

TAROTFID:
using RFID technology to create interactive multimedia
experiences

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introduction: overview of concept, technology and schematics

concept

TAROTFID is an installation piece utilizing Radio Frequency Identification (RFID) technology to create an interactive multimedia experience. Specifically, the piece gives users the opportunity to manipulate a physically present deck of Tarot cards tagged with RFID labels. The cards generate playback of associated multimedia files when placed on a custom-built table equipped with an RFID reader and database server.

technology

RFID technology works on a relatively straightforward concept: An RFID tag transmits a unique identifying code via a specific radio frequency, which can be detected and interpreted by purpose-built readers. The reader passes this translated ID to a server, via a wireless or cabled network connection. The server queries a database (hosted locally or remotely) that contains additional information associated with that ID, and returns the information to the user.

The most basic type of RFID tag is simply a microchip attached to an antenna. The microchip is used to store the tag's unique ID, and sometimes a small amount of additional data. The antenna is used to draw power from the reader device and activate the tag so it can send a signal back to the reader, as simple passive tags (the most common kind) have no power source of their own.

RFID technology in its most primitive form has been in use since World War II, when its core concepts were applied to identifying incoming planes as ally or enemy. RFID's first widespread commercial implementation was in the 1960s, when the technology was used to create electronic anti-theft tags. The 1980s brought electronic toll collection via RFID, and since the 1990s the technology – paired with the growth of the Internet -- has spawned a massive and still-growing industry utilizing RFID as an international supply-chain management tool (Landt 2001, p. 5).

