DuelReality

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Advisor: Professor Jackson

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Team Members

Hadi Ghantous
CSE

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EE

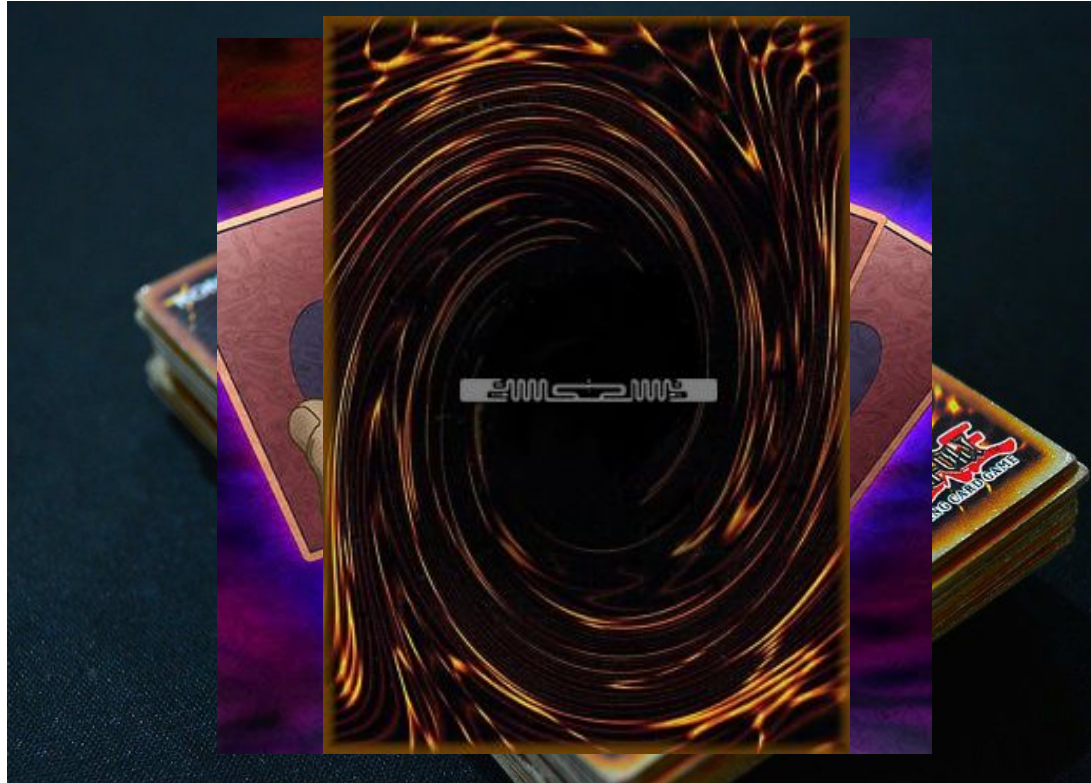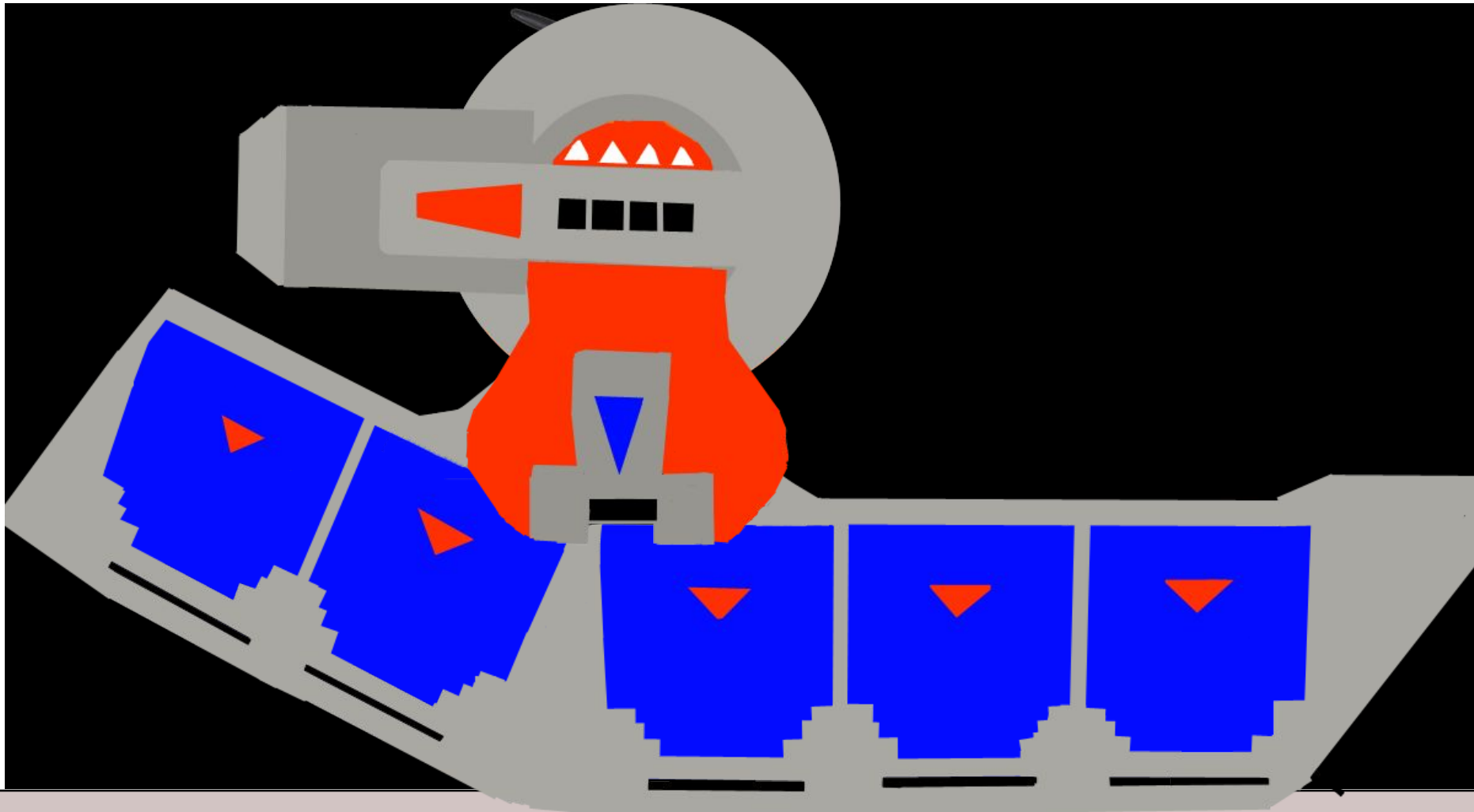Department of Electrical and Computer Engineering   Advisor: Prof. Jackson

