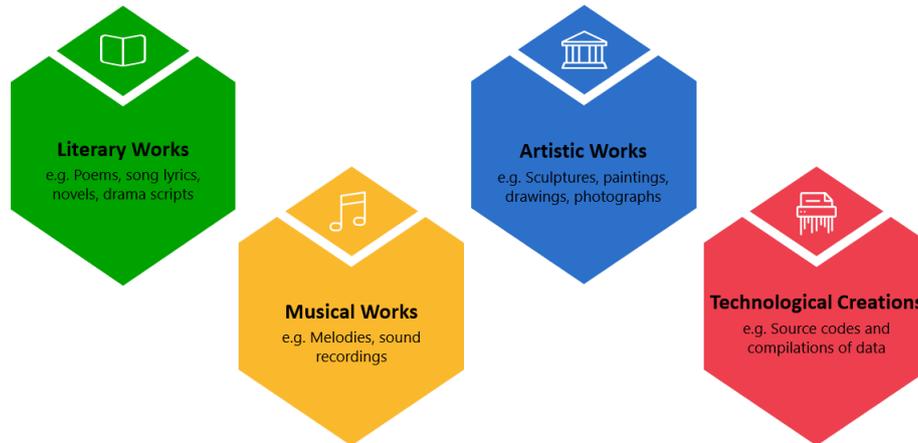
⁵ To understand more, please refer to paras 8.22 to 8.27 (“Artificial intelligence and machine learning”) of the Examination Guidelines for Patent Applications at IPOS (accessible at [ipos.gov.sg/resources/patent](https://www.ipos.gov.sg/resources/patent)).

Section 2: Copyright

What is copyright?

Copyright protects the expression of ideas – ideas alone cannot be protected. Copyright owners have the exclusive right to control specific uses of their works for a limited period of time.⁶ **Figure 2** outlines some types of content that can be protected by copyright (the list is non-exhaustive):

Figure 2: What can be Protected by Copyright?



How is copyright protection relevant to AI?

In the realm of AI, source codes and AI algorithms may be protected by copyright.

In addition, copyright also protects compilations of data (including databases). Copyright would protect such compilations if there is sufficient originality in the selection and/or arrangement of the data in the compilation. However, the copyright owner's monopoly does not extend to the data contained in the compilation, which may be freely used by other AI innovators.

How can an inventor protect a work using copyright?

For a work to be protected by copyright in Singapore, it must be original. A creator automatically enjoys copyright protection as soon as they create and express their work in a tangible form, without any need for registration of the work.⁷

⁶ The term of copyright protection depends on the subject matter. For example, for a literary work, copyright expires 70 years after the death of the author.

⁷ Refer to Section 27 of the Copyright Act for requirements for copyright to subsist in works.

AI Innovation and the Singapore Copyright Review

The Singapore Copyright Review Report was released in January 2019.⁸ Of interest to AI innovators may be *Proposal 8: Facilitating Uses of Works for Text and Data Mining*. To catalyse innovation and provide certainty for inventors seeking to use data in their AI machines, an exception has been proposed for copyrighted works, solely for the purpose of data analysis (regardless of whether commercial or non-commercial). This text and data mining exception will allow those in the AI community who engage in data analysis to do so without the fear of possible infringement curtailing the scope of their work.

To strike a balance, this exception is accompanied by safeguards for rights holders' interests. The user of the works must have lawful access to the works, and must not further distribute the works to those without lawful access. Rights holders may also implement security measures to maintain the security and stability of their network or system.



⁸ Ministry of Law and the Intellectual Property Office of Singapore, "Singapore Copyright Review Report". Issued 17 January 2019.

Section 3: Trade Secrets and Confidential Information

What is confidential information?

Confidential information refers to non-trivial, technical, commercial or personal information, which is not known to the public but is private to the company or individual who possesses that confidential information. “Trade secrets” is usually used to describe such information with commercial value. Unlike a patent, no application or registration is required for the protection of confidential information.

A person with access to confidential information is generally required under the law to keep it confidential and not disclose it. If they do so, they would be liable to legal action. **Figure 3** outlines a few common ways by which your organisation can secure confidential information.

Figure 3: Protecting Confidential Information



Protecting AI inventions with patents or as confidential information

It is not possible to simultaneously obtain a patent and ensure non-disclosure of an invention – the act of filing a patent requires the invention to be disclosed. Deciding on the appropriate strategy for IP protection therefore depends on the business strategy and nature of the invention. Below are just two considerations to bear in mind:⁹

- a) **Does my invention constitute patentable subject matter?** Not all AI “inventions” are considered patentable subject matter. If a patent application is filed and published but is subsequently deemed non-patentable, the invention has come into the public domain and as a result is not considered confidential information.
- b) **Is my invention likely to be found in the public domain soon?** If the particular AI innovation is likely to be made public soon, or can be easily derived by others (for example through reverse-engineering), protection under the patent regime may be preferred.

