Limboid LLC

Business Plan

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Background: Accelerating technological evolution

The endless evolution of artificial intelligence (AI) penetrates numerous industries. Deep neural networks design novel pharmaceuticals. Neurosymbolic AI systems traffic the backbone of Internet activity. Billion-parameter language models and deepfake generators synthesize ultra-realistic content in milliseconds. Appropriately tuned and trained, machine learning has proven its ability to master nearly every problem domain. With dozens of AI-related papers published every day -- including defining accomplishments for the scientific community and larger globalized society as a whole -- a contemporary attitude is expressed that no problem exists outside the application space of artificial intelligence and that by its continued evolution, humans may soon witness the realization of AI systems capable of operating completely independent of humans often identified as 'human-level AI' or 'Artificial General Intelligence'.

Still, much accomplishment remains between that ambitious goal and present state of the art. For instance, state-of-the-art deep neural networks today are still relatively hardwired considering that they have to be hand fed datasets, explicitly trained, and operate under an economic fitness landscape that does not always align with their training objective. In short, AI has significant progress to make, and even at the iteration speed of an expert research team with high end equipment, there are just too many accidental and essential complexities, and not enough automation driving its evolution from end-to-end. Approaching and surpassing that rate-limiting bar of human research and development demands liberating as many aspects of the AI development cycle as possible to autonomous control.

Similar technological momentum is accelerating in the robotics industry. The mechanical man has been a dream of thousands -- perhaps millions -- of engineers, businessmen, writers, and philosophers, yet only recently have industry plans, competition, and demand converged to make the humanoid robot a serious engineering goal. Boston Dynamics develops humanoid robots that can perform acrobatics and heavy lifting activities. Agility Robotics produces a limited dexterity humanoid robot called Digit that can perform warehousing and last-mile logistics operations. Elon Musk has stated that a prototype of the Tesla Bot Optimus will be revealed by this year. He states this 5' 8" humanoid robot will help "performing tasks that are unsafe, repetitive or boring".

There is strong motivation to develop human-level artificial intelligence along with a robot to assist in the broad spectrum of presently human tasks including motivation stemming from: labor shortage problems, performing dirty, dangerous, or demeaning activities, automating repetitive work, and accelerating the rate of economic activity. Highly advanced AI and humanoid robots will likely introduce entirely new industries, business paradigms, and fundamentally change the average human's experience. Still, all research to date has only produced pieces of human-level AI, exorbitantly-priced humanoid robots, or otherwise limited systems. We believe the time is right to enter the AI, robotics, and service industries with 4 revolutionary products and services.

4 Revolutionary Products & Services

Following is a declarative description of the 4 revolutionary products and services that Limboid LLC is currently developing.

Computatrum

The Computatrum is an autonomous machine learning system with human-level intellectual mastery over a broad domain of computer interaction tasks. This program interacts with its host computer using standard peripherals (keyboard, mouse, display, speaker) to execute task instructions. Users can specify abstract commands (such as “Book the cheapest flight from San Antonio to Dallas”) or fine granularity instructions (such as “Click that button. Then go to github and enter the information you saw in the issue.”) using any combination of text, voice, video, or demonstration. Computatra (plural of Computatrum) are fine-tuned on a variety of application domains including internet research, business intelligence, automation, programming, social media communication, creative applications, and general human information tasks, and third parties can fine-tune it on their own application domains.

Computatrum is available as an on-demand web service allowing users to interact with Computatra through their browser and as a standalone desktop, mobile, or server application on Windows, macOS, Linux, and Android OS.

I❤️U

I❤️U is a disruptively-cutting-edge on-demand artificial general intelligence web service marketed at medium-skill general information problem domains. Clients specify their task using any combination of text, images, audio, video, or other un/structured data from files, sensors, and actuators and receive an intelligent response from the I❤️U server. Example tasks are: “Given the attached employee records, make payroll computations and prepare the appropriate tax documents <employee records attached>”, “Maximize factory profit <sensor input and actuator output history included>”, and “Design an automobile engine that meets these given requirements: <requirements document attached>”.