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Agenda

- Review of Project

- CDR Deliverables

- FDR Deliverables

- Demo

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Our Card Game mechanism

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Review of Project

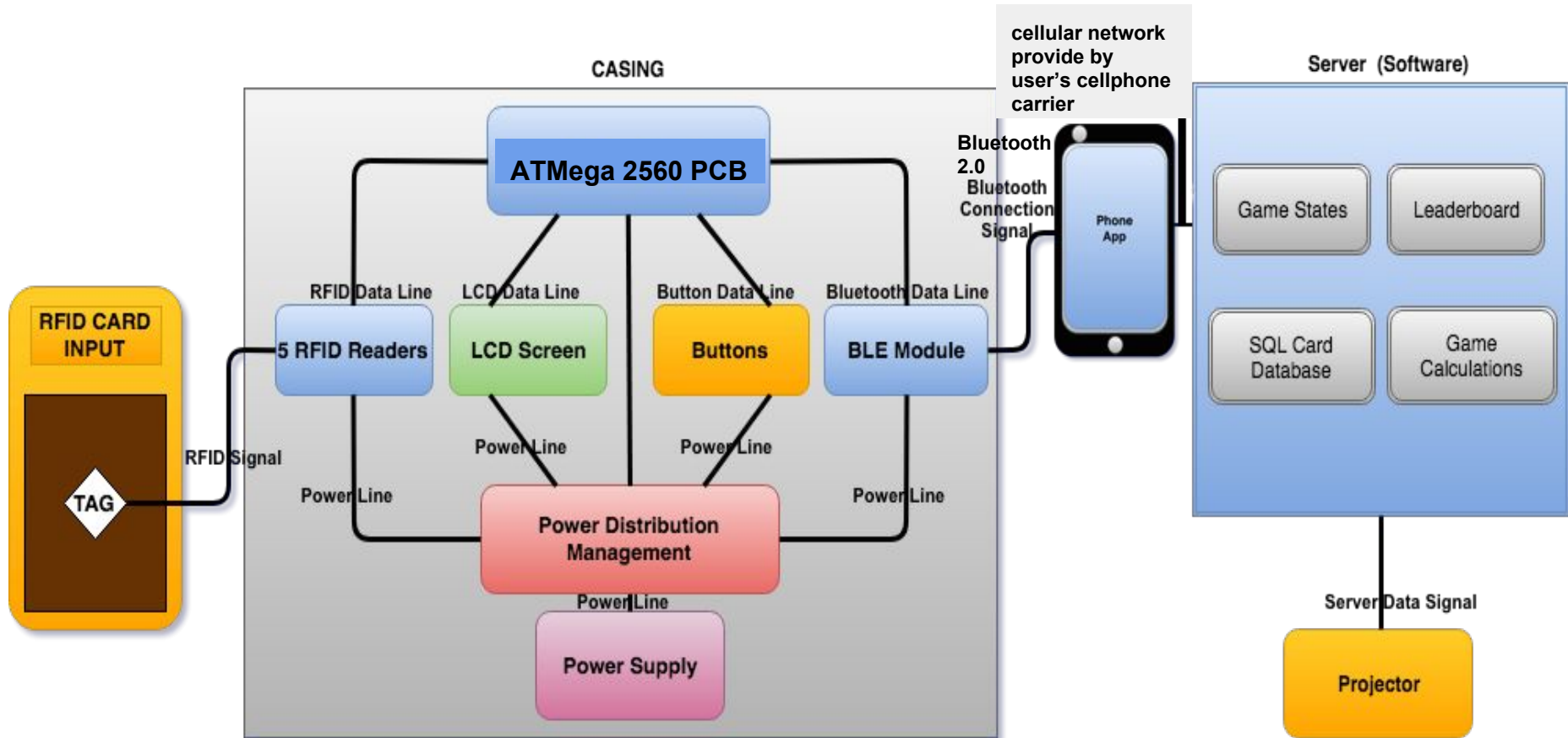Department of Electrical and Computer Engineering   Advisor: Prof. Jackson

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System Requirement

1. Minimum of 20 cards needed for each player, RFID Tags attached to each card

2. Wristband device is light enough to wear and hold still

3. Support 2 Player Mode (need 2 wristband devices)

4. Casing Meet Safety Standards

5. 4+ hours battery life

6. Inexpensive

7. Bluetooth as midway communication

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Block Diagram

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CDR Individual Responsibilities

- Jerry:
  - Enable communication between wristband device and server, and players login to server through mobile app.

- Hadi:
  - Design online web server that handles game implementation, functionalities, and databases.

- Xiaobin:
  - Power distribution for the system and PCB microcontroller Design that integrates an ATMega2560 Processor.

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Met CDR deliverables

- Jerry:
  - Mobile app registers players and enables communication between device and server.

- Hadi:
  - Designed online web server and full game implementation, functionalities, and databases.

- Xiaobin:
  - Power distribution for the system and PCB microcontroller Design that integrates an ATMega2560 Processor.

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Gantt Chart

ACTIVITY	MDR										CDR						FDR
	Dec.4	Dec.11	Dec.18	Winter break	Jan.22	Jan.29	Feb.5	Feb.12	Feb.19	Feb.26	Mar.5	Spring Break	Mar.19	Mar.26	Apr.2	Apr.9	Apr.16
Hadi: Finish App To Server Implementation																	

Gantt Chart from Team No.2

ACTIVITY	MDR										CDR
	Dec.4	Dec.11	Dec.18	Winter break	Jan.22	Jan.29	Feb.5	Feb.12	Feb.19	Feb.26	Mar.5
Hadi: Finish App To Server Implementation											
Hadi: Implement/Register Card Database											
Hadi: Implement Card Game Mechanism On The Server											
Jerry: Enable Bluetooth App To Login Players To Server											
Jerry: Test Communication Between BLE and Server For a Full Game											
Xiaobin: Research PCB Microcrontroller Design											
Xiaobin: Design PCB Integrating ATmega2560 Microprocessor											
Xiaobin: Order Parts and Print PCB											
Whole Team:Prepare and Present CDR											
Whole Team: move the code from andrino to PCB and testing											
Whole Team:Prepare and present CDR											
Whole Team: Complete additional features implementation											
Whole Team: Prepare and present FDR											

