

CS 6359 OBJECT-ORIENTED ANALYSIS AND DESIGN

Summer 2020

Instructor: Dr. Kang Zhang

TERM PROJECT DESCRIPTION (50%)

1. Problem Description

1.1 *Coronavirus Tracking App*

To effectively prevent the wide spread of the Coronasvirus pandemic (COVID-19), tracking the status of the entire population in terms of the disease contraction and personal contacts is one of the essential but challenging methods. The most feasible solution for tracking the disease is to design and install a tracking application on smartphones. Such a virus tracking app (TrackApp for short) would ideally be installed on everyone's phone.

TrackApp enables phones to communicate with each other via Bluetooth at a given distance, by informing each other's disease status (infected, symptoms, contacted any who was infected, normal), and alarming the user. It would also inform a centralized disease contral system of its surrounding disease status and location via wifi once a high risk level is reached.

1.2 *Informal Requirements*

This project aims at design and simulation of an environment for Coronavirus Tracking Application system for smartphones (or TrackApp for short). The main objectives of TrackApp include locating people contracted with Coronavirus, alerting individuals who have been close to those contracted, and informing a central disease control system (CDC) of any high risk situation.

Assumptions (maybe unrealistic):

- All privacy issues have been taken care of. So this project needs NOT to consider such issues.
- All smartphones installed with TrackApp would turn on Bluetooth and communicate via Bluetooth.

Two essential phone facilities should be used: Bluetooth and Location tracking. Each phone carries a colored token marking the status of its user and initialized as below:

- **Red** – infected or test positive;
- **Green** – normal or test negative;
- **Orange** – having sympoms, or had close cotact with someone infected.

The token changes from green to orange or red according to the specified condition, from red to orange after the user is tested negative, and from orange to green after the user self-quarantined for 2 weeks.

Two phones within a distance of 5 meters or less would inform each other of their users' disease status by sending each other its token and location.

A **warning** signal is displayed whenever:

- The phone is within a distance of 5 meters of an infected person (a red token is received);
- The phone receives an orange token; or
- The location of the phone has a density between M and N persons per KM^2 .

An **alarm** signal is triggered and its own token is set to orange whenever:

- The phone is within a distance of 2 meters of an infected person (a red token is received); or
- The location of the phone has a density higher than N persons per KM^2 .

The entire status including the locations within the past 7 days is sent to CDC periodically every week, and as soon as the token becomes red.

The project must be able to demonstrate the scenarios of all TrackApp's user's 3 statuses, plus the token turning red with transmission of the situation to CDC. TrackApp should allow its user to retrieve relevant disease and location data whenever desired.

2. Milestones and Deadlines

The project is divided into two phases:

2.1 **Use Case and Analysis Phase.** Deadline: **6 July 2020** (document and PPT) via eLearning. Deliverables of this phase include a **presentation** on **7 and 9 July 2020** (10%) and a **well formulated document** (10%) representing the use case and system analysis models, which include:

- 2.1.1 A detailed use-case model. You may need to use a combination of use case diagram, sequence diagram (or collaboration diagram), and/or activity diagram, plus English notation to describe the model.
- 2.1.2 An analysis class model that identifies and represents all building blocks of the app and relationships between them at analysis level.
- 2.1.3 A GUI interface model describing the major graphic user interfaces and demonstration of the system.

2.2 **Design and Implementation Phase.** Deadline: **27 July 2020** (document and PPT). Deliverables of this phase include a well-defined design model, a demo (20%) and a presentation on **28, 30 July 2020** (10%), including:

- 2.2.1 A class model representing classes and their relationship at design level (static design).
- 2.2.2 A state-chart model describing state transitions for major classes in 2.2.1.
- 2.2.3 An interactive diagram (collaboration diagram or sequence diagram) describing ALL possible application scenarios.
- 2.2.4 Any algorithms (based on the class design) for implementing main functions.

2.2.5 Complete and documented source code.

2.2.6 Project demonstration cases including sample execution runs and results collected.

The two phases of the project will be graded separately. No **LATE** project will be accepted unless evidence is provided for an emergency situation for which all students in a group must miss the class on the due date.

Two important requirements for the project documentations are: (1) Rationale: you must provide clear and adequate explanation on different design alternatives for each of the models, and discuss why you choose a specific way for building the analysis and/or design models of the system. (2) Traceability: you must **CLEARLY** and **EXPLICITLY** show that the relationship between different models and different parts of the same model. For example, given a design class, you need to show where the class comes from, which requirements this class of objects satisfy or contribute to, and the dependency between this class to others.