

# The World of Hatsune Miku

*A brief overview of the VOCALOID phenomena*



Hatsune Miku boxart illustration. Crypton Future Media Inc.©

Philip Peng

[pengp@stwing.upenn.edu](mailto:pengp@stwing.upenn.edu)

<http://www.stwing.upenn.edu/~pengp>

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# The Diva



Original Hatsune Miku concept illustrations by artist KEI. <sup>1</sup>

## The Persona

In their news special titled, “VOCALOID Hatsune Miku, the world’s virtual diva”, Japanese TV network *TV Asahi* introduced Miku as “a 16-year old girl with long green pigtails and a voice with a range no human could ever hope to match.”<sup>2</sup> Her official profile describes her as a “cute pop idol”, with a height of 158cm, weight of 42kg, favourite genre of pop and dance, and a “charming voice that can climb easily to very high notes, while still able to sound beautiful at mid-ranges”.<sup>3</sup> When her songs were broadcasted on a Tokyo street, nearby pedestrians were entranced yet perplexed by the calming yet unnatural voice.<sup>4</sup> Their initial confusion was not unexpected; Hatsune Miku is a virtual diva who’s voice is computer synthesized.

On August 31, 2007, music software importer and developer Crypton Future Media Inc. released the voice synthesizing software package “初音ミクHATSUNE MIKU” on Amazon.co.jp.<sup>5</sup> The box for the software featured an illustration of an anime-style teenage girl in a grey-schemed school outfit, turquoise-coloured tie and pigtails reaching the ankles, black headphones, a digital music equalizer embedded on her sleeve, and the digits “01” stamped on her left shoulder.<sup>6</sup> Despite Crypton Future Media’s poor success with previously released *VOCALOID* software, the character design for *HATSUNE MIKU* was so well received that the software rocketed at the top of software sales rankings on September 12, selling close to 3,000 copies in the first 12 days.<sup>7</sup> As the software became more and more popular, Miku’s signature green pigtail design became an immediately recognizable figure in Japan and around the world. “Hatsune Miku” had become synonym for both the character and the product, and the character had become an expected association with the thousands of songs produced using the software. Originally just a promotional mascot and box art, Miku had transcended illustration status into that of an iconic persona in the digital world, named by many as the first *VOCALOID* diva.

## The Software

The “初音ミクHATSUNE MIKU” product sold by Crypton Future Media consisted of two components: a voice synthesizer and a voice bank. For Miku, these would be Yamaha Corporation’s *VOCALOID2* and a *VOCALOID2*-compatible voice banks recorded by voice actor Saki Fujita.<sup>8</sup> *VOCALOID2* is the second iteration of the *VOCALOID* voice synthesizer engine and user interface package developed by Yamaha. The software package allows users to synthesize singing through typing lyrics and melody

into a piano roll-like interface and adjusting voice variables such as pitch, vibrato, dynamics, etc. In the backend, the voice engine uses pre-recorded voice samples from the voice bank to synthesize the desired sounds. This effectively allowed user to compose and execute a song with the *VOCALOID* acting as a virtual replacement singer.

Originally a research project in voice synthesis, Yamaha pushed the technology into a commercial product, licensing the voice synthesizer package to third-party companies.<sup>9</sup> The technology was first announced on February 26, 2003 and was well received by the public.<sup>10</sup> The first *VOCALOID* products included “Leon”, “Lola”, and “Miriam” from Zero-G Limited, and “Meiko” and “Kaito” from Crypton Future Media.<sup>11</sup> The first *VOCALOID* music upload recorded was on March 3, 2004 (the day Leon and Lola were released), the video featured Lola covering *Cirno's Theme - Beloved Tomboyish Girl* from the video game *Touhou: Embodiment of Scarlet Devil* and was uploaded onto Japanese textboard 2channel (2ch).<sup>12</sup>

Hatsune Miku was released with the upgraded *VOCALOID2* package many years later. Despite not being the first *VOCALOID*, its unexpected popularity brought public attention to the *VOCALOID* technology, resulting in not only numerous more *VOCALOID* products from Crypton Future Media but also other licensing companies such as Internet Co., Ltd, AH Software, PowerFX, and even Yamaha themselves.<sup>13</sup> Other early Japanese *VOCALOID2* products (and their subsequent personas) received notable online popularity, including “Kagamine Rin and Len”, “Gackpoid: Kamui Gakupo”, “Megurine Luka”, and “Megpoid: Gumi”.