Limboid

The Limboid is an earthshaking humanoid robot. Limboids possess human-comparable size, strength, agility, and dexterity allowing them to serve a broad range of industries including customer service, retail, contract work, social work, counseling, healthcare, teaching, research, information technology, fine arts, security, supervision, transportation, agriculture, manufacturing, construction, mining, and general dirty, dangerous, demeaning, or otherwise labor intensive work. The Limboid is produced with less than $200 of materials, and Limboids are capable of reproduction.

BoidNet

The Limboid Network or BoidNet is an on-demand Limboid-as-a-service offering. The BoidNet consists of a distributed, decentralized network of limboid robots that roam public spaces. Humans submit a request to reserve the next available Limboid robot and pay the robot on work completion. We aim to provide Limboid service within 15 minutes of a booking in urban centers and serve users for up to 24 hours consecutively. This service will initially be offered in select cities and later spread throughout the continental United States.

Competitive Advantages

Limboid LLC does not aim to directly compete with high-end robotics companies like the aforementioned. Rather it aims to deliver reasonable quality robotic performance at a much lower price then competitors. The Limboid robot will be sold for $200. Limboid LLC believes they will be at the production phase by this Summer 2022. By quickly entering the market with a reasonable quality, unrivaled, and revolutionary product, Limboid LLC plans to saturate the humanoid robotics market early.

Many existing humanoid robots are extremely expensive in part because they use costly electric motors and the drivers they require. The Limboid utilizes a low-pressure water hydraulic system to power its humanoid robot at a fraction of the cost of traditional electric motor approaches.

Regulations

Machine learning systems are subject to increasing privacy regulations. Limboid LLC will not only stay up-to-date on the latest laws and regulations and operate within the limits they prescribe but also become an ethical leader in the Machine Learning space by voluntarily constraining its own activity to and clarifying for all actors a core set of ethically acceptable standards of conduct.

Limboid robotics equipment only uses electronic components that are already compliant with federal electromagnetic emissions requirements. Hydraulic and pneumatic components used never exceed 120 psi of operating pressure.

Artificial general intelligence and humanoid robots under its control pose that disruptive technological impact on the world. Nonetheless, this technology is already on the cusp of emergence and limboid LLC believes its open source, low cost business strategy introduces these technologies with the greatest equality and least monopolizing potential. Some researchers express concern that highly advanced artificial intelligence might intentionally or unintentionally behave in dangerous ways. Anomaly detection, semantic categorization, and other deep learning techniques will be employed to monitor and mitigate biased, misleading, dangerous, and other harmful content produced by I❤️U. Additionally, the artificial intelligence systems's name I❤️U is chosen to nurture positive public perception of the system's social impact.

Marketing & Sales

Limboid LLC basically exploits a freemium subscription-based revenue model.

Computatrum

General purpose computatra code and parameters are permissively-licensed and open sourced. Computatra trained for specific applications are not open-sourced but are available for use along with open sourced Computatrum models on a per-second billing basis through a managed Computatrum software-as-a-service offered at a rate around $1.00 per hour and automatically adjusted daily in anticipation of market demand and compute overhead. Limboid LLC will host competitions to train Computatra for specific applications to incentivize third-party Computatra development.

I❤️U

I❤️U is marketed as on-demand intelligence-as-a-service. Pricing is automatically adjusted to account for task complexity, fluctuating compute provider costs, client reputation, and speed, quality, and privacy requirements. Limboid LLC aims to service a request such as the above payroll computation example in under $1.00 and 60 seconds. A user friendly web interface and developer friendly APIs in multiple programming languages are made to encourage I❤️U use.

Limboid

Limboid robots cost less than $200 to manufacture, and are sold as a one-time purchase or through the BoidNet at an hourly rate. Limboids require a connection to I❤️U to operate, and customers are offered a monthly or yearly subscription sale on this service when purchasing or renting a Limboid. A penetration pricing strategy is employed for Limboid robots. One-time purchase costs are priced just high enough to cover production and shipping costs in order to accelerate market penetration and build customer loyalty. In the future, Limboid LLC may offer Limboids at an even lower price or free. On the other hand, the accompanying subscription to I❤️U that every Limboid needs to operate will be priced around $1.00 per hour and provides the majority of revenue.

BoidNet

On-demand robotic labor introduces a radical paradigm shift to the service industry. For example, BoidNet will be marketed in the service industry for handling traffic surges. It will also be marketed to government agencies for disaster response work. The Limboid Network service has no upfront fees and we aim to initially provide it at around $1.00 per hour.

