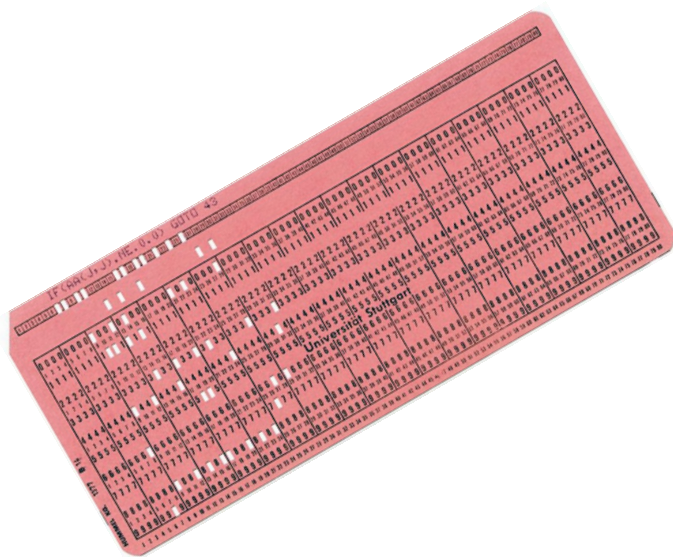


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The Trumpet of the Swan

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ABSTRACT

This paper will outline the ideation, background and development of the electronic artwork *The Trumpet of the Swan* (Donnachie & Simionato, 2017) presented by the authors at the Electronic Literature Organisation conference in Porto, Portugal in 2017. The artwork is a custom-coded drawing-robot which automatically inscribes in natural media, every post published from the personal Twitter profile of the 45th President of the United States of America, Donald Trump, identified on Twitter as @realDonaldTrump. The machine, which has the appearance reminiscent of a swan, including a broad “body” balanced on two short legs that end in webbed “feet”, is a semi-autonomous robot that writes in a pen, crowned by a long white plume, on a continuous scroll of paper while producing bird-like sounds. The drawing-robot remains permanently in a state of attention and the demonstrated sequence of actions can only be triggered remotely and by the 45th President of the U.S.A. himself (or more precisely, by whomever publishes a new tweet through his Twitter account '@realDonaldTrump'). In other words, to borrow a popular phrase taken from twentieth century cold-war propaganda: only the President has the ability to “launch” this artwork which otherwise remains dormant, in waiting.

KEYWORDS

electronic art; drawing machines; robotic art; twitterbots; social media.

RESUMO

Este artigo descreve a concepção, a contexto e o desenvolvimento da obra de arte eletrônica *The Trumpet of the Swan* [A Trombeta do Cisne] (Donnachie & Simionato, 2017) apresentada pelos autores na conferência Electronic Literature Organisation no Porto, Portugal, em 2017. A obra de arte é um robô-desenhador programado que inscreve automaticamente, em meio natural, cada post publicado no perfil pessoal do Twitter do 45º Presidente dos Estados Unidos da América, Donald Trump, identificado no Twitter como @realDonaldTrump. A máquina, cuja aparência é reminiscente de um cisne, incluindo o amplo “corpo” largo sobre duas pernas curtas que terminam em “pés” palmípedes, é um robô semi-autônomo que escreve com uma caneta, coroada por uma longa pluma branca, sobre um rolo contínuo de papel enquanto vai produzindo sons semelhantes a pássaros. O robô-desenhador permanece em estado de alerta permanente e a sequência demonstrada de ações só pode ser desencadeada remotamente pelo 45º Presidente dos EUA (ou, mais precisamente, por quem publica um novo tweet através de sua conta no Twitter '@realDonaldTrump'). Por outras palavras, para tomar de empréstimo uma expressão popular extraída da propaganda da Guerra Fria do século XX: somente o presidente tem a capacidade de “lançar” esta obra de arte que, de outra forma, permanece latente, à espera.

PALAVRAS-CHAVE

arte eletrônica; máquinas de desenhar; arte robótica; *twitterbots*; mídia sociais.



Figure 1. Karen ann Donnachie, Andy Simionato and Donald Trump, *The Trumpet of the Swan*, 2017. Custom-made Twittering-machine with electronic components, paper, pen, feather.