## The Community



Cover of Finnish song, "Ivan Polkka" by Hatsune Miku.<sup>14</sup>



Nico Nico Douga chorus of doriko's "Romeo and Cinderella", covered by 8 singers.<sup>15</sup>

## The Videos

The rise in *VOCALOID* popularity is rooted mainly in the sharing of promotional videos featuring *VOCALOID* songs. The start of the Hatsune Miku phenomena can be traced back to the Japanese video sharing site, Nico Nico Douga (NND). On September 4, 2007, NND user Otomania uploaded a cover of the Finnish folk song “*Ievan Polkka*” featuring Hatsune Miku, accompanied by a looping animation of a super deformed version of Miku, now unofficially named “Hachune Miku”.<sup>16</sup> The song cover was inspired by the popular “Leekspin/Loituma Girl” meme of 2006, which featured a looping animation of Orihime, from the popular anime *Bleach*, spinning a leek to a looped section from “*Ievan Polkka*” as played by the band *Loituma*.<sup>17</sup> This video inspired many other NND users to investigate into Hatsune Miku and *VOCALOID* software, resulting in more song covers and remixes being published on NND. The popularity of the cover of “*Ievan Polkka*” also led to the adoption of the leek as Miku’s “character item”.

Timing was also an influential factor in Miku’s rise to fame. NND had just launched less than a year earlier and had just picked up steam. The Japanese’s love for video memes, covers, and remixes combined with the low original video count on NND at that time meant wide-scale exposure of the “*Ievan Polkka*” video. In October 30, 2007, only two months after the release of Hatsune Miku, the Japanese Society for Rights of Authors, Composers and Publishers (JASRAC) started holding contract negotiations with Niwango, the operators of NND, concerning copyright fees on hosted video content.<sup>18</sup> At that time, a large portion of NND video uploads consisted of user-created remixes of (often-copyrighted) anime clips to (often-copyrighted) audio, also known as anime music videos (AMVs). This pressure from JASRAC supposedly discouraged the uploading of AMVs or other material that was not entirely user-created; later, copyright-infringing videos started being removed from NND.<sup>19</sup>

On the other hand, Hatsune Miku is classified as a musical instrument and Crypton Future Media openly permits the usage and derivation of Miku’s character design (under the Piapro Character License, which is similar to the Creative Commons license).<sup>20</sup> These two factors highly encouraged NND users to focus on creating remixed or original music (and accompanied original video animations) using *VOCALOID* software and sharing them. The wide range of *VOCALOID* products also led to multiple covers and remixes of previous *VOCALOID* songs using different voice banks. These songs were also highly popular with NND singers, who would upload their own covers of songs, and NND chorus creators, who would mix multiple NND singer covers of a specific song to create mashups of *VOCALOID* songs.

Some of the most popular original songs by *VOCALOID* composers such as ryo (supercell), OSTER project, and kz(livetune) have continued in maintaining top video rankings on NND and the Weekly *VOCALOID* Rankings<sup>21</sup>, with ryo (supercell)'s original piece "*MELT / メルト*" currently sitting at over 8 million views<sup>22</sup>. Many popular *VOCALOID* songs have been so widely covered that choruses often feature tens or even hundreds of singers; for example, one chorus of Hachi's popular Miku x Gumi song "*Matryoshka \ マトリョシカ*" features over 200 singers mixed together<sup>23</sup>. The rapidly increasing popularity of *VOCALOID* content on NND ultimately lead to the addition of a *VOCALOID*-exclusive subsection of the website in 2011.<sup>24</sup>