General Marketing

Limboid LLC believes much appreciation for artificial intelligence and humanoid robots has already been cultivated via science fiction and popular media. Therefore, little operating funds will be dedicated to advertising. However to raise awareness for the existence, practical

application, and benefits of its revolutionary products and services and prevent them from being overlooked as merely toys for high-class individuals, unoccupied Limboids on the BoidNet will be tasked to perform ordinary errands in major pedestrian hubs throughout the United States wearing clothing that indicates the product's affordable price and the company website. It is predicted that bystanders will interact with and promote the Limboids via their personal social media accounts.

Operations

Limboid LLC's managed Computatrum software-as-a-service and the I❤️U a web service both run distributedly across AWS, GCP, and Azure cloud providers. As a whole, the web service is architected for 99.999% availability -- or less than 6 minutes of downtime each year. Once stable development versions are reached, little maintenance will be required to operate them. Charges incurred by client requests are automatically billed through the Stripe payment handler, and user support is provided by I❤️U and fine-tuned Computatra.

Limboid robots are primarily manufactured by Limboid LLC. The Limboid is primarily constructed from commodity hardware. Necessary manufacturing operations are sawing, drilling, sewing, heat gun welding, and assembly. These simple, inexpensive techniques allow Limboids to be used in their own production. Two exceptions are fabricating the PCB's and injection molding which are both outsourced to third-party manufacturers. The primary capital needed to produce Limboids are basic shop equipment, floor space, and human / limboid capital.

The Limboid Network will initially deploy 1,000 Limboids at major population hubs. Selection criteria include: publicity, human employment rates, historical limboid network usage rates, time of year, and local government regulation.

Projected Costs & Returns

As of February 14, 2022, Limboid LLC is actively developing the Computatrum, I❤️U, and Limboid. Please see the Appendix for pictures and detailed descriptions of the current state of progress. Development is expected to continue into April before realizing a production-ready version of Computatrum. I❤️U and the Limboid are projected to reach release status this Summer. All three products and services will begin commercial sales this Summer.

Around $5,000 will be spent on filing necessary paperwork to establish legal status in all 50 States. Initial revenue will be spent on registering and obtaining legal business status in the United Kingdom, Canada, Australia, and other countries . All commerce will take place online and purchasing and shipping will be managed by a third party enabling Limboid LLC to effectively sell products to customers all over the world.

Software development and ML training costs are not expected to exceed $500. The Limboid is currently being developed on personal property and will initially be produced in a

factory space rented for $5,000 per month or less. 3D printing will substitute injection molding until enough revenue is acquired to make initial investments on injection molding equipment.

It is difficult to accurately estimate the adoption rate of disruptive technology such as Limboid LLC's revolutionary products and services. However as a lower bound estimate, Limboid LLC aims within the first month of selling to achieve a minimum of 1000 hours spent running managed computatra, 100 Limboids with accompanying I❤️U monthly subscriptions and an average of 100 active hours monthly, and 1,000 invocations to I❤️U at an average rate of $1 per minute for 1 minute. Multiplied and added, this gives 1000 hours computatra usage × $1/hour + 100 Limboids × $1/hour × 100 hours × 1,000 I❤️U invocations × 1 minute / invokation × $1/minute = $12,000 of income in the first month. In this scenario, subscriptions packaged with the Limboid are the greatest selling point. After breaking even, profit will primarily be spent on expanding production and training larger machine learning models.

Limboid LLC will start repaying its startup loans as soon as it starts making profit. As a standard policy, shareholders will be given a 5% dividend every fiscal quarter. Limboid LLC will incorporate as a publicly traded company once it receives a market evaluation exceeding $100 million or by the majority vote of the board of directors. Existing private ownership will be transferred to equivalently valued publicly tradable stock. Regardless of its private / public trading status, Limboid LLC will hold to the generally accepted accounting principles in providing consistent information to its investors, creditors, shareholders, regulators, and tax authorities.

