CSC 473/HCI530 Sensors/IoT

Proposal

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Arduino Attendance Checker

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Introduction

- **Project Description**
    - Arduino Attendance Checker is a RFID-based project that allows students to use RFID tags to check into classes.
- **Motivation for the project**
    - Many professors across the world have to manually check attendance everyday.
    - It is tedious and a gigantic waste of time for students waiting to learn.
    - We would like to resolve this problem with a simple and effective solution.
    - RFID technology would be a good tool for this scenario
- **Project Goals**
    - Scan students' tags with an RFID scanner
    - Send tag IDs to application that retrieves data from a database
    - Identify a student with a tag ID
    - Display attendance information to user
    - Store attendance information and export it to a data file

Background

When we were doing research for this project, we discovered a past project on Arduino Project Hub which used the RFID technology for an attendance system (Embedotronics Technologies, 2019). Our project will be different from this one by how we store our data. Instead of putting attendance information on a Google Sheet, we will work with a SQL database. Also, we would like to have an application that gets data from Arduino and the database, and we found some sources that show how to do it in Java (Smith, 2021; and Zhong, 2018).

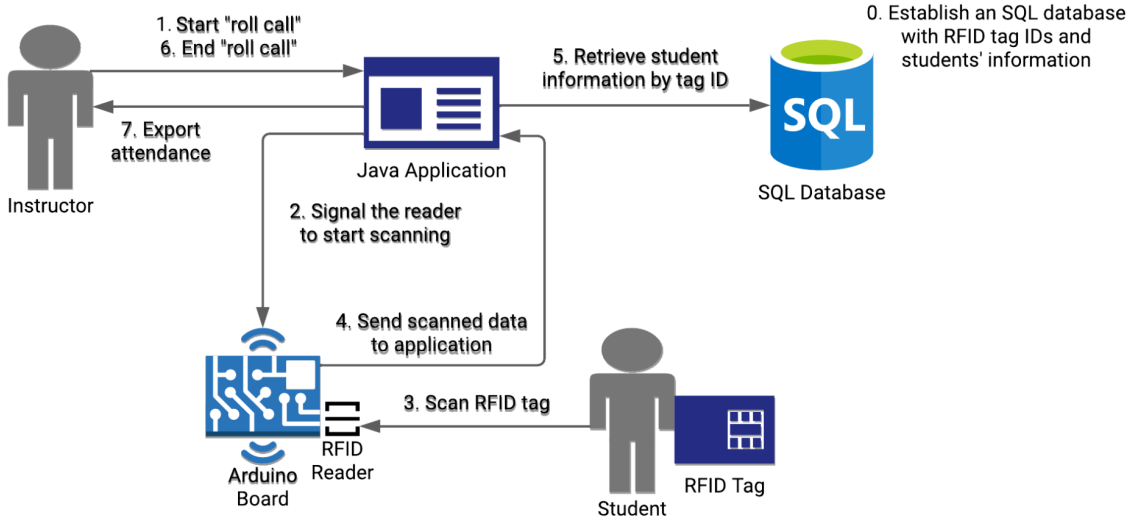
Proposed Idea

- **Project Description**
    - For the project setup, we will have an RFID reader connected to an Arduino board, and the board will be connected to a PC.
    - There will be a Java application that communicates with the Arduino. Before a class starts, the instructor can start a “roll call” from the application side. Once a “roll call” is started, the RFID reader will start scanning RFID tags.
    - When the RFID reader scans a tag, the Arduino will process the scanned data and send the ID number of the tag to the application.
    - The application will check with the pre-established SQL database of the corresponding class to get the information of the student who is associated with the tag ID. It also keeps track of a list of present students.
    - As the tag is scanned, the corresponding attendance data will also be displayed on the application.

- When the class starts, the instructor can end the “roll call” from the application side. Any tag that is scanned after that timestamp will be considered as late.
- By the end of the class, the application should have a list of present students, a list of late students, and a list of absent students by excluding those who are present. The instructor can then export these lists as some sorts of files (e.g. JSON, CSV, etc.) for later use.

- **Required Tools**
  - Hardware
    - Arduino UNO
    - RFID reader and tags
      - MiFare RC522 RF IC Card Sensor Module
      - 13.56MHz Cards
    - LED screen / green light and red light
    - Wires, USB cables, ethernet cables
    - Laptop computers (PCs)
  - Software
    - Arduino IDE
    - MySQL server
    - Library for RFID RC522
    - Java

- **Overview diagram**



- **Problems Foreseen**
    - **Issue:** Students forget their tags
        - **Solution:** Allow professors to manually put in students' information to check in
    - **Issue:** Students take others' tags and help check in
        - **Solution:** Out of our project scope
    - **Issue:** Students are not in the database
        - **Solution:** The system will notify the instructor to take corresponding actions

Plans/Schedule/Work Distribution

- Week of 2/28
    - Submit Proposal
    - Get the required tools ready
- Week of 3/7
    - Get the RFID reader functional
    - Display the scanned data on the serial monitor
- Week of 3/14
    - Spring Break
- Week of 3/21
    - Create a Java application to send commands to and retrieve data from the Arduino
- Week of 3/28
    - Have the Java application communicate with a SQL database to retrieve the information of a student by a scanned tag ID
- Week of 4/4
    - Work on application GUI
- Week of 4/11
    - Make the application have more features such as selecting the type of class
- Week of 4/18
    - Work on exception handling
        - Tackle foreseen problems
- Week of 4/25
    - Work on project write up

- Week of 5/2
    - Work on presentation
- Week of 5/9
    - Present the project

Reference

Embedotronics Technologies. (2019, May 6). *Attendance system based on Arduino and google spreadsheet.* Arduino Project Hub. Retrieved from https://create.arduino.cc/projecthub/embedotronics-technologies/attendance-system-based-on-arduino-and-google-spreadsheet-105621?ref=tag&ref_id=rfid&offset=5

Smith, J. (2021, February 17). *Practical java: Receive data in Java from an Arduino.* YouTube. Retrieved from https://www.youtube.com/watch?v=9pbsasv2izk

Zhong, X. (2018). *Communicate with Arduino through Java.* Purdue University. Retrieved from https://xiaozhon.github.io/course_tutorials/Arduino_and_Java_Serial.pdf