schematics

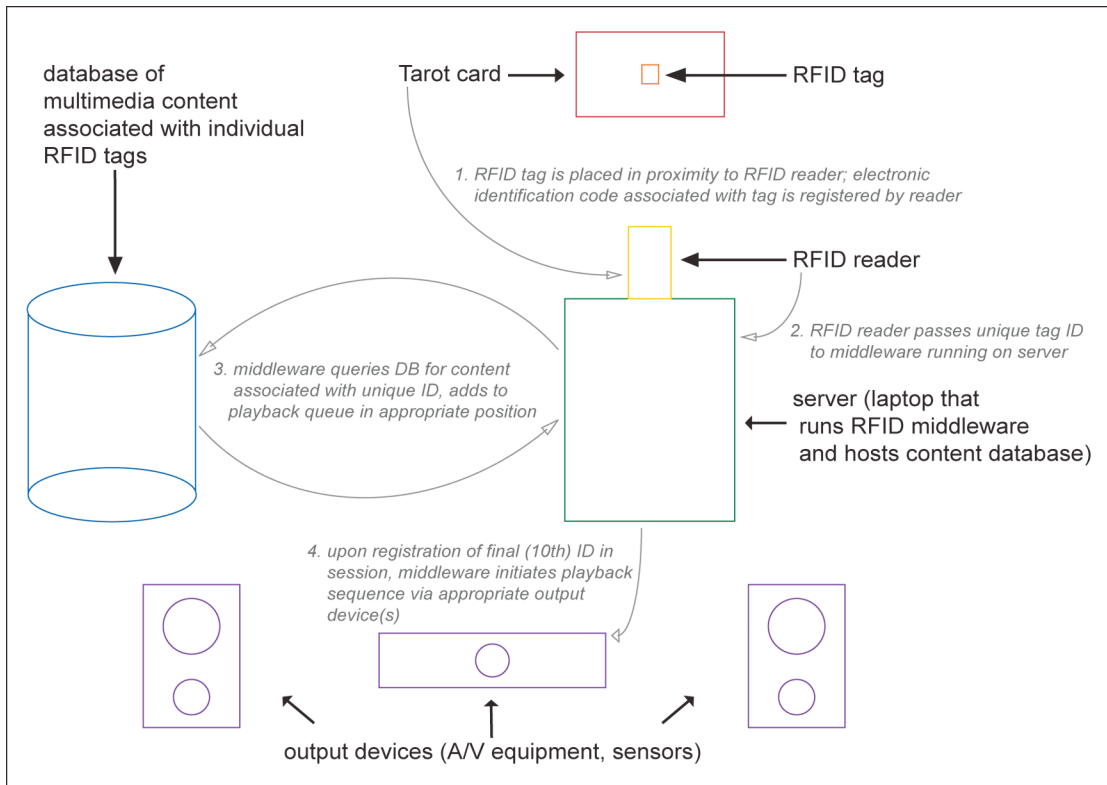


Figure 1: graphical representation of TAROTFID data flow

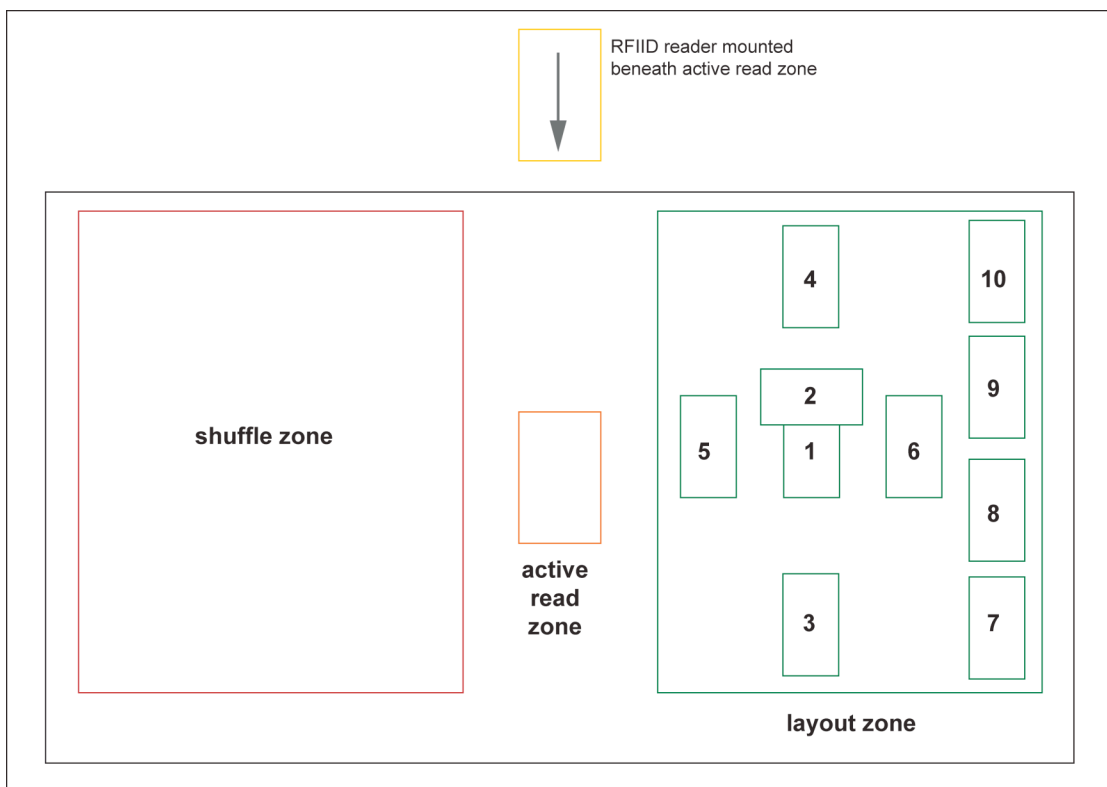


Figure 2: layout of TAROTFID tabletop

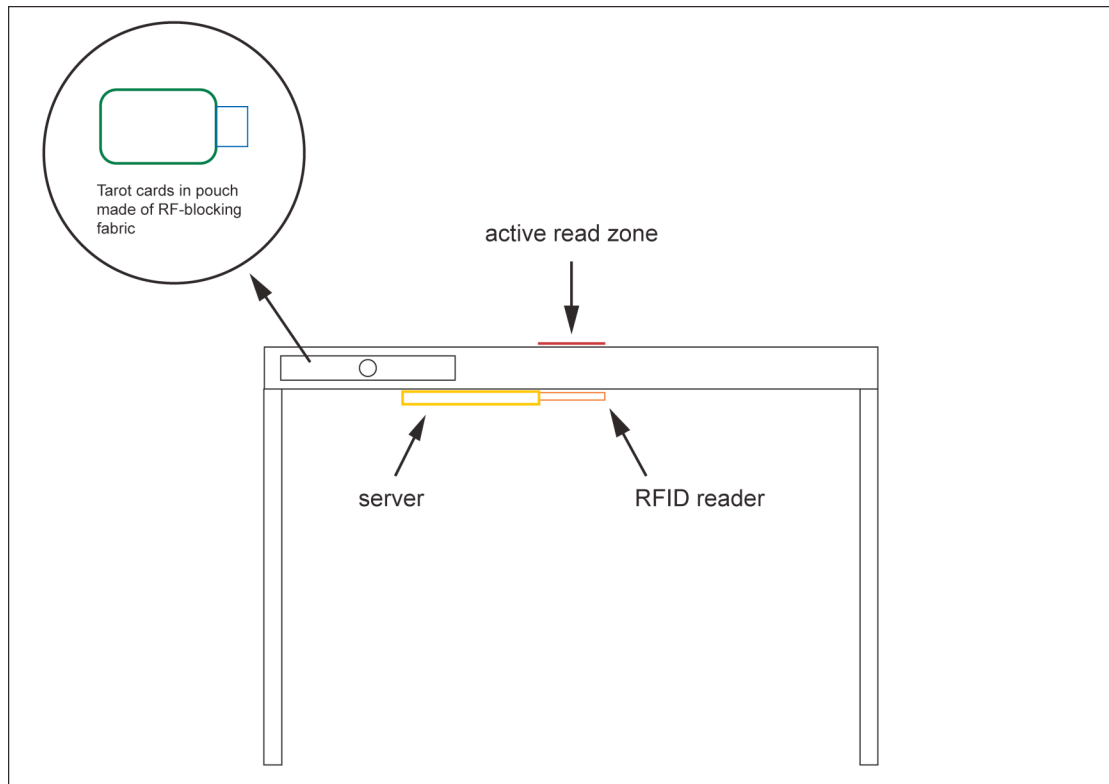


Figure 3: basic schematic of TAROTFID table

aims: technical, artistic, critical

technical aims

My primary goal with this project is to establish a strong working knowledge of RFID technology and application development, for the purpose of furthering the artistic and theoretical aims outlined later in this section. I hope to achieve this goal through experimentation with both the hardware and software aspects of RFID systems, which will be necessary for the successful execution of this project.

In terms of hardware, I anticipate that it will take not only research but some trial and error to identify the optimum tag-reader solution for this project, specifically in determining the correct type of tag for the project's material-penetration and read-distance requirements. The signal generated by the reader-tag relationship must be strong enough to penetrate the barrier of the tabletop that will lie between the two objects, but not so strong as to activate tags that lie outside the active reading zone.

In terms of software, I'm hopeful that I will be able to adapt or model one or more of the applications discussed in the Related Projects section below, and/or gain a similar foothold on a middleware solution by working with the open-source RFID development communities that are emerging as the technology filters down from strictly industrial-scale use (McAllister 2005). In particular I anticipate needing to create original code for the queuing, templating, mash-up and resetting behaviors I wish to establish:

Queuing: Playback of the multimedia content will not begin until the user has selected 10 cards from the deck and has placed each one onto the active read zone, transferring it to the appropriate spot in the layout zone as s/he goes.

Templating: The meaning of the card's position in the reading (past influences, fears, etc) is conveyed through audio and/or visual means before the unique card data is displayed, thus offering a narrative guide to users who are unfamiliar with Tarot or with the particular layout being used.

Mash-up: After each card has been presented individually through its associated files, all 10 sets of files are randomly remixed and presented as a multimedia collage for a set amount of time. (*Note: This may only be feasibly in a future iteration of the project, due to development time constraints.*)

Resetting: The entire system automatically returns to a ready state when a reading is complete.