Structure

Limboid LLC is an LLC filed in Texas. It adopts the usual privately-traded corporate structure. Private shareholders trade stock and vote on board members who consider shareholder votes in deciding regulatory policy. Board members also vote the CEO into office. Shareholder votes are weighted by share ownership and board votes are weighted equally. The CEO serves as the LLC's Organizer and makes final executive decisions for the company. Internally, the company adopts an agile, lean, low-human organizational architecture. Employee hierarchy is flat and project-specific roles and working groups are dynamically formed or adjusted on a case-by-case basis keeping internal managerial paperwork to a minimum. Most essential intellectual capital needed to operate the company comes from I❤️U. As an exception, the board rather than the CEO has final authority over decisions made by I❤️U. Currently, the founder, Jacob Valdez, serves as Limboid LLC's Organizer, chairs the board, and owns all private equity.

Future of Limboid LLC

Limboid LLC aims to establish itself as a thought leader in the emerging artificial general intelligence and humanoid robotics space.

Most designs, code, parameters, and other intellectual resources needed to replicate its technology are permissively licensed and openly published to promote third-party interest in expanding its ecosystem.

Proposal

Limboid LLC seeks a one time $15k loan from the Texas Business Hall of Fame investors to finance its R&D for an MVP, cover necessary startup fees, and start production. Limboid LLC promises a $10,000 return on investment within the next year and the remaining repaid with interest in 2024. Join us in developing the future!

Appendix A1: State of Limboid robot development

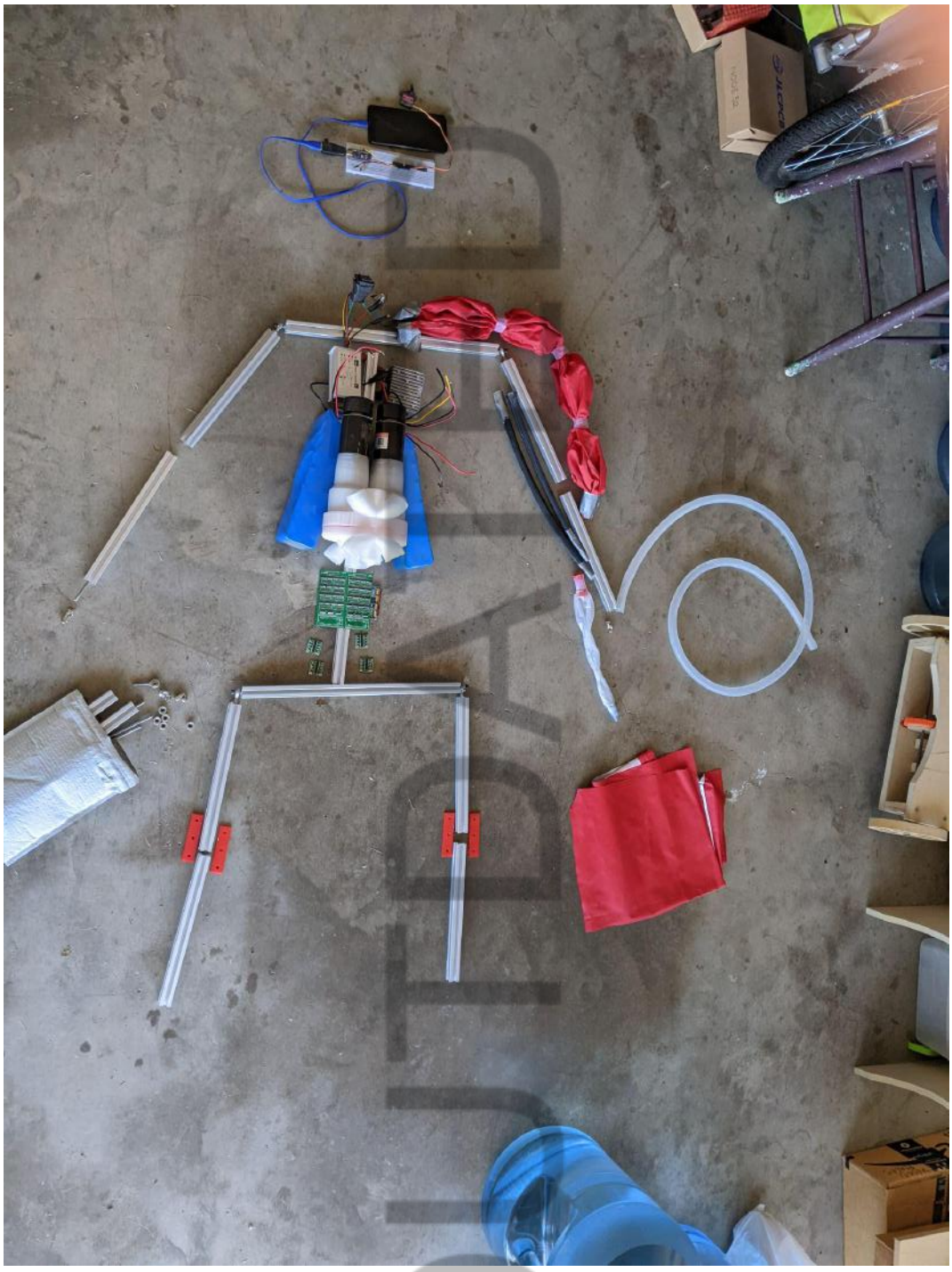
Following are photos showcasing the current state of Limboid robot development. All of the following designs depicted are copyrighted material by Limboid LLC 2019, 2021, and 2022.