⁹ The list is non-exhaustive.

Section 4: Open Source Software

What is open source software (OSS)?

Unlike proprietary software, OSS is software for which the source code is made legally available for people to use, change, and/or share with others through the terms of a licence (i.e. a set of permissions issued by the software owner). There are generally no restrictions on the purposes, duration, or number of users, but there may be other restrictions on use typically concerned with ensuring that the source code to any modifications or enhancements is also released where the modified or enhanced software is distributed to the public.

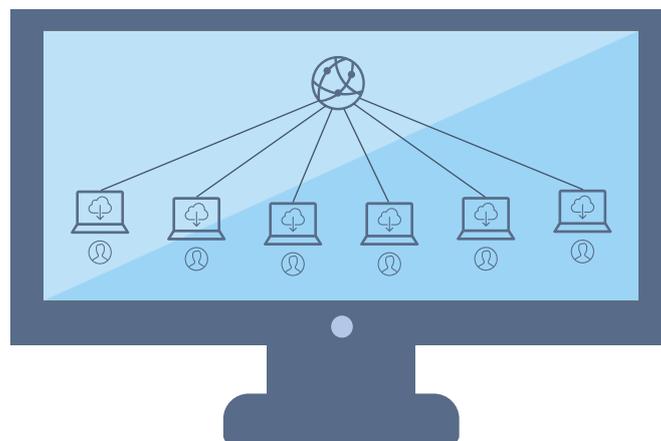
Some reasons why businesses opt for OSS include:

- a) Typically free-to-use
- b) Access to regular community updates
- c) Avoid vendor lock-in

Types of OSS licences

Although licensees may deal with the licensed OSS according to the OSS licence terms, the licensor continues to own the licensed software and any underlying patent or other IP rights. Use of the licensed OSS outside the scope of permission granted under the OSS licence terms is a breach of the licence, as well as copyright infringement. Such unauthorised use could also amount to patent infringement if rights to the underlying patented invention are infringed. The label “OSS licence” covers a whole spectrum of licence types, from the more permissive ones to the most restrictive ones.

Hence, it is important to check the licence terms to ensure that you are complying with the licence terms while being mindful that there is usually no absolute freedom of use. Permissive licences have the least restrictions, beyond some minimal obligations such as requiring licensees to display a copy of the copyright notice and licence terms. On the other hand, restrictive licences have the most conditions, such as requiring licensees to re-distribute the software containing the OSS-licensed source code on the same terms as the licensed OSS i.e. to make derivative works similarly open source.



AI and OSS licences

Many of the AI products and solutions today use OSS tools and frameworks such as Python, Scikit-Learn, Tensorflow and PyTorch. Tensorflow, for example, is an OSS library developed by Google that helps in the development and training of machine learning models. It is released under the Apache 2.0 OSS licence, which is an example of a permissive OSS licence that allows product developers to freely commercially use, modify, distribute and sublicense its source code without requiring the developers to contribute their own derivative works and modifications to the open source community under the same licence terms. This approach results in both rapid development of software products and solutions, as well as mass adoption of the tool by the open source community.

Other permissive OSS licences are MIT or BSD licences, which also do not require product developers to contribute their own derivative works and modifications to the open source community under the same OSS licence terms.

However, almost all open source licences require a preservation of copyright notices. So it is not the intent of open source licensing to extinguish the subsistence of copyright in the tool or framework being distributed under such licences.

At the opposite end are the “copyleft” OSS licences, of which the GPL series is an example. In contrast to permissive OSS licences, such OSS licences require developers to contribute their own modified work back to the open source community under the same OSS licence terms. Thus, such developer created works are required to be contributed back to the open source community and made available to be used by anyone under the same OSS licence terms. This is by virtue of such developer created works being derived from or being modifications of originally “copyleft” OSS licensed software.

Another issue to be mindful of is patents. An OSS or the underlying inventions around the OSS could also be the subject of patent rights. The OSS licence may permit use of the copyrighted software only, but not the underlying patent. In such situations, software developers who are unaware of the underlying patent rights relating to the OSS could inadvertently infringe such rights by dealing in products incorporating such OSS. The users and others who may wish to commercially exploit such products should be mindful of this and obtain the necessary rights to use and commercially exploit such products. However, some OSS licences (e.g. Apache 2.0, GPL v2) include express or implicit grants of patent licences to protect users of the OSS or the people they redistribute copies to, from being sued for patent infringement. If you use OSS with your patented software, you may be granting a patent licence to others as well, so you should read the terms of the OSS licence carefully before using it with your patented software.

In summary, there is a broad range of different OSS licence terms. Whether and how the IP behind an AI product or solution leverages different OSS licences really depends on the goal of the developer, the purpose of the distribution of the AI product and other considerations such as funding obligations which the developer may have with a funding organisation.