artistic aims

Artistically, my primary goals with this project are to continue the explorations of unconventional narrative begun in previous works, and to improve my level of proficiency with various multimedia authoring tools.

In the Creative Technology module undertaken this past semester, I created a multimedia Tarot deck for use on the iPod and other portable media players. The iPod Tarot was a preliminary examination of metadata and "hidden" (context-specific) data as narrative objects, and the various possibilities for combining those objects in a non-linear but meaningful fashion.

TAROTFID offers the chance to extend these explorations with different types and models of metadata and context-specific data. The more advanced computational nature of this project also provides opportunities to push the definitions of “data” and “media” by incorporating files into the content database that are not multimedia objects in themselves, but scripts that trigger behaviors by unconventional output devices. Building on the knowledge gained in this iteration of the project, I hope in future iterations to more fully engage the user’s senses with database objects that trigger fans, thermal scent-release coils, confetti or feather drops, and other multi-“media” experiences.

The computational nature of TAROTFID also allows greater opportunity to experiment with relationships between narrative objects, which I hope to explore in a preliminary way with the Mash-up feature of this iteration and in greater depth in future iterations. In particular I see great potential to leverage the nature of relational databases and account-based user profiles to create interesting results.

critical aims

As the use of RFID technology has proliferated to include the tagging of objects that contain sensitive data, such as credit cards and passports, issues of security and privacy have come to dominate discussions of the technology. Both industry- and consumer-led organizations such as the RFID Consortium for Security and Privacy (rfid-cusp.org) and Spychips (spychips.com) have been established, in fact, to grapple exclusively with these issues.

TAROTFID aims to address this issue in a subtle way with the custom-made pouch that will contain the cards when not in use. The pouch, which will be sewn from fabric specifically designed to block radio waves, resembles both the RFID-blocking wallets and other accessories that are quickly becoming popular (see idstronghold.com and difrwear.com for examples), as well as the ritual of many Tarot practitioners to store their decks in silk bags or other personally meaningful containers to protect the cards’ “energy” from outside forces.

