

ECE4007 Project Summary

Project Title	Pokemon Card Coliseum: Using RFID Technology to Augment Card Game Play via PC Tablet	
Team Members (names and majors)	Nanley Chery, CmpE	
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Semester	2012 Spring	Final
Project Abstract (250-300 words)	<p>Team TableTop spent \$248 in funding to develop Pokémon Card Coliseum, an interface between the traditional Pokémon Trading Card Game (TCG) mat and a tablet PC via an RFID reader. The Pokémon Card Coliseum provides players with a unique way to play the traditional Pokémon TCG, displaying real time animation based on game play using 2D graphics. Pokémon Card Coliseum is a unique concept—there are no existing products for any TGC that really compare to Pokémon Card Coliseum’s design.</p> <p>During game play, players can swipe Pokémon cards with RFID tags over the RFID reader and "into" the game, an Android application developed by project engineers. This allows the tablet to track and animate game play. The proposed design included a USB connection between the RFID reader and tablet. However, the design team discovered that the FTDI drivers for the USB reader were incompatible with the tablet’s operating system. For this reason, an alternative hardware design was selected. Major hardware components include an RFID reader, an mbed microcontroller, a Bluetooth module and the host computer, a Samsung Galaxy 10.1 Tab tablet. The microcontroller is powered through a USB-rechargeable 5V battery. The design prototype includes a limited set of Pokémon cards to demonstrate game play. Twenty three Pokémon, basic energy cards (Fighting, Fire, Grass, Lightning, Psychic, and Water), and three trainer cards were implemented.</p> <p>Although the design team has produced a relatively polished prototype, the team would recommend that before production, another prototype cycle should be implemented. A smaller RFID scanning device with thinner RFID cards as well as a re-constructed version of the software would be the primary goals of a second prototype cycle.</p>	

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List codes and standards that significantly affect your project. Briefly describe how they influenced your design.	<p>The RN-42 chip (Class 2 Bluetooth ® Module) has the features:</p> <ul style="list-style-type: none"> - Baud rate speeds: 1200bps up to 921Kbps - Class 2 radio, 60 feet distance, 4dBm output transmitter, -80dBm typical receive sensitivity. - Frequency 2402 ~ 2480MHz. - FHSS/GFSK modulation, 79 channels at 1 MHz intervals. - Secure communications, 128 bit encryption. - Error correction for guaranteed packet delivery. - UART local and over-the-air RF configuration. <p>The frequencies 2404 ~2480MHz are the standard frequencies for wireless Bluetooth communication.</p>
List at least two significant realistic design constraints that applied to your project. Briefly describe how they affected your design.	<p>1. The tablet did not have drivers compatible with the originally selected USB-out RFID reader. Therefore, the hardware design was changed so that the reader would be able to communicate with the tablet. The new design consisted of an RFID reader, an mbed microcontroller, and a Bluetooth module, all of which were powered by a 5V USB-rechargeable battery.</p> <p>2. Developing Pokémon Card Coliseum on an Android platform restricts the number of tablets on the market the game can be played with. Specifically, the game will not be compatible with iPads or Microsoft OS tablets. However, since Android is an open source platform, there is a wealth of code already available to jump start the programmer's game development. In addition, further development of Pokémon Card Coliseum could easily include versions for both iPads and Microsoft OS tablets.</p>
Briefly explain two significant trade-offs considered in your design, including options considered and the solution chosen.	<p>1. Camera-based image processing was considered as an alternative to using RFID tags and readers. This technology would allow trading card manufacturers to continue producing cards without the addition of RFID components. It would also allow players to use their current collection of cards, eliminating the need for players to buy a RFID tag add-on or new cards with embedded tags. While this technology would save money for current card owners and manufacturers, it would also limit the flexibility and increase the price of the product. Optical processing would require the user to have proper lighting conditions and would require technically complex software for image analysis - increasing the chance of bugs and card-detection failure.</p> <p>2. The design team tried a number of ways to display dialog boxes for the GUI. Originally the team wrote code to display these boxes, but eventually switched to the pre-defined Android dialog boxes because they provided more functionality and tended to be less buggy. However, the pre-defined dialog boxes can only be displayed in a landscape orientation. Since the GUI is designed to be viewed in a portrait orientation, dialog boxes appear perpendicular to play.</p>

<p>Briefly describe the computing aspects of your projects, specifically identifying hardware-software tradeoffs, interfaces, and/or interactions.</p> <p><i>Complete if applicable; required if team includes CmpE majors.</i></p>	<p>The mbed microcontroller facilitates communication between the RFID reader and the Bluetooth modem used to send data from the reader to the tablet. The microcontroller takes the last eight bits of the ID and appends a line character before sending the data on to the Bluetooth modem.</p> <p>The data sent from the Bluetooth module is accessed by the Pokémon Card Coliseum software via a Bluetooth socket automatically assigned to the modem when it's connected to the tablet. The software can read data from this socket and use the data to create 'cards' in the game. The software used for Pokémon Card Coliseum was developed with Java using an Android API.</p>
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ECE4007: International Program

(Only groups with one or more International Program participants need to complete this page)

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<p>Global Issues (Less than one page)</p>	<p>(10 point font, single spaced)</p>
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