

THE OPEN UNIVERSITY OF SRI LANKA

Faculty of Engineering Technology
Department of Electrical & Computer Engineering
Bachelor of Software Engineering

**FINAL EXAMINATION – (2011/2012)****ECX4267 – Software Engineering Concepts****CLOSED BOOK EXAM**

Time Allowed: 3 hours

Date: 03rd March 2012

Time: 0930 – 1230 hours

INSTRUCTIONS TO CANDIDATES

1. This question paper contains one question in **SECTION A** and four questions in **SECTION B** on 4 pages.
2. Answer **ALL** parts in **SECTION A**.
3. Answer **any TWO** questions from **SECTION B**.
4. State your assumptions (if any) clearly

Continued...

SECTION A:
Answer ALL questions

Question 01

The following scenario is based on Online *SmartBike System*. (Source: <http://www.smartbike.com>)

Refer attached article in APPENDIX for more details

The popularity of public bike sharing is easily explained as cities around the world are fighting traffic congestion, struggling to reduce pollution and working hard to extend their networks of public transportation.

SmartBike System is especially designed for frequent use by different users and under varied conditions. The bikes are typically used between 10 to 15 times a day, with an average ride of 20 minutes, that makes over 4 hours of continuous use per day!

SmartBike System has been specifically designed for self-service use

SmartBike stations can be found at all central and convenient locations throughout the city. Only 3 simple steps are necessary to ensure the user care-free and individual transport:

REGISTER - offer various methods of registration to suit the needs of the user and city. These include Website, Call Centre, Registration Office and WAP. A user card or code will be made available upon registration.

RIDE - Swipe your card or type in your code at a SmartBike station and it will release a bike for you to ride.

RETURN - When you have reached your destination, return your bike to any SmartBike station. The bike is automatically locked and ready for the next user!

Software application is a new piece of software which will be given a release number of 0.1. Future release numbers will follow the common number convention.

- | | | |
|-------|---|------------|
| (i) | Draw detail level USE Case diagram of the system | [10 Marks] |
| (ii) | Draw the prototype user screens (GUI) of the system | [10 Marks] |
| (iii) | Draw a flowchart to represent the algorithm of the system. | [15 Marks] |
| (iv) | Draw Class diagram for the system. | [15 Marks] |
| (v) | Draw Sequence diagrams of the system | [10 Marks] |
| (vi) | Write top level pseudo code to implement "REGISTER" operation | [10 Marks] |

SECTION B:
Answer any TWO questions

Question 02

- (i) Briefly describe the categories of software maintenance, give examples for each category from "*SmartBike System*" above *Question 1* [12 Marks]
- (ii) Briefly describe the software configuration management and why it is important for the software maintenance. [03 Marks]

Question 03

- (i) What are the hardware and software faults? Give an example to each fault. [05 Marks]
- (ii) Briefly describe the two ways that a system's ability to tolerate failure by giving examples. [10 Marks]

Question 04

- (i) Compare and contrast the three techniques which are used in redundancy fault-tolerant design. [10 Marks]
- (ii) What are the fault tolerance techniques? [05 Marks]

Question 05

- (i) Briefly explain why software project management is important in software development process? [07 Marks]
- (ii) Briefly describe by giving examples, how you keep *software scheduled path* and *software development path* close together in software development process? [08 Marks]

SmartBike System

Historians of public bike sharing services all credit Clear Channel Outdoor with a pioneering role. The very first SmartBike installation was ours in the French city of Rennes in 1998 and since then SmartBike has rolled into many more European and American cities.

The popularity of public bike sharing is easily explained as cities around the world are fighting traffic congestion, struggling to reduce pollution and working hard to extend their networks of public transportation.

With more than a decade of experience, Clear Channel continuously works on developing and improving the system, keeping up to date with today's user and city requirements.

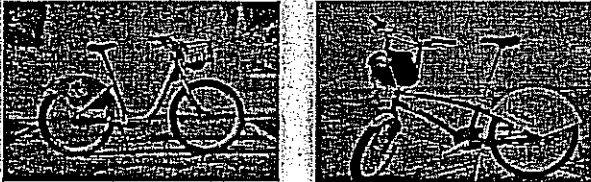


the bike

SmartBikes are especially designed for frequent use by different users and under varied conditions. The bikes are typically used between 10 to 15 times a day. With an average ride of 20 minutes, that makes over 4 hours of continuous use per day!

It is clear that a public bike has different requirements than a private one. It needs to be strong and must tolerate rough handling and at the same time be easy manoeuvrable and light for the user. But most importantly it must be safe and comfortable.

Robust, innovative, comfortable and easy to maintain, SmartBike has been specifically designed for self-service use.



maintenance & logistics

It goes without saying that maintenance and logistics form an essential part of the SmartBike system.

In order to guarantee a smooth and problem free management, our service team offers 24-hour assistance.

Maintenance and repairs are performed both locally at the stations as well as in the warehouse.



Circulating redistribution vehicles ensure full availability of bikes at any time of the day.

The vehicles are automatically warned to pick up bikes from fuller docking stations and replenish the stations with a low amount of bikes.

get a bike and ride it!

SmartBike stations can be found at all central and convenient locations throughout the city. Only 3 simple steps are necessary to ensure the user care-free and individual transport:

REGISTER - We offer various methods of registration to suit the needs of the user and city. These include Website, Call Centre, Registration Office and WAP. A user card or code will be made available upon registration.

RIDE - Swipe your card or type in your code at a SmartBike station and it will release a bike for you to ride.

RETURN - When you have reached your destination, return your bike to any SmartBike station. The bike is automatically locked and ready for the next user!



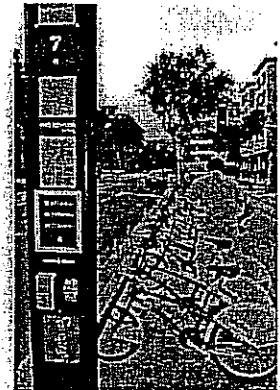
the docking station

This is where the user truly 'meets' SmartBike in its proper environment: on the streets of the city.

The station consists of the 'docking modules' which lock the bicycles in place, ready for use, as well as the vertical interactive and informative column that identifies the user.

Taking into account the immediate needs of the user, the station is user friendly and offers various ways to access the bikes, while focusing on simplicity and speed.

The modular format is specially designed for easy and fast installation, expansion and maintenance and saves public space by facilitating a high density of bikes per station.



SmartBike is good for you!

No doubt about it, SmartBike is a great invention and positive for everyone who needs to move around within their city.

Here are some of the many advantages of SmartBike:

- Provides fast and flexible transport
- Reduces pollution
- Improves public health
- Reduces traffic congestion
- Increases use of public transportation
- Reduces need for parking spaces
- Increases traffic awareness & safety
- Improves city identity