In future iterations of the project I hope to address implications of RFID that are less frequently explored in the critical realm, particularly notions of identity. For example: An object that is tagged with an RFID label is merely associated with the data referenced by that label; the object itself does not necessarily embody those

characteristics. Even if an associated database item is a picture of the tagged object, the object is still itself and not a picture of itself. Moreover, even the tag is a mere reference point; a key, if you will, that opens the universe contained within a particular database. Scanning a tag with a reader that communicates with one database could tell an entirely different story about the associated object than if the tag were scanned with a device paired to a different database. What are the implications for identity as we introduce more and more layers of abstraction into our representations of reality?

context: previous work and related projects

previous work

TAROTFID relates to past work I have done both on this course and independently. As previously mentioned, it bears a direct link to my iPod Tarot project, *The Powers That Be*, in its exploration of metadata and context-specific data (such as ID3 tags, in the case of TPTB) as narrative objects, particularly as tools for non-linear storytelling.

TAROTFID also follows on the work of TBTP, as well my previous project, *The Spam Oracle*, as an exploration of randomized combinations of content as a tool for both serious and light-hearted self-reflection. *The Spam Oracle*, available online at <http://the-spam-oracle.com>, brings the cut-up technique popularized by writer William S. Burroughs to the increasingly quirky scourge of spam, creating an interactive oracle that serves up cryptic collages of modern junk mail that are often surprisingly thought-provoking. TBTP, like TAROTFID, uses a shuffling mechanism to randomly select cards and deliver multimedia interpretations of the cards' meanings. With 78 cards in the Tarot deck, the likelihood of drawing the same cards in the same order more than once is fairly rare; the potential combinations of meanings are almost endless, particularly when factoring in personal interpretation (as the cards are designed to do).

Last, both TAROTFID and TPTB address my interest in emergent (consumer- and artist-led) uses of commercial technologies, which has been a favored research topic of mine since at least 2002, when I began writing *Technophilia*, a monthly newspaper column on the subject. (See <http://previously.jesskilby.com/writing/index.html> for samples.)

related projects

There are two projects of which I'm aware that relate directly to TAROTFID: The Symbolic Table, and iLand. A third project, Sensitive Samples, has a few strongly relevant similarities.

The Symbolic Table, a project by Willem Velthoven and Andy Smith of Amsterdam's Mediamatic, is billed as a "100% interface-free media player." The user places an RFID-tagged object on the table and associated multimedia files are played back. Primary hardware design for TAROTFID was inspired by The Symbolic Table, which similarly houses an RFID reader and compact server hosting middleware and a content database under the table. Where I hope to depart from The Symbolic Table is in the more complex queuing and serving of files I envision for TAROTFID. To my knowledge, the current version of The Symbolic Table is not capable of these behaviors.

iLand is a more commercial and fully-featured project, from Danish developers Cordura. It operates on the same principle as The Symbolic Table, but comes with user-friendly software for programming tagged objects with associated media files and behaviors. It also has multiple "active" zones on the table, and supports complex interactions between pieces and zones.

The Sensitive Sample is a related project by the Institute of Design and Assessment of Technology at Vienna University of Technology, Austria. It consists of two prototypical design models that utilize a combination of RFID tags and various sensors to create novel learning interfaces for the institute's architecture students. Of greatest interest to me is their prototype still in development, Materialkammer.

Materialkammer is a room filled with material samples [embedded with tilt and touch sensors] ... The room is equipped with projectors, sound devices, fans, lighting equipment... The users enter the room and start exploring the materials. Depending on the way how the users interact with the samples, an atmosphere in the room is created. If someone plays with the wooden samples, and does it in a quite gentle and smooth way, an atmosphere of a wood in spring could be created (Matkovič et al. 2004, p. 4)

While it could be said that these projects as a collective indicate that too much prior art exists for TAROTFID to be considered a unique project, as a relative newcomer to a still emerging artistic field I look at this project as a chance to learn from proven

techniques – and hopefully make some small creative advances as well.

implementation: production schedule

WEEK 01: Research and identify hardware solution most likely to meet technical specifications. Research and identify best starting point (programming language, relevant open-source models) for middleware programming.

WEEK 02: Familiarize with chosen middleware programming language and models.

WEEK 03: Begin writing/adapting middleware. Order hardware and related materials.

WEEK 04: Continue writing middleware.

WEEK 05: Finish writing middleware. Create content database and populate with sample content. Create sample of physical card with intended dimensions and materials.

WEEK 06: Conduct first trial run: interface between hardware and software. Troubleshoot and debug.

WEEK 07: Create multimedia card content

WEEK 08: Create multimedia card content

WEEK 09: Finish design of physical cards remaining from TPTB

WEEK 10: Print and assemble physical cards

WEEK 11: Build or retrofit table

WEEK 12: Conduct second trial run: interface between all hardware components (cards, table, reader, server, projector, speakers). Troubleshoot and debug.

WEEK 13: Contingency week. Allowance for necessary summer travel/wedding disruptions to production schedule.

works cited and external links

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