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| Ateneo de Manila University |
| Loyola Schools Parking Lot Management System |
| Technology Plan |

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| Raymond JNC Cruz  2/18/2014 |

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# Introduction

Parking lot management systems are common in Europe. They are usually installed in urban environments such as cities and metropolitan areas. These systems are usually automated and have proven efficient in handling parking traffic. Similar systems are present here in the Philippines and are usually seen in shopping malls and commercial areas, such as SM, Robinsons, and Eastwood.

# Problem Definition

Finding a parking spot is one of the everyday problems of a Loyola Schools student. A typical student would enter each LS parking lot to find a spot, which takes a significant amount of time and fuel. This phenomenon is usually encountered by students which arrive at the campus during non-peak hours, by which then the parking lots are almost fully occupied.

# Scope

The project will be implemented in the five parking lots in the Loyola Schools campus. These parking lots are the East, West, North, Northwest, and JSEC parking lots.

# Impact

The project aims to decrease the amount of time a student motorist takes while searching for a parking slot. Free parking slot counters placed in strategic areas will inform the student if there are remaining vacant slots in the parking lots. Availability indicators within the parking lot will direct the student to vacant spots, if there are any. This solution will save the student time and resources, which is invaluable to most Loyola School students.

# Technology

## Parking Slot Counter

The counters simply are LED displays that show the number of slots available in the parking lot. The LED displays are housed in a protective casing. The counters are interfaced with the overall system via underground protected cabling pipes.

## Parking Slot Availability Indicator

The availability indicators are composed of the LED indicator light, sensor, and protected cabling pipes. The LED indicator lights are mounted on top of a post, and emit a red or green light depending on its respective sensor’s input. The sensors use infrared signals to detect if a vehicle is occupying its respective parking slot. Both of these components, along with the parking slot counter, are linked via protected cabling pipes, which are mainly underground. The cables are encased in steel or PVC pipes to provide protection.

## Software

The system is administered through a management application installed in a terminal that is connected to the system’s infrastructure.

# Implementation Plan

## Development

The development phase of the project will take place over the course of 8 months. All activities necessary prior to the implementation phase will be done during this stage, such as system analysis and design, market analysis, stakeholder analysis, and all prerequisite legal functions.

## Implementation

Once all prerequisite activities are done in the development phase, the implementation stage can begin. Deployment of the system is essentially a construction project, since most of the hardware involved will need to be integrated into the Loyola Schools parking lots. The parking lots will be excavated and the “outdoor” components of the hardware will be installed. Since the parking lots need to be usable for students, the lots will be partitioned and each partition will be developed successively. The server and workstation will be installed inside an office, most probably the Associate Dean for Student Affairs Office. New personnel will need to be hired for the purpose of administering and managing the system. This phase will take place over the course of 2 months, preferably during the summer months of April and May, wherein there is the least student traffic.

## Maintenance and Support

Hardware maintenance and support will be provided by the customer support department of the vendor. Software maintenance and support will be provided by the software developer.

# Cost Benefit Analysis

## Assumptions and Givens

The computation for the cost-benefit analysis is based on the given assumptions and values:

* Loyola Schools student population: 8,000 students
* A student pays an average tuition fee of Php 200,000 annually
* Tuition fees will be increased by 0.015% to gain project revenue

## Payback Period

Based on NPV values, the project will achieve payback in **3.06 years** after it starts.

## Tables and Figures

|  |  |  |
| --- | --- | --- |
| COSTS (Monthly): |  |  |
|  | Development | Production |
| Hardware | 9,039.54 | 0.00 |
| Software | 16,666.67 | 0.00 |
| Personnel | 0.00 | 13,500.00 |
|  |  |  |
| BENEFITS (Monthly): |  | 20,000.00 |
| Scenario Values: |  |  |
| Development Period (Months): | | 8 |
| Interest Rate (Annual): | | 5.0% |
| Projected Changes (Annual) | |  |
| Production Costs: | | 5.0% |
| Production Benefits: | | 3.0% |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PROJECTED COSTS: |  | |  | | |  | |  | |  | |  |
|  |  | |  | | |  | |  | |  | |  |
|  | Year 0 | | Year 1 | | | Year 2 | | Year 3 | | Year 4 | | Year 5 |
| Hardware | 72,316.33 | | 0.00 | | | 0.00 | | 0.00 | | 0.00 | | 0.00 |
| Software | 133,333.33 | | 0.00 | | | 0.00 | | 0.00 | | 0.00 | | 0.00 |
| Personnel | 0.00 | | 162,000.00 | | | 170,100.00 | | 178,605.00 | | 187,535.25 | | 196,912.01 |
|  |  | |  | | |  | |  | |  | |  |
| Annual Costs | 205,649.67 | | 162,000.00 | | | 170,100.00 | | 178,605.00 | | 187,535.25 | | 196,912.01 |
| NPV of Annual Costs | 205,649.67 | | 154,285.71 | | | 154,285.71 | | 154,285.71 | | 154,285.71 | | 154,285.71 |
| NPV of Cumulative Costs | 205,649.67 | | 359,935.38 | | | 514,221.10 | | 668,506.81 | | 822,792.52 | | 977,078.24 |
|  |  | |  | | |  | |  | |  | |  |
|  |  | |  | | |  | |  | |  | |  |
| PROJECTED BENEFITS: | |  | |  |  | |  | |  | |  | |
|  | |  | |  |  | |  | |  | |  | |
|  | | Year 0 | | Year 1 | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
| Annual Gross | | 0.00 | | 240,000.00 | 247,200.00 | | 254,616.00 | | 262,254.48 | | 270,122.11 | |
| NPV of Annual Gross | | 0.00 | | 228,571.43 | 224,217.69 | | 219,946.87 | | 215,757.41 | | 211,647.74 | |
| NPV of Cumulative Gross | | 0.00 | | 228,571.43 | 452,789.12 | | 672,735.99 | | 888,493.40 | | 1,100,141.14 | |
|  | |  | |  |  | |  | |  | |  | |
| Annual Net | | (205,649.67) | | 78,000.00 | 77,100.00 | | 76,011.00 | | 74,719.23 | | 73,210.10 | |
| NPV of Annual Net | | (205,649.67) | | 74,285.71 | 69,931.97 | | 65,661.16 | | 61,471.70 | | 57,362.03 | |
| NPV of Cumulative Net\* | | (205,649.67) | | (131,363.95) | (61,431.98) | | 4,229.18 | | 65,700.88 | | 123,062.91 | |