While NND was a Japanese-only video-sharing website at the time and the majority of its videos were in Japanese, there were also overseas users who were also swept up in the *VOCALOID* craze. These users decided to share or "reprint" *VOCALOID* videos from NND onto the popular English video-sharing website, YouTube. Otomania's cover of "*Ievan Polkka*" featuring Hatsune Miku was reprinted on YouTube on September 7, 2007 (four days after the NND upload). These videos were generally well received by the Western world and mass reprinting occurred. Because of the larger user-base of YouTube compared to NND and NND's registration requirement, YouTube reprints would often end up with higher view counts than their original NND counterparts. The YouTube reprint of Otomania's cover of "*Ievan Polkka*" currently has over 7 million views<sup>25</sup>, whereas the NND original upload only has 3.5 million views<sup>26</sup>. JASRAC copyright negotiations also affected YouTube; however, the effects of the subsequent video deletions had a lesser effect on increasing *VOCALOID* video popularity, most likely due to its larger video base due to its longer history and lower content of AMVs. While YouTube never featured any *VOCALOID*-exclusive subsection, on July 2, 2011, Crypton Future Media launched the English website MIKUBOOK.com for the sharing of *VOCALOID* songs hosted on YouTube.<sup>27</sup>



## The Music

First and foremost, *VOCALOID* is a technology for computer synthesis of singing for usage in song creation. A producer (or often group of artists) could compose a melody using *VOCALOID*, compose the instrumental using *FL Studio*, *Garage Band* or other instrument synthesizing software, and then combine them to create a complete song. That song could then be uploaded online with a cover image (most likely featuring the persona of the *VOCALOID* used) in its full form or preview form. Video sharing websites such as NND and YouTube were the most common form of introducing new *VOCALOID* songs to the world.

For most amateur artists, the work was released in its full form online as a means of evaluation of skills or as a means of contributing back to the *VOCALOID* community. Those who wanted to also distribute the original song files often included download links in the video descriptions themselves. Otherwise, users could use third party websites or tools to rip the audio track of the uploaded video and convert it to MP3 format; the free Nicosound service provides this for NND<sup>28</sup> while numerous free online websites and browser tools offer a similar service for YouTube.

As *VOCALOID* video popularity reached mainstream Japanese media, record labels started to take note and sign on some of the more famous and well-known *VOCALOID* artists. The most prominent example would be ryo, the songwriter of the supercell group and best known for his songs, “*Melt / メルト*”, “*World is Mine / ワールドイズマイン*” and “*Black★Rock Shooter / ブラック★ロックシューター*”. Previously, supercell was an unofficial, self-publishing “doujin” music group that released songs through NND and links to files hosted on personal blogs. In March 2009, however, supercell signed under the Sony Music Entertainment Japan label; their first professional music release album, titled “*supercell*”, sold extremely well and reached #4 on the Oricon’s weekly music charts.<sup>29</sup> The ryo and the supercell group then continued to release numerous singles featuring non-*VOCALOID* singers, including songs for animes *Bakemonogatari*, *Cencoroll*, *Guilty Crown*, and many more.

For established *VOCALOID* artists not so fortunate to be recognized by large record companies but wanting to release their works under official labels, Crypton Future Media stepped in. The website PIAPRO was released, allowing users to upload and share “Consumer Generated Media” (CGM), i.e. self-created *VOCALOID* songs.<sup>30</sup> Following that, the independent “KarenT” record label was created, under which *VOCALOID* artists could publish their songs and sell them in online music stores such as iTunes, and AmazonMP3.<sup>31</sup>

## The Fanart

Much of the popularity of Hatsune Miku stems from her well-received, signature character design (it is worthy to note that while some *VOCALOIDs* such as Gumi sound more realistic, they were never able to match Miku's popularity). Due to Crypton Future Media's permissiveness on character design derivations, common internet users who were not musicians could still involve themselves in the creative process through the creation of fanart. Because songs were often released in video form with cover art, many unique variations of Miku in different costumes were created (popular songs could often be directly associated with a unique character outfit).

PIAPRO served not only as a song sharing website but also an artwork sharing website. On PIAPRO, users could upload, share, and comment on *VOCALOID* fanart or promotional video materials. Much attention was brought to the website when, on August 21, 2008 for Miku's 1<sup>st</sup> anniversary, SEGA announced an open illustrations and costume design contest in collaboration with PIAPRO for an upcoming Hatsune Miku video game.<sup>32</sup> The contest was met with a resounding response of over 2000 entries, with finalists used in the PSP video game, “初音ミク -Project DIVA-”.<sup>33</sup> More collaborated contests for user-submitted content were, including for the PSP game “初音ミク -Project DIVA2nd-”<sup>34</sup><sup>35</sup>, Coca-cola promotional poster<sup>36</sup>, and a recently unnamed “Project MMT”<sup>37</sup>.

