LBYCPD2

Laboratory Activity 1

**Conceptualizing Problem Statement for Software Project**

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# Objective:

To conceptualize and prepare for a software project.

# Requirement:

Desktop Computer/Laptop, Office Productivity Tool (MS Word)

# Discussion:

The problem statement is the initial starting point for a project. It is basically a statement that everyone on the project agrees with that describes what will be done at a high level. The problem statement is intended for a broad audience and should be written in non-technical terms. It helps the non-technical and technical personnel communicate by providing a description of a problem. It doesn't describe the solution to the problem. The input to requirement engineering is the problem statement prepared by customer. It may give an overview of the existing system along with broad expectations from the new system. The first phase of requirements engineering begins with requirements elicitation i.e., gathering of information about requirements. Here, requirements are identified with the help of customer and existing system processes. So, from here begins the preparation of problem statement. So, basically a problem statement describes “what” needs to be done without describing “how”.

# Example:

**Topic: DLSU** Scheduling and Reservation System

Scheduling and reserving rooms in De La Salle University or corporation is difficult. Different events such as lectures, and meetings need to be scheduled efficiently and easily. Some events may be recurring or may happen only once. Each event has its own specific needs, some of which are required and others that are optional. Consider the problem of scheduling rooms for DLSU courses. Most courses meet regularly, but some meet only a few times. Room capacity is generally the determining factor in scheduling, but location is also of great importance. Scheduling engineering classes, meetings, and events in DLSU is clearly desired for comfort, and ease of finding the classroom. Finding a room in the DLSU itself is equally challenging. Rooms are limited and often scheduled far in advance by faculty or administrators. Quite often these rooms are reserved “just in case” and may not even actually be used, adding to the frustration of students looking for a quiet area to work on a project or rehearse a presentation. Equally annoying is having a meeting interrupted because the schedules conflict or finding “squatters” in a room that you reserved weeks ago.

# Exercises:

1. Provide a statement of the problem for each topic below:
   1. **Automated Water Quality Monitoring System**
   2. **Automated Garbage Segregator**
   3. **Real-time tracking system Application for LRT and MRT**
   4. **Automated village vehicle entry/exit system**
2. Provide one to two pages of problem statements. This will help to know the current problems that need urgent computer engineering solutions.
3. **Automated Water Quality Monitoring System**

Water pollution has gravely affected most of the world’s water systems and has a negative impact on everyone’s health. As such, water quality monitoring is crucial in ensuring the safety of all those that consume it. An automated water quality monitoring system will help reduce the negative impact of chemicals and microbes people may ingest from water and prevent avoidable fatalities and illnesses such as Cholera, Diarrhea, Dysentery, Hepatitis A, Typhoid And Polio. While most first world countries like Singapore and China ideally have potable tap water, not many other countries have this luxury, including much of Southeast Asia and the Philippines. At present, most water quality monitoring systems are often manual, time consuming and prone to human error. An automated water quality monitoring system will not only be more efficient but also more accurate compared to the manual solution. The system should ideally consist of sensors and analytical devices that will continuously measure and observe certain parameters like pH, turbidity, dissolved oxygen, and levels of heavy metals and microbial contaminants among others. This system can utilize the pH sensors to monitor acidity and detect contamination from industrial waste or acid rain. Turbidity sensors measure the cloudiness from sediment or particulate matter using nephelometric scattering and absorption principles. Dissolved oxygen sensors determine the amount of oxygen that is available for aquatic life forms. The heavy metal sensors can specifically quantitate the concentrations of toxic elements like arsenic, mercury,cadmium,etc. using techniques like atomic fluorescence spectrometry. Lastly, microbial detection can help enumerate and identify all dangerous levels of pathogens through the use of advanced bioassay panels. Rather than relying on sporadic manual inspections, authorities can just use the dashboard insights in order to identify hazardous areas, which helps in protecting the ecosystem and prevent health impacts through data-driven decisions about contamination events and treatment measures. Citizens also benefit from public visibility into granular water safety metrics.

1. **Automated Garbage Segregator**

There are nearly eight billion people all around the whole world, with nearly 114 million in the Philippines as of 2021. As a result, this will undoubtedly come with a lot of trash, waste, or garbage. In the Philippines, it is required by Republic Act. 9003 that households segregate garbage as “nabubulok” (biodegradable) and “di-nabubulok” (non-biodegradable), and as of 2021, it is estimated that nearly 62% of households do practice such segregation. However, some local government units (LGUs) have yet to strictly enforce the law, in addition, the act does not exactly mandate the separation of paper from metal and the like.

Segregation is incredibly important as the population continues to grow. Because instead of specific trash ending up in materials recovery facilities, composting sites, and hazardous waste treatment plants, it ends up piling in our scarce sanitary landfills and water bodies. Waste must to be appropriately segregated, transported, handled, and disposed of in order to reduce the dangers to the public and environment. Littering and discarded waste on open land can attract a variety of disease-causing bacteria and viruses. In lowland areas, the breakdown of combined dry and moist trash produces harmful greenhouse gasses.

1. **Real-time tracking system Application for LRT and MRT**

Public transportation systems in the Philippines like the LRT and MRT aim to provide efficient, affordable, and reliable mobility across metro areas in Metro Manila. However, delays, unexpected stoppages, and long intervals between trains are common issues that negatively impact commuter experiences and access. There is a lack of publicly visible real-time monitoring and arrival prediction information for mass transit riders in most regions. Without live route tracking such as the one seen through the Grab App, and next train ETAs, passengers face difficulty planning transfers, managing schedules, and minimizing individual wait times. This then leads to compounding system congestion as travelers resort to alternative modes, lowering mass transit adoption.

The proposed real-time tracking system web/mobile application addresses all, if not most of these transportation visibility shortcomings through modern IoT and predictive analytics. By tapping into control centers and leveraging ridership data, the software can geo-locate all transit units and update arrival forecasts dynamically. On the consumer side, this means improved train ETAs, personalized notifications, route change alerts, and expected transfer coordination. For providers, enhanced visibility facilitates opportune maintenance, failure identification, and even automated scheduling around demand. By creating these user-friendly monitoring apps, it allows for more enjoyable, informed public transportation experiences, upholding mass transit viability.

1. **Automated village vehicle entry/exit system**

Villages require vehicle entry and exit systems to track who’s entering and leaving and if they are a resident of the village or not. Car stickers are normally used to identify whether a vehicle belongs to a resident of the village. In combination with stickers, villages normally need a security guard or staff to let the vehicles through. An automated village vehicle entry-exit system will bypass the need of staff manning the gates and also allow for greater security. Village stickers can be easily forged by individuals. Having an automated village vehicle entry-exit system will allow for increased safety as those who forge stickers to enter villages may not enter anymore. Commonly, these automated village entry-exit systems require a chip in the sticker to decide to allow or deny vehicles from entering a village. RFID technology, license plate recognition and automated gates are commonly used to scan residents’ stickers and license plates to allow entry into a village, leading to enhanced security as it ensures that authorized vehicles are the only ones allowed to enter the village.