node8 and node32 PCBs for controlling the hydraulic valves. Each PCB costs less than $1 to fabricate, including its IC's. A node8 PCB can drive servo valves for up to 8 muscles. A node32 PCB can control up to 32 muscles and scan across 32 analog inputs.

Prime mover motor (to left), chamber cavity exposed (top right), and assembled unit (bottom)

An example hip joint assembled from commodity hardware.

Demonstration of small and large hydraulic artificial muscles contracting.



Layout showing the robot's basic architecture: skeleton assembled from easily reconfigurable aluminum V-slots hydraulic artificial muscles providing contractile force between articulating limbs, node8 and node32 chips placed where they will be connected with valve manifolds, lipo battery packs, the prime mover, and other vital organs situated in the chest cavity, an android running AInimal 🐶 Leash which interfaces with the peripheral electrical system.

Appendix A2: Key open source repositories in the Artificial Ecosystem.

Limboid LLc actively promotes third-party contributions to its code by itself making contributions to the open source developer ecosystem. It maintains a container repository "the Artificial Ecosystem" (https://github.com/limboid/the-artificial-ecosystem) consisting of critical codebases for its products and general ML work. All repositories listed are published under the MIT license.

- **Modalities**: Python and JavaScript libraries that define a minimum set of primitives for building modality agnostic models and training pipelines. Repo: https://github.com/Limboid/modalities
- **MultiparadigmNet** (**MPNet**): Deep learning architecture and framework for building massively integrated sparse and recurrent neural networks with cyclic topology. Trains networks using combination of supervised/self-supervised/unsupervised/reinforcement, continual, open-ended, multiagent learning with several optimizations for compute efficiency and speed. Repo: https://github.com/Limboid/mpnet
- **Multi-Agent Network** (**MAN**): Framework for orchestrating networks of specialized and general-purpose deep learning agents including MPNets. Exposes an iterative sparse update architecture with agent modalities labeled and connections learned automatically. Provides convenience functions to succinctly define multiple views of a model so that it can reduce several training steps for supervised, unsupervised, reinforcement, etc. learning into a single backpropagation pass. Also extends several standardized ML model interfaces allowing ML practitioners and artificial general intelligences to efficiently capitalize on the millions of hours already poured into existing foundation models. Repo: https://github.com/Limboid/man
- **ComputerEnv**: Python library that allows ML agents to interact with a local computer or remote VNC server using standard input and output peripherals (keyboard, mouse, display, speaker). The compute environment can also be containerized and internet access can optionally be enabled. Repo: https://github.com/Limboid/computer-env
- **The Artificial Experience**: Library to facilitate training and evaluating models, optimizers, pipelines, and training paradigms across dozens of tasks, domains, dataset loaders, environments, and hubs simultaneously, lifelong, and in-context. Extensive training domains are achieved by standardizing a framework for efficient data augmentation and automatic annotation. This library also provides a highly complex, multi-task, open-world learning environment the `ArtificialExperience` which can be used to quickly run general intelligence experiments. Training modalities covered include: text, audio, images, video, clickstreams and keylogs, graphs, robotics, and several multimodel combinations are these. Repo: https://github.com/Limboid/the-artificial-experience
- **The Artificial School**: Extremely high level training framework to instill technical, social, ethical, and commonsense knowledge into general purpose artificial agents. Primarily educates agents by administering appropriately-timed rewards as they autonomously interact with a computer. A small portion of experiences are hand-curated

from YouTube, literature, online simulations, and automated evaluation tools. Major curriculum topics include:

