CSC 8223 – Internet of Things
Course Project

You are expected to design and implement a project regarding privacy leakage on mobile devices. This project is research orientated which consists of background survey, solution proposal, experimental validation, and observation and inference. You can choose your favorite programming language and platform to work on the project. A final project report is expected. Following are the detailed requirements.

Functions and Components

Part 1: Sensory data collection from smart devices. Please develop an app to collect sensory data from your smart devices and save it as *.csv file in your smart device. There are many sensors embedded in smart devices. You may collect data through sensors such as accelerometer, gyroscope, and rotation vector, etc.
Requirements:
   a. Collect sensory data with the sampling ratio of at least 20 HZ.
   b. Record the timestamp of the sensory data.
   c. Create a button in your app to start the collecting process and a button to stop.
   d. Save sensory data to a *.csv file.
   e. Need to keep recording sensory data even when the app runs at background.
   f. Plot the real time sensory data curve (optional).
Hints:
   a. You need to create a project in Android Studio.
   b. You need to create at least one activity and one service. You can interact with the app through activity (two buttons, maybe one textView to input filename).
   c. You need a service which is responsible for recording data.
   d. Store the data into the sd card so that we can export it later.

This part is actually what you have learned in Lab 3.

Part 2: Sensory data analysis. You are expected to utilize sensory data to do some predictions. Develop an app on a mobile device so that users can input an unshown password (a sequence of numbers/characters). After a user's input, the password can be predicted and shown on a computer screen wirelessly connected to the mobile device. The prediction is based on the collected sensory data during a user's input. You may need to train a model to do the prediction with any way you think proper. The prediction model should be clearly elaborated in your project report.
Requirements:
   a. Record the sensory data using the app you developed for password input.
   b. Decide how much sensory data need to be collected based on the prediction model you are going to use.
   c. Test and improve your prediction model thoroughly to achieve best possible accuracy.
Hints:
   a. To make a prediction, you need to know what features to be considered. In other words, you need to find out the patterns of the collected sensory data.
   b. In order to have higher prediction accuracy, you need a large data set and start your implementation as early as possible!

Phase 0

Please form your project team. Each team should have up to 2 members. A PhD student is expected to be the team leader. As a reward, a team leader can decide how to distribute 10 bonus points among all the team members at the end of the semester. If you cannot find a team, please notify the TA before Sep. 16th. Once you form a team, you cannot change your team. Send your team information to the TA by **Sep. 19th**.

Phase 1

In the first phase, a survey about the related knowledge and techniques needs to be conducted. You should have clear ideas about the challenges/problems to be addressed in your project, potential solutions, system architecture/components, datasets to be used for evaluation, experiment design, testing plan, etc. After Phase 1, the following sections should be ready for your project report (3-5 pages):

  a. Introduction: background and motivation, problem definition, system overview, etc.
  b. Methodology: potential algorithms/models/methods/tools, flow chart, system architecture/components, etc.
  c. Evaluation: evaluation plan, experiment settings, evaluation metrics, analysis methodologies, etc.
  d. Implementation Plan: timeline, expected outcomes, roles and task assignment of each team member. Note: If there is a significant difference of workload among team members, your team will be subject to inspection. You must distribute the workload fairly and reasonably. If your workload is significantly less than that of your teammate, you will not get full credits. If you are not satisfied with your teammates' performance/behaviors, you can email the instructor and TA. You will be notified if we receive complaints from your teammate.

We suggest you finish Phase 1 by **Oct. 20th**.

Phase 2

This phase is the implementation phase of your project. Your implementation should include your novel technical contributions, not simply an implementation of an available algorithm, framework, system, etc. There should be meaningful experiments and test cases to validate and evaluate your work. A thorough analysis is required to derive observations and inferences.

***Phase 2 submission: Project Report, Code, & Demo* (Deadline – Dec 5th)**

The project report constitutes **15% of your final project grade**. The report will be graded over 100 points. It should include the following sections (5-10 pages):

  a. Introduction (10 points): background and motivation, problem definition, system overview, etc.
  b. Methodology (40 points): proposed algorithms/methods, adopted models, flow chart, system architecture/components, justifications and analysis, etc.
  c. Evaluation (30 points): settings for experiments and demo, experiment results, observations and inferences.
  d. Learning outcomes (18 points): tasks accomplished by each team member, reasons for unaccomplished tasks or any failures, lessons learned from the project and teamwork experience.

Create a folder called "Sources". In this directory, include all your code and executables (if necessary) for your project. A *readme* file is required which includes which systems (with version info) are required to run the code as well as the step-by-step instructions on how to run your code. This part constitutes **5% of your final project grade.**

Team leaders: Please submit the project report and Sources folder as a **zip/tar file** to iCollege. Only the very last uploaded submission will be graded. Each team only needs to submit one copy.

Your team will demo your project on **December 5th**. All team members must be present. Each team will have **15–20 minutes** for the demonstration and Q&A. A group of users will test your password prediction app and determine its prediction accuracy. The accuracy results from all teams will be ranked, and your score for accuracy will be assigned based on your team's position in the class ranking. This accuracy score will account for **80% of your final project grade**.

Project submission and deadlines:

Phase	Deliverable/Submission	Deadline	Assessment
Phase 0	Sign up for a team.	Sep. 19th	N/A
Phase 1	Partial Report	Oct. 20th	N/A
Phase 2	Report - iCollege	Dec. 5th	15%
	Code - iCollege	Dec. 5th	5%
	Demo – In class, In person	Dec. 5th	80%