Apart from PIAPRO, original *VOCALOID*-related artwork can be found on many other mainstream online artwork sharing websites. On the Japanese pixiv website, there are currently almost 300,000 entries, making it one of the most popular tags.<sup>38</sup> On the English deviantArt website, there are over 400,000 entries tagged for *VOCALOID*.<sup>39</sup>

## The Freeware

While most *VOCALOID* videos uploaded to NND featured static illustrations or occasional simple animations, a handful of early releases featured impressive full 3D promotional videos (3DPVs). Most notable were the Hatsune Miku 3DPVs for ika's "*Miku Miku ni Shite Ageru ♪/みくみくにしてあげる♪*" (2.5 million views)<sup>40</sup>, mikuru396's "*melody.exe*" (1.3 million views)<sup>41</sup>, and Tripshots' "*Nebula*" (585,000 views)<sup>42</sup>. Many producers also wanted to follow suit; however, the learning curve of professional-level 3D graphics programs such as *Autodesk Maya* and the steep license cost made 3D animation inaccessible to most *VOCALOID* producers.

This gap was closed on February 24, 2008 when programmer Yu Higuchi (HiguchiM) released *MikuMikuDance (MMD)*.<sup>43</sup> *MMD* is a free 3D modeling and animation program designed for simplicity and ease of use for those new to 3D animation creation. Coming prepackaged with a default Miku model, *MMD* opened up 3DPVs to ordinary producers as well as spawned an entire community around *MMD* model development and special effects, even after HiguchiM's retirement from development.<sup>44</sup>

As *VOCALOID* became more and more popular, a lot of new interest was generated in the voice synthesizing techniques themselves. One feature that artists wanted to explore was the usage of custom voice bank for singing synthesis. While the *VOCALOID*'s voice bank specifications are not public and the *VOCALOID* software not easily modifiable, there exists other voice synthesizing software that are configurable. The most prominent of these is the shareware program *UTAU*, released by Ameya/Ayame (飴屋/菖蒲) in March 2008.<sup>45</sup> While less featured than Yamaha's *VOCALOID* software package, *UTAU* is free and allows users to record and use their own voices (or the voice of others if granted permission).

The ability to import your own voice bank with *UTAU* led to an entire new community of producers and song releases created using *UTAU* in substitution of *VOCALOID*. Users created and publically released numerous *UTAU* voice banks, each with their individual "*UTAUloid*" personas. One of the notable *UTAUloids* is "Teto Kasane". Originally created as a 2008 April Fool's joke (pretending to be Crypton Future Media's upcoming *VOCALOID2* with a model number of "04"), the Teto project continued on as an actual *UTAU* release and slowly rose in popularity, becoming as familiar a name as other *VOCALOIDs*.<sup>46</sup> Another notable *UTAUloid* is "Momo Momone", most famous for her cover of daniwellP's "*Nyanyanyanyanya*" which was originally sung by Miku.<sup>47</sup> While the original cover only received mediocre popularity (91,000 views)<sup>48</sup>, the covered song was used as the background music in the wildly popular "*Nyan Cat*" YouTube video (72.5 million views)<sup>49</sup>.

## The Product



Promotional material for SEGA's upcoming PS3 game, "初音ミク -Project DIVA- ドリーミーシアター 2nd"<sup>50</sup>

## The Goods

With the wild popularity of *VOCALOID* and Hatsune Miku among the general consumer population, companies in the entertainment industry immediately jumped at the commercial opportunity. The first gaming company to do so was SEGA, with the development of a PlayStation Portable (PSP) rhythm game, “*Hatsune Miku: Project DIVA / 初音ミク -Project DIVA-*”.<sup>51</sup> Drawing content from the PIAPRO community and signing deals with popular *VOCALOID* artists, SEGA was able to create an incredibly successful rhythm game series that lead to multiple titles across multiple platforms – *Hatsune Miku: Project DIVA/2nd/Extend* on PlayStation Portable, *Hatsune Miku: Project DIVA Dreamy Theatre* on PlayStation 3, *Project DIVA Arcade* on arcade cabinets, *Miku Flick* on Apple iOS, *Hatsune Miku and Future Stars: Project Mirai* on Nintendo 3DS, and a future *Project DIVA* title being developed for the PlayStation Vita.<sup>52</sup>