I. SIGNIFICANCE OF THE TITLE

The title of the artwork is taken from the children's book of the same name (White, 1970). E. B. White tells the story of a mute swan who, without the ability to sing, is unable to find a mate, if not for the help of a small boy, who saves the mute swan by stealing a trumpet for him from a music store. The swan learns to play the trumpet in his attempt to find love, while the boy's misguided act of kindness is discovered by his father, who teaches his son

the moral lesson of honesty by making him work for the money needed to pay for the instrument. There are a number of enfolded meanings that emerge from the artwork's title, the most evident two being the presence of Mr. Trump's name as a substring in Trumpet, and Mr. Trump's extensive use of Twitter's social-media messaging service, which not only has a singing bird as a logo, but also describes the activity of posting a message with the neologism 'to tweet', connection to the titular swan. In these ways, the title underlines the centrality of Mr. Trump's online behaviour to the artwork in practical terms (the work is driven by his Twitter posts) and as an allegorical framework (the work recasts Mr. Trump's social-media identity on a metaphysical plane).¹

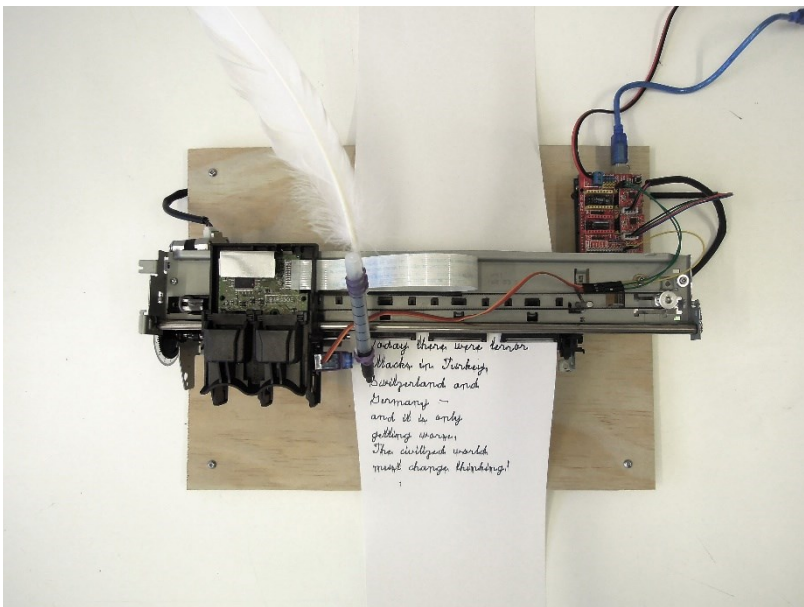


Figure 2. *The Trumpet of the Swan*, 2017 (early prototype). Custom made writing-machine, electronic components, paper, pen, feather.

II. BACKGROUND

Initial development of this artwork began during the 2016 U.S.A. Presidential election campaign, or more precisely, as we live and work in Australia, it began during our experience of the campaign as filtered through the internet. At the

¹ A note on the limitations in presenting the working prototype: The project presented at ELO2017 was an advanced working prototype, yet a demonstration 'on demand' offers some challenges linked to the impracticality of waiting for a "live" Twitter post by Mr. Trump. So for the purpose of demonstration before an audience, archived tweets were delivered to the system manually, rather than allowing the work to operate autonomously. It should be noted, however, that under normal operating circumstances, the drawing-robot remains permanently in a state of attention and the demonstrated sequence of actions can only be triggered remotely and by the 45th President of the U.S.A. himself (or more precisely, by whomever publishes a new tweet through his Twitter account '@realDonaldTrump'). In other words, to borrow a popular phrase taken from twentieth century cold-war propaganda: only the President has the ability to "launch" this artwork which otherwise remains dormant, in waiting.

centre of these internet sources of information was Mr. Trump's prolific Twitter publishing. Increasingly over the final months of the presidential race and immediately after, we felt the need to address our own fascination in the charged words and emoji symbols steadily flowing from Mr. Trump's Twitter account. Perhaps this need stemmed from the hope that we could tease out some of our own meaning, and value, from the time and energy dedicated to what, in moments of objectivity, amounted to a foreign political race for which we should have had little emotional investment given our geographic distance to the unfolding events.

