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INSO4101

A3 PROBLEM SOLVING

1. **Define the Problem:**
    a. Ideal State: App that tracks routes, location and remaining time on campus buses to bus stop and buses to user.
    b. Current State: No app that tracks routes, location and gives remaining time to specific bus stop.
    c. Missing Gap & Problem: No tracking mechanism provided from bus stop to campus buses and no mechanism provided from bus to user.
    d. Goal: Create app that tracks bus location and gives an estimate location, route and time to user's location.
    e. Benefit: Reduces time for pedestrians waiting for the bus and permits analysis on bus traffic.
2. **Containment:**
    a. This will be implemented in a combination of hardware/software to avoid protest by bus drivers.
3. **Breakdown the problem:**
    a. Why do we need more efficient buses?
    b. Who would use this app?
    c. When will this app be beneficial?
    d. What will the users gain from this?
    e. Why do we need to track bus location?
    f. What algorithms would we use?
    g. How would this affect the existing pedestrian traffic?
    h. How often would our users benefit from the app?
4. **Define Goals:**
    a. Increase naturality from users and bus drivers.
    b. Define efficient routs for buses in the campus.
5. **Root Cause Analysis:**
    a. Lacking existing software and hardware_
        i. Lacking existing hardware and software to track buses and students' traffic.
    b. Lack of naturality_
        i. Students don't feel the necessity to use app to estimate time for bus between departments.
6. **Countermeasures:**
    a. Obligate users to download app before using bus service.
    b. Design a simple interface for improve user experience.
    c. Design simple hardware device for bus and bus stop.
    d. Use existing/design map tracking software as a feature.
    e. Create incentive for users to download/use the app

7. **Implementation:**
    a. Implement existing map tracking software as Google Maps.
        i. If it cannot be used, then design our own algorithms using basic principles in topography.
        ii. Develop software in durable code, such that it takes time to reach obsolescence's.
    b. Implement existing hardware for real-time tracking.
        i. If it cannot be done, then implement our own hardware for tracking.
        ii. Develop hardware using IEEE standard hardware to avoid obsolescence's.
8. **Monitoring Validation:**
    a. Confirm effectiveness of the countermeasure during the process of development and launch.
    b. Count real-time users of the app.
9. **Standardize and improve:**
    a. Implement same version and tracking soft/hardware in all the buses prior to launch.
    b. Implement same version and tracking software in all user's app prior to launch.
    c. During improvement of version, develop mechanism to update all app and hardware in buses.