Another commercial goods industry that has been taking advantage of the *VOCALOID* craze is the fan merchandise industry. Keychains, phone straps, stickers, bookmarks, pencil cases, drinking mugs, and all sorts of stationaries are produced featuring Miku or other *VOCALOID* characters as over-priced but high demand novelty items. In particular, figurine and plushie companies have added many *VOCALOID* character models to their official production lines. Good Smile Company, known for their high quality PVC figurines and miniature Nendoroid series, alone currently holds over 20 full-sized *VOCALOID* figurines (most of which are Miku), and over 15 *VOCALOID* Nendoroids.<sup>53</sup>

In the paper publishing scene, plenty of art collections or doujinshi manga are released every year through magazines or comic markets. On November 26, 2007, KEI, the artist behind the original Hatsune Miku design, started serializing a manga titled “*Maker Unofficial: Hatsune Mix*” in the magazine *Comic Rush*<sup>54</sup> as well as released “*VOCALOID*”, a colour doujinshi featuring unofficial material at Comiket 73<sup>55</sup>. Also first sold at Comiket 73 was the visual novel, “*Mirai no Kimi to, Subete no Uta ni / 未来のキミと、すべての歌に-*” by doujin circle Supplement Time, who would then go on to make a sequel “*Rin ga Utau, Mirai no Neiro / 鈴が歌う、未来の音色-*”.

## The Concerts

The turning point in an idol's career is often signified by their first solo live performance on-stage. Hatsune Miku was no exception. On March 9, 2010, SEGA held "*Miku no Nichi Kanshasai 39's Giving Day*" (3/9 can be pronounced in Japanese either as "Miku" or like the English word "thank you"), the first ever live *VOCALOID* concert featuring Miku herself.<sup>56</sup> Using cutting edge 3D-projection technology and character models borrowed from *Project DIVA*, Hatsune Miku was brought to life. Dressed up in various PIAPRO-designed costumes, the virtual *VOCALOID* diva performed a slew of *Project DIVA* songs in front of a standing-room-only crowd of 25,000 fans.<sup>57</sup>

Following the commercial success and highly positive reception of the concept, SEGA continued hosting more *VOCALOID* concerts featuring the *VOCALOID2* cast from Crypton Future Media (Hatsune Miku, Kagamine Len/Rin, Megurine Luka); "MikuFes" was held on September 1, 2010<sup>58</sup> and "MikuPa" was held on March 9, 2011<sup>59</sup>. On July 2, 2011, Hatsune Miku arrived in North America, performing live at Mikunopolis in Los Angeles during Anime Expo ("MikuLa")<sup>60</sup>. The concert sold out within days of the announcement, surprising guest invitee Crypton Future Media president Hiroyuki Itō and proving that there was indeed a strong market for *VOCALOID* in North America.

## The Anime

While no direct, official *VOCALOID* animated series were created (apart from cameo appearances in animes *Zoku Sayonara Zetsubou Sensi*, *Lucky Star OVA*, *Maria†Holic*, *Baka to Test to Shoukanjuu* and a few others<sup>61</sup>), ryo's *Black★Rock Shooter (BRS)* was adapted. The original *BRS* song was created as a promotional video after ryo came across the character design illustrated by huke and posted on his pixiv account.<sup>62</sup> Wide interest in the video and character design (whose features resembled a recoloured Miku) led to two animated pilots being released, the first on September 30, 2009 and the second on July 13, 2010.<sup>63</sup> The generally positive reception led to an OVA adaption released on July 24, 2010 and an eight-episode anime series that aired between February 3, 2012 and March 23, 2012.<sup>64</sup>

## The Future



Official logo for Yamaha's recently released *VOCALOID3* synthesizer engine.<sup>65</sup>



The Hatsune Miku BMW car that won the Super GT 2011 Championship.<sup>66</sup>

## The Technology

Hatsune Miku was released in 2007 and was one of the first *VOCALOID2* software packages. At that time, *VOCALOID* technology was still under heavy development and scarcely known by the public; issues were plentiful, user feedback lacking, and techniques yet to be mastered. With the release of Hatsune Miku and the subsequent boom in *VOCALOID* awareness and usage, the rise in interest level drastically helped drive research and the aim for sound perfection.