Much of our studio practice consists of building and programming drawing- and writing- robots, so to attempt to make an electronic machine that could, in some way, respond to Mr. Trump's prolific Twitter posting, seemed like the most obvious path to follow. Before this specific project we had built general purpose drawing-robots that could be controlled via customized CNC software in order to create collaborative human-machine artworks. For this project, we decided to make what we call a 'single-serve' machine, which here means a machine designed to perform only specific predetermined sequences of actions according to custom-coded micro-controllers combined with specifically engineered mechanical elements. The design and development of a machine which captured Mr. Trump's twittering in real-time, and translated them into machine-written texts in natural-media, also produced a number of unexpected outcomes, that we outline in this paper.

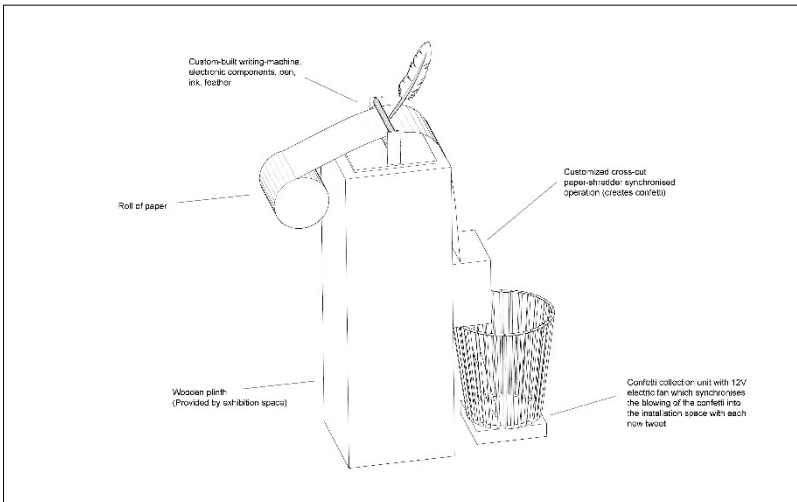


Figure 3. *The Trumpet of the Swan*, 2017 (technical sketch). This sketch of an early prototype included an automatic confetti-making system that was abandoned in the final version.

III. TWITTERING-MACHINE, SOME DEFINITIONS

The most evident outcome of the project was the custom-made drawing-robot which could ‘capture’ and ‘write’ any Twitter posts (tweets) from a given Twitter account. By ‘capture’ we mean that a microprocessor is programmed to continuously survey the content of Twitter through its Streaming API (Application Programming Interface), for any changes to a specific Twitter user’s account (feed), and once a new tweet is detected, it parses this new post as a string of characters which are permanently logged, along with other identifying information such as the date and time, to a database. By ‘write’ we mean that the microprocessor subsequently runs an algorithm that translates the words and characters of the tweet into machine-readable code which controls the motors and other connected mechanical elements in the robot, in such a way that a pen is manipulated to perform and produce human-like cursive writing in natural media, on paper. The microprocessor permanently monitors the Twitter stream in order to capture and queue any new tweets, prepared for subsequent writing.

Like our previous drawing—and writing—robots, *Trumpet of the Swan* is a mix of upcycled, discarded domestic printers, custom-coded micro-electronics, custom CAD-designed stereolithographic printed parts and found objects.² Within our practice, the words ‘machine’ and ‘robot’ are often interchangeable, however some differentiation is useful for the purpose of this paper. Firstly, the use of ‘machine’ connotes the physical assemblage of mechanical components (motors, gears, driving belts, bearings, and steel bars) as well as decorative elements (feathers, pen-holders, stereolithographic printed parts), and can be distinguished from ‘robot,’ which refers more broadly to the combination of these mechanical components and decorative elements with the electronic parts (sensors, micro-switches and custom-programmed microprocessors) which permit either a semi-autonomous or completely autonomous operation. Specific to *Trumpet of the Swan*, the ‘machine’ refers to the mechanical object, while ‘robot’ refers to an assemblage comprising both the physical machine *and* the networked, algorithmic system that controls it, including the human subject of Mr. Trump (or his surrogates)—without whom the robot cannot function.