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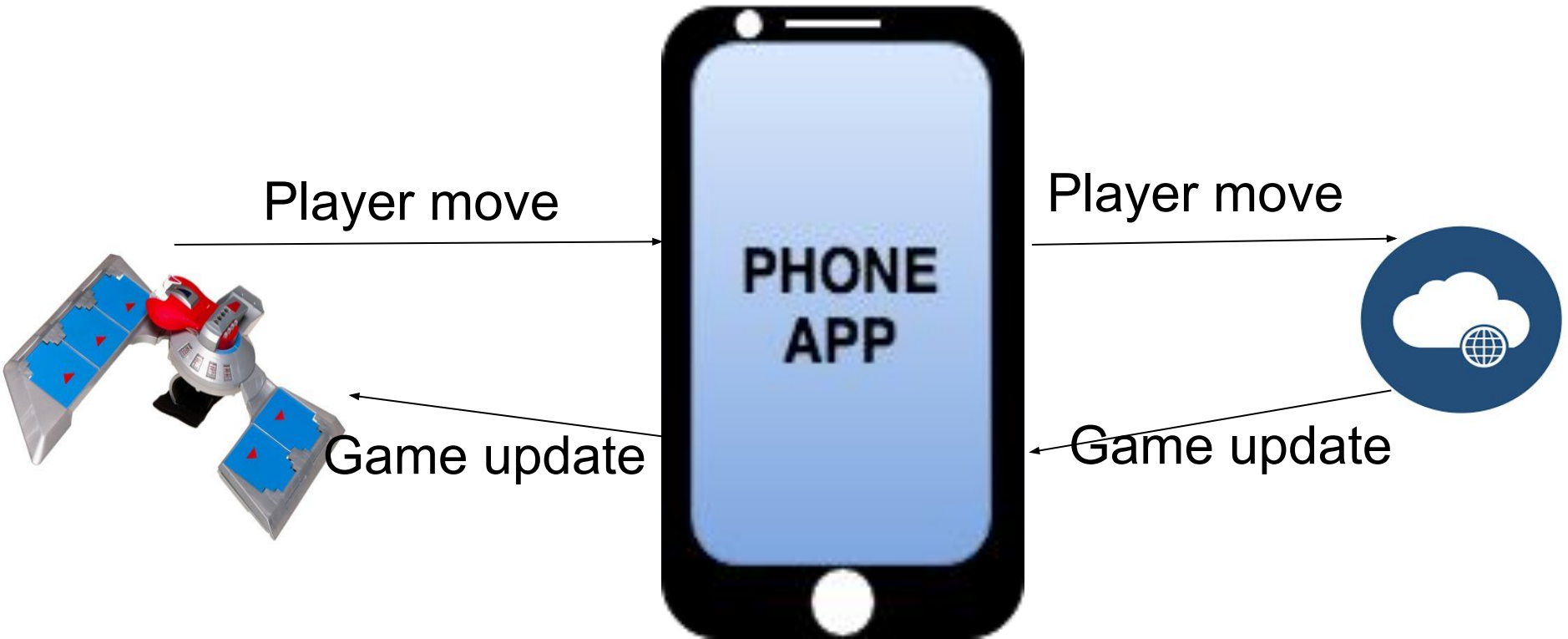
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Jerry: Smartphone Application

- Connects wristband device to phone through Bluetooth

- Enables user to connect to the server

- Allows wristband device to send messages to server(card IDs, Login messages)
- Allows server to send messages to device

HC-06 Bluetooth module

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Jerry: Mobile application diagram

Player move

Player move

PHONE
APP

Game update

Game update

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Hadi: Reader-Game Communication

- Hardware:
  - Arduino Mega2560
  - MFRC522 RFID Reader
  - LCD Display

- Software:
  - Arduino IDE - C

- Process:
  - RFID Readers detect new card ID
  - RFID reports ID details to Microcontroller
  - Microcontroller prints contents to LCD Display
  - Pushes ID through Bluetooth to Server