Learning from their mistakes and given plenty of user feedback, Crypton Future Media revisited their old works, re-recording the voice banks and releasing higher quality, better polished and mood-focused “Append” voice banks for Hatsune Miku and Kagamine Len/Rin. Using lessons learned from Megurine Luka, the first bilingual *VOCALOID*, Crypton Future Media recently started to develop an English voice bank for Hatsune Miku. Although incomplete, the Miku English demo piece sounded noticeably better than Luka’s English voice.<sup>67</sup> At around the same time, Yamaha released new *VOCALOID2s* VY1 (female voice) and VY2 (male voice). These newest voice banks sounded drastically cleaner and higher quality than any of their *VOCALOID2* precedents with minimal manual tweaking needed of voice parameters, reflecting improved understanding in how to best prepare voice banks.

While the voice bank side is being worked on and improved, so is the voice synthesizing engine itself. The *VOCALOID3* engine was released on October 21, 2011, with major improvements in synthesizing techniques as well as backwards compatibility with *VOCALOID2*.<sup>68</sup> The engine was also modified to be standalone, meaning voice banks are sold separately but do not need to be patched on every *VOCALOID3* engine update. In addition, better support for non-Japanese/English languages was added. This led to the development of many new *VOCALOID3s* covering new languages, including Spanish via Voctro Lab’s “Bruno” and “Clara”, Korean via SBS Artech’s “SeeU”, and Chinese (no *VOCALOID3* voice bank yet).<sup>69</sup> In addition, a new “VocalListener” plugin is planned to be released for *VOCALOID3*. The plugin takes a real user’s singing voice data and adjusts the *VOCALOID* sound data to match the original singer’s inflections and details.<sup>70</sup> This can result in more realistic sounding *VOCALOID3* output in the future and is an important step forward in voice synthesizing research.

Apart from the *VOCALOID* technology itself, another area that can be expected to drastically improve in the future is the 3D projection technology used for SEGA’s “39 Giving Day” concerts. Prior to these concerts, pseudo-hologram technology had been used for live concerts by the virtual band, *Gorillaz* during the 2006 Grammy Awards.<sup>71</sup> This hologram projection, however, was generally very low



in detail and colour vibrancy. With the passing of numerous SEGA “39 Giving Day” concerts, the 3D projection technology has been refined, showing noticeably clearer, more detailed and more vibrant projections than during the first few concerts. As a cutting edge new technology that is being applied for commercial purposes and an overwhelmingly positive consumer response, the advent of future Miku concerts will only encourage the further refinement and development of 3D projection technology to keep up with expectations.

## The Cultural Impact

Although *VOCALOID* is a piece of computer software and Hatsune Miku classified as a virtual singer, the cultural impact of Miku extend far into the real world. The first sign of this influence is her appearance in non-*VOCALOID*-related promotional material for special events. Starting in 2008, the Good Smile Company has been sponsoring different teams in the Super GT grand tour racing competition and turning their cars into *VOCALOID*-covered itasha cars.<sup>72</sup> Each year, new car designs and mascot Hatsune Miku outfits are created as official Hatsune Miku derivatives. The 2011 win lead to great public attention toward the mascot (Miku) but also a special “Racing Miku 2011 First Win Version” figurine being produced by Good Smile Company.<sup>73</sup> Another example of deeper cultural impact can be seen in the annual Sapporo Snow Festival, a famous festival held with millions of visitors who come to see snow statues and ice sculptures. Starting in 2010, Crypton Future Media started sponsoring the winter festivals, with images of a yearly “Snow Miku” design placed around the town and sculpted in snow or ice. This general integration of the Miku character into large scale cultural events unrelated to *VOCALOID* helps push Miku into a position of an accepted icon.

Outside of Japan, Miku awareness is also slowly spreading. In May 2011, car manufacturer Toyota featured Hatsune Miku in their US advertising campaign for the 2011 Toyota Corolla.<sup>74</sup> Videos were posted on Toyota’s website, Facebook, and YouTube channel with an animated Miku endorsing the Toyota Corolla as “the official car of Hatsune Miku”.<sup>75</sup> While the ads were not aired on TV, they did catch the attention of members of the Association of National Advertisers, who awarded the campaign the Multicultural Excellence Award.<sup>76</sup> Though hard to measure due to the generally larger and more widespread population in North America, campaigns such as these improve the general awareness of *VOCALOID* and Hatsune Miku, a step toward more mainstream acknowledgement in the future.

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