The process of determining the machine’s form began by experimenting with a number of ‘candidates’ (various discarded commercial ink-jet printers collected from kerbside hard-waste disposal over the course of the previous year) resulting in a form that appealed to us. The final hybrid-machine, as presented at the ELO2017 conference, appeared the most appropriate for this application not only for its mark-making outcomes (initial experiments with the working prototype produced outcomes which appeared closest to human-made cursive-writing) but also for the machine’s formal aesthetic qualities. The chosen ink-jet printer, once adapted to operate as a writing-machine, could function with a minimal number of mechanical parts, essentially reduced to a

² One example of another drawing robot project is the automated publication project *Live Draw* by Karen ann Donnachie and Andy Simionato (2017).

combination of two stepper motors, a few gears, rubber rollers and a steel bar, all attached to an aluminium frame. However, the more we reduced the machine to the bare minimum required to function, the more unstable the structure became. Eventually we added two sets of steel table “legs” to give the robot some structural integrity and provide easier access during its development, and immediately realized that this gesture had given the machine the appearance of a swan, with a broad body perched over two webbed feet. A visual conceit that was underlined when we added a swan’s feather to the machine’s writing mechanism.

IV. THE ‘SHARPIE’ QUILL

Although our drawing- and writing-machines are capable of working in almost any natural media, they are most often developed and tested using the commercially available Sharpie marker. The pragmatic reason for this choice is not only that the pens are inexpensive, but they can be reliably found in most cities, and therefore can be replaced with relative ease. As noted by some collaborators, because the Sharpie ink is alcohol based, it is not as permanent as other types of markers. The convenience of the more readily available marker however has outweighed any concerns for archival quality outcomes during the development phase of the artworks.

These more commercially available markers used for the research and development of the project, were always intended to be exchanged for a traditional quill pen in its final outcome. The quill pen in this context was intended as a parody of medieval inscription practices, and associated literary and rhetorical aspirations, such as declarations of Kings or Founding Fathers. However our plan to replace the Sharpie with the quill pen was abandoned once we became aware of an online discussion on the Reddit message board and later a slew of memes distributed via Twitter, in which users suggested an image shared by Mr. Trump of himself writing his inaugural speech may have depicted him doing so with a Sharpie in his hand—the clip/lid of the pen that can be seen in the photograph could arguably be a Sharpie pen (Anthony, 2017). Regardless of the accuracy of these online claims about Mr. Trump’s writing instrument of choice, the existence of such a debate was sufficient to inform our decision to simply keep the ubiquitous marker as a permanent element in the artwork as it symbolised the layer of vernacular functionality that sometimes belies Mr. Trump’s attempts at self-aggrandizement as evidenced by the above example. Yet we couldn’t renounce the opportunity to experiment our initial idea for surrealist assemblage combining bird and machine, so it was a small step to attach the feather to the Sharpie pen with a custom-made clip, resulting in a machine-bird hybrid most reminiscent of Paul Klee’s *Twittering Machine* (1922).