Section 5: Support for AI Innovation

Accelerating patent protection in Singapore and overseas

An early patent grant provides business certainty and facilitates activities such as negotiating licensing agreements and securing investments. To this end, IPOS has a range of programmes that allow AI innovators to accelerate patent protection, in Singapore and abroad.¹⁰

In May 2020, IPOS built on the FinTech Fast Track (FTFT) and Accelerated Initiative for Artificial Intelligence (AI²)¹¹ to launch the **SG Patent Fast Track Pilot Programme**. Under the programme, patent applications in all fields of technology that are first filed in Singapore can be granted in as fast as six months.¹² In September 2020, the programme was expanded to include the acceleration of related trade mark and registered design applications, and renamed the **SG IP Fast Track (“SG IP FAST”)**.

Applicants may use their Singapore patent application to expedite the pathway to protection in more than 30 other jurisdictions through IPOS’ network of work-sharing agreements –

- a) The **ASEAN Patent Examination Cooperation (“ASPEC”)** programme, which allows patent applications to be accelerated in eight other ASEAN countries. In addition, AI inventions are eligible for the ASPEC Acceleration for Industry 4.0 Infrastructure and **Manufacturing (“ASPEC AIM”)** initiative, under which the patent offices in the other ASEAN countries relying on the Singapore report are committed to responding within six months.
- b) **Bilateral Patent Prosecution Highways (“PPH”)** with the European Patent Office and patent offices in China, Mexico, and Brazil.
- c) The **Global PPH** network, which covers more than 20 other jurisdictions including key markets like the US, Japan, and Korea.¹³



¹⁰ IP rights, including patents, are territorial. This means that if an inventor wants their creation to be protected in multiple jurisdictions, they would need to apply for patents in each of those jurisdictions.

¹¹ The FinTech Fast Track and Accelerated Initiative for Artificial Intelligence were technology-specific acceleration schemes launched in 2018 and 2019 respectively.

¹² Currently, there is a cap of five patent applications a month on SG IP FAST, and applicants are limited to 10 accelerated patent applications a year.

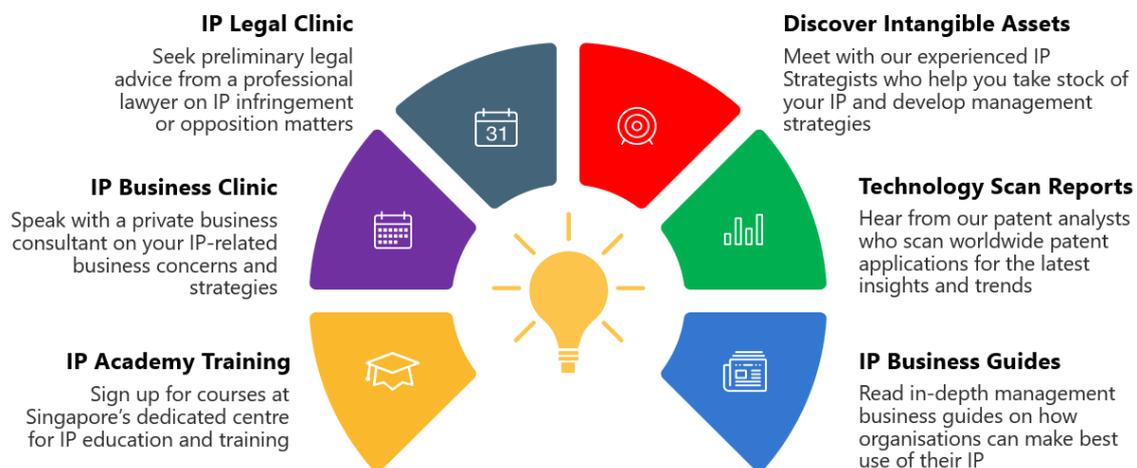
¹³ More information on acceleration programmes can be found on IPOS’ website at ipos.gov.sg/protecting-your-ideas/patent/application-process/accelerated-programmes.

IP Clinics and IPOS International Pte Ltd

AI innovators and businesses may require assistance to better understand the IP system, and how IP protection and management can support their business goals. IPOS and its subsidiary, IPOS International Pte Ltd, can help innovators better understand the IP application process and their intangible assets, and develop effective IP strategies.

Figure 4 outlines some of the resources that IPOS has to support businesses in better understanding and leveraging IP.

Figure 4: IPOS Family Resources



Find out more about our IP legal and business clinics at <https://www.ipos.gov.sg/e-services> and other IPOS International resources at <https://iposinternational.com/insights>.

Other Useful Information

AI businesses and innovators can find useful information on the various initiatives and activities at AI Singapore ("AISG"), a national AI programme launched by the National Research Foundation, at the following links:

- AISG website: <https://www.aisingapore.org>
- AI Makerspace: <https://makerspace.aisingapore.org>
- Facebook Group: <https://www.facebook.com/groups/aisingapore>
- LinkedIn: <https://sg.linkedin.com/company/aisingapore>