- Communication: human languages (written and spoken), formal languages, composition, speaking, language arts, conversation, cooperation and competition
- general science: general scientific method, tools & techniques, classical study techniques (textbook reading and automated grading exercises), virtual simulations, independent research
- general engineering: the engineering design process, self-paced study of individual engineering disciplines, self-paced simulator observation and interaction, various engineering projects
- artificial intelligence: theory and philosophy, history, computational methods, software engineering, deep learning, automated exercises, arxiv reading, independent research and development, self-optimization
- business: economics, finances, sales, marketing, operations, logistics, management
- The human experience: first principles and design patterns, religion and philosophy, history, literature, popular culture, current events
- Benevolence: ethics, law, government, leadership, self-discipline, integrity, honesty, self-awareness, empathy, counseling, professional practices, philanthropy, respect for human life, AI safety

The Artificial School intends to cover the breadth and depth of general human formal and informal education from infancy to the level of a PhD student. Clearly, no single effort can reasonably achieve this. Therefore, Limboid LLC will offer a knowledge bounty for open source collaborators to contribute to this repository. Computatra will also be used to automatically curate and expand this artificial intelligence education system. Repo: https://github.com/Limboid/the-artificial-school

- **Computatrum**: Fully autonomous, open-ended machine learning system with human-level intellectual mastery over a broad domain of computer interaction tasks. Interacts with the computer using standard peripherals (keyboard, mouse, display, speaker) to execute both abstract and highly detailed task descriptions. Repo: https://github.com/Limboid/computatrum
- **AInimal Ecosystem**: As heterogeneous, distributed, and exotic AI systems (*AI*nimals 🐯) continue to pervade the real world, it is increasingly important to observe, care for, and stay in touch with them. AInimal Zoo, Zookeeper, and Leash form an AI management ecosystem to facilitate observing, interacting with, and managing AI systems in the wild. This is a container repository consisting of AInimal Zookeeper, AInimal Zoo, and AInimal Leash. Docs: https://github.com/Limboid/ainimal-ecosystem
- **AInimal 🐯 Zookeeper**: Generic cross platform (react-native: iOS, iPadOS, watchOS, Android OS; react: web; electron: macOS, windows, linux) composable interface for ML agents with support for audio/visual/text/speech/arbitrary modality bidirectional streams and MLops stuff like model versioning, deployment, runtime introspection, and remote server control. Not all features must be used but bidirectional data streaming is the

primary use-case. For MAN-based AInimals, runtime introspection allows merging two MAN agents into one to maximize synergy. This is useful in massive multiagent systems like factory complexes, limboid festivals, and global limboid networks. Repo: https://github.com/Limboid/ainimal-zookeeper

- **AInimal 🐘 Zoo**: Manages model versioning, monitoring observations, actions, and environment state in realtime, introspection, viewing and/or overriding the value of any tensor (hidden state, input, output, parameter, reward, optimizer and other runtime configurable hyperparameters) and viewing the graph structure, data collection and asynchronous training, A/B testing and other evolutionary meta-learning paradigms, and arbitrary functions defined by individual AInimals. With multi-agent networks, AInimal Zoo supports runtime merging, splitting, and growth. AInimal Zoo also optionally manages cloud compute provider placement for AInimal models. The entire Zoo exposes a graphQL API to perform its operations. Various authentication providers are supported with authorization schemes ranging from no authorization to AInimal-operation-specific granularity with federated privilege levels assigned to roles, users, and groups. Repo: https://github.com/Limboid/ainimal-zoo
- **AInimal 🐶 Leash**: Robot sensorimotor interface. Facilitates streaming camera, microphone, motion, display, and speaker content. Also provides access to Arduino nano connected to USB port and defines a communication protocol for generic sensory motor peripheral interface. No plans to store data or support federated learning. Repo: https://github.com/Limboid/ainimal-leash

Appendix B: Articles of Organization

Limboid LLC was legally registered as an LLC on September 27, 2019. Until recently, covid-related issues have frozen its development. Now we are resuming progress for good.

[Please see document attached below]