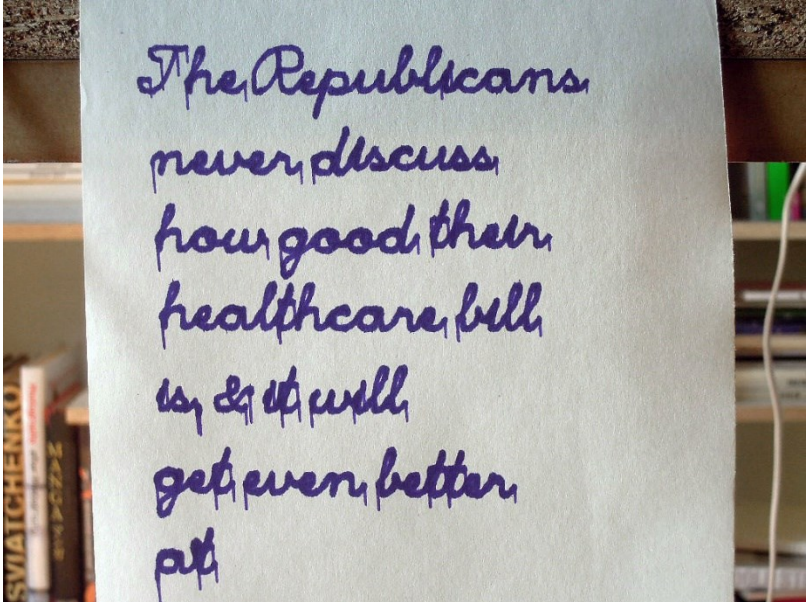
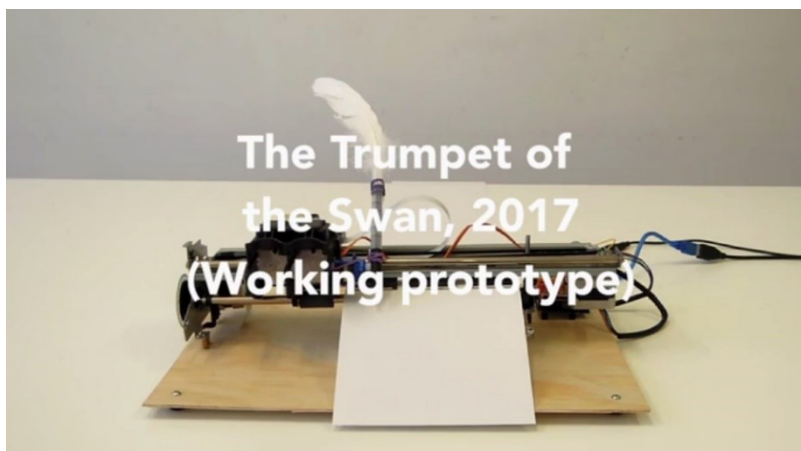


Figure 4. Twitter post from user @realDonaldTrump automatically written in Sharpie by *Trumpet of the Swan* drawing machine, testing the Trumpet Machine Cursive font designed by Karen ann Donnachie and Andy Simionato, 2017.

V. TRUMPET MACHINE CURSIVE

Beyond the machine itself, a second significant outcome generated during the development of the artwork was a system of custom-designed machine-cursive letterforms for use by our scribal robot. These letterforms were originally based on the single-line vector fonts known as Hershey fonts developed by the computer engineer Allen Hershey (1967), which were designed for cathode ray printers, display through oscilloscopes and other machinery of the 1960s. These fonts initially seemed particularly well suited to *Trumpet of the Swan* as they promised a single path for each letter, rather than the current outlined letterforms generated from Adobe's proprietary TrueType or OpenType font based software. However, the resulting combination of path direction, segmentation and order of stroke, all embedded into the Hershey fonts, did not resemble handwriting closely enough to satisfy our self-imposed need for human-scribal movements. Eventually we custom designed a set of machine-cursive letterforms specifically for the *Trumpet of the Swan*, along with a custom text-parsing algorithm (written in Python programming language) capable of translating the words from any given Twitter post into natural-order continuous stroke-movements, a process which also permitted the elimination of irregular pen lifts and other pen movements that might disrupt the illusion of the machine's human-like cursive writing. Our Trumpet Machine Cursive is loosely based on Victorian cursive characters, as currently taught in the Australian

primary school curriculum. Each letterform and symbol of the Trumpet Machine Cursive consists of a series of single-line strokes coded to be executed in an order that corresponds as closely as possible to their analogous human movement. We adopted an iterative process of designing, coding and testing each letterform, in order to more easily respond to the affordances and (mostly) challenges of the machine relative to the desired aesthetic outcomes of the machine-writing. We are currently extending and developing this and other single-line cursive fonts in the hope that this research can be valuable for broader applications where machines and robots are required to imitate human-like writing movements.



Video. [Trumpet of the swan](#), 2017 (Working Prototype) from [Andy Simionato](#) on [Vimeo](#).
Donnachie and Simionato (2017). *The Trumpet of the Swan*, (early prototype). Custom made writing-machine, electronic components, paper, pen, feather.