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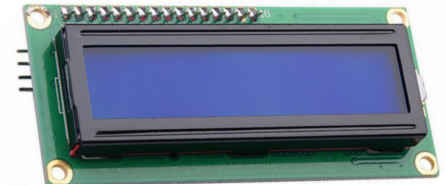
Client-Server Implementation

- Eclipse IDE:
  - Main Classes: Client.java, Server.java, Spectator.java

- Client Class:
  - Make connection with Temp Local Server (localhost)
  - Send and receive messages to/from server for testing

- Server Class:
  - Listen and accept new connections
  - Send and receive messages to/from client(s) for testing

- Spectator Class:
  - Connect viewers to current games
  - Allow for real time game viewing

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Server Hosting

- Google Cloud Platform:
  - Establishes an online client-connectable server running Server.java
  - Bulk of the game states, calculations, databases, and leaderboards.
- Security:
  - Uses RSA algorithm for Public-Key Encryption
  - Uses MD5 hashing for additional security

Google Cloud Platform

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Xiaobin: Power distribution

- BLE Module @ 5V
  - Standby Mode: <25 mW
  - Transmission Mode: 200 mW
- LCD 16x2 @ 5V
  - No Backlight: < 5mW
  - Backlight Enabled: 600~800 mW
- (RFID Reader @ 3.3V) x 5
  - Standby Mode: 170~210 mW
  - Peak: <480 mW
- PCB @ 5V
  - <100mW

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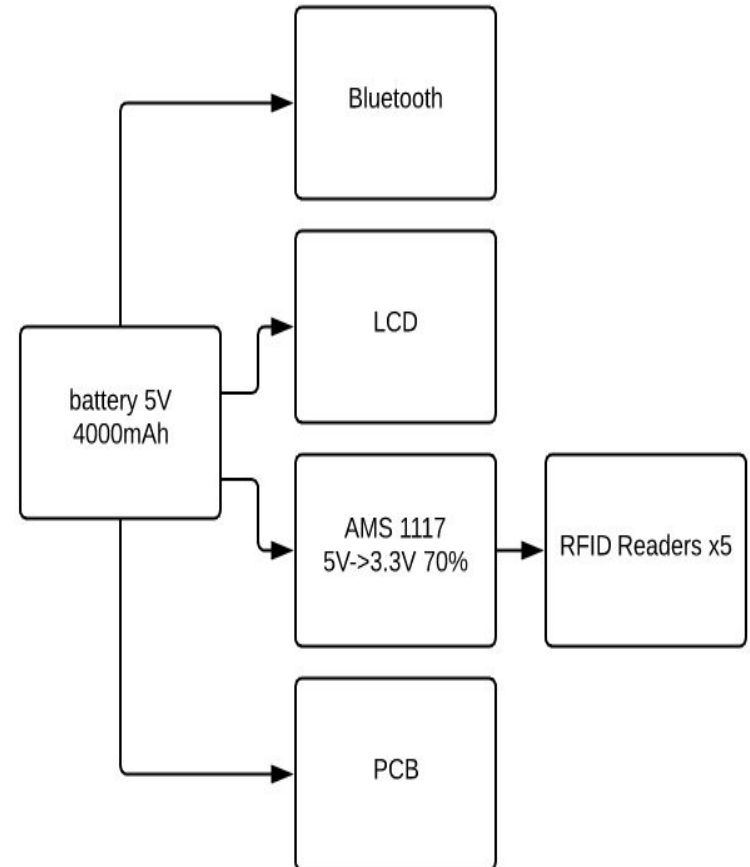
PCB Design Requirement

- Lower component count and smaller board size

- Pin layout matches Arduino Mega pinout

- Bypass capacitors from Vcc to ground

- LED indicators for power and transmission

- Pull-up resistor between RESET and Vcc/AVcc

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Programming PCB

- Use an CP2102 USB to UART TTL Module or equivalent

  Module to upload sketch onto the ATmega2560 chip

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FPR Deliverables

- Build 2 fully functional wristband devices with an integrated PCB Design.

- Allow users be able to start, play, and end a fully functioning game from their DuelReality systems without the use of a computer.

- Project game actions into a user's Field-Of-View through a connected projector

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Demo

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Thank You!

Questions?

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