VI. BIRD-SONGS

A third, distinct outcome from this project was the development of an analog system of translating machine-code into sound. From the earliest sketches of the project we imagined the inclusion of an electric horn, adapted from commercially available car or motorcycle parts. This was an element that we had originally intended to use in the system for making a kind of fanfare at each new tweet (imagine a bugler signalling the announcement of a 'royal decree'). Due to the irregular schedule of Mr. Trump's tweets the machine would occasionally remain inactive for lengthy periods of time, so we felt the need to add an auditory signal of the incoming message. However, as we were testing early iterations of the machine, we noted the underlying melancholic sounds of the stepper motors in certain moments of operation. When the machine draws arcs and circles, the turning of the electric motors also releases sound energy that changes in frequency suggesting melodies. It occurred to us that the machine's

inherent sound of operation may be more suited to the project than the comedic effect of a blaring horn as we had anticipated. Once again, we decided to privilege more nuanced layering of meaning over our initial intentions of parody. We extended the custom-coded script, which issued the machine-code for the machine's stepper motors, in order to simultaneously generate sound through a speaker which we added to the pen's gondola. The code manipulating the machine's actions becomes a musical score, adding a muted-birdsong whenever the artwork writes.³

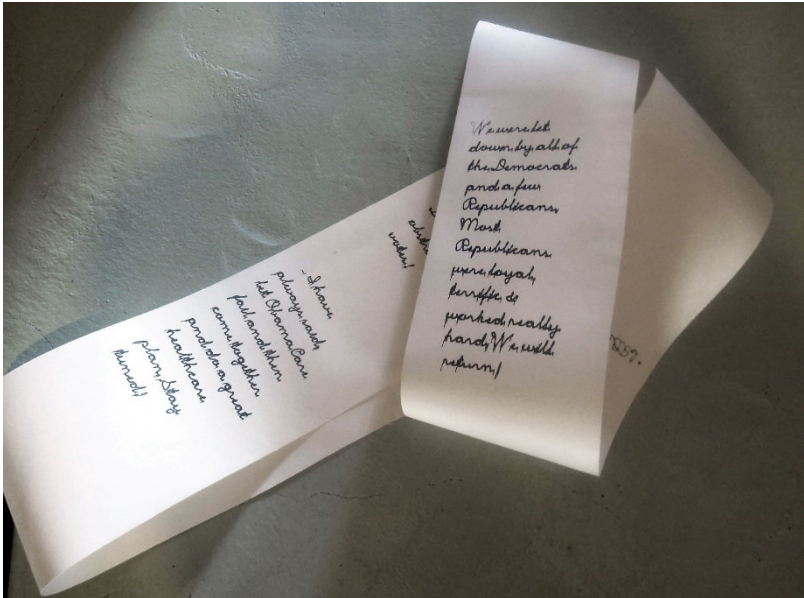


Figure 5. A portion of the continuous scroll with a number of consecutive Twitter posts from user @realDonaldTrump automatically written by *Trumpet of the Swan* drawing machine by Karen ann Donnachie and Andy Simionato, 2017.

The machine is deliberately laborious, taking several minutes to perform its untiring scribal activity. Indeed, it very likely requires more time to write Mr. Trump's tweets than he uses to compose them. The primary function for the texts that Mr. Trump (or his surrogates) tap with his (or their) fingers (or thumbs) into Twitter, has been described as an immediate and direct conduit to his (their) readers (Ingram, 2017). These tweets are considered a circumnavigation of traditional media useful for entering the lives of his readers in ways that the filtered and considered commentary of newspaper or television cannot. The pattern remains immutable: Mr. Trump tweets (and occasionally retweets, or re-publishes an existing tweet), his supporters reciprocate with messages of support, his detractors with dissent, and the media diligently follow

³ The symbology of the bird is further echoed by the name and logo of the Twitter platform: "Twitter is the bird, the bird is Twitter" (Grigg, 2012).

observing and if sometimes they critically respond, it is necessarily from outside of Mr. Trump's personal network of communication with his (Twitter) followers. These are immaterial texts intended to flow without pause for critical consideration, untethered from earthly concerns, they are even exonerated from grammatical constraints (Groys, 2011). In short, these are words without material bodies. *The Trumpet of the Swan* attempts to embody these disembodied thoughts, writing what presumably has never been written, neither by hand, nor on paper.

As the advanced prototype that we are demonstrating at ELO2017 began its first deliberate movements, accompanied by the strained notes of its bird-song, we reflected on the affect of these outcomes: like the Swan who finds his voice with the help of a small boy in E.B. White's children's story, Mr. Trump's emotionally charged Twitter posts, those short, sudden and sometimes clumsy outbursts of digital texts, when written by the Trumpet we have built, reveal themselves to be a search for love and friendship.

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