EGE UNIVERSITY
COMPUTER ENGINEERING

SOFTWARE ENGINEERING THIRD REPORT

REQUIREMENTS ANALYSIS REPORT

Project Name

Driver Assistant System (DAS)

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INCLUDES

Tip: It is recommended to open the navigation pane on the view tab to allow easy access within the report.

1. INTRODUCTION

In this report, the architecture of the system will be defined in order to indicate the major components and relations between them. Selected architectural model will be explained. Also other architectures that we do not see appropriate for our project will be explained. Architecture will be shown as a block diagram and a class diagram.

2. ARCHITECTURE DEFINITION

2.1 – Architectural Model

We chose Repository Pattern for our system architecture. In Repository Pattern, all data in the system is managed in a central repository that is accessible to all system components. Driver Assistant System is a data-driven system, there are cameras and sensors which supplies data for subsystems. These subsystems use this data and convert into information for driver or control the car if necessary. And subsystems are independent, they can be changed separately.

2.2 – Major Components

- **Phone Pairing System**
  It connects the drivers phone with system via bluetooth and sends "pairing is done succesfully" message to the driver.
- **Forward Collision Warning**
  The Forward Collision Warning system shall scan the traffic ahead 20 times per second up to 500 feet in front of the car and then warns the driver to brake or steer if a hazard is in the path.
- **Collision Warning System**
  Depending on the instantaneous speed of the driver and the vehicle ahead, if the calculated following distance falls below the safe following distance, car shall be braked and stopped to prevent collision due to metrics such as vehicle type, speed and weight.
- **Blind Spot Warning System**
  It detects the objects in blind spots by using motion sensors located at these points and if the system detects an object, the notification light on the mirror ,in the direction in which the vehicle is detected, shall warn the driver by flashing.
- **Sensor Control System**
  It gets information from sensors.
- **Speed Control System**
  It controls the vehicles speed if it is necessary.
- **ESP(Electronic Stability Program)System**
  Also referred as Dynamic Stability Control (DSC), is a computerized technology that improves a vehicle's stability by detecting and reducing loss of traction (skidding).
- **Suspension Tuning System**
  It sets the car suspension tuning any level that driver chooses from the car settings menu.
- **Automatic Wiper System**
  Wiper system is a switching device activated by rainfall, it wipes the windshield automatically.
- **High Beam Control System**
  It switches to low beam from high beam automatically if system detects an oncoming car.
- **Lane Keeping Assistant**
  If the driver begin to leave the center of a detected lane without signaling, the steering adjusts to keep the driver centered.
- **Parking Assistant System**

It refers to an automated parking aid which utilises sensors and it allows the car to do most of the work itself when parking.

- **Automatic Headlight System**
  It is located in the front bumpers of the car and switchs on the headlights automatically when the weather is dark.
- **Humidity Detection Sytem**
  It turns on the front and rear fog lights automatically when the weather is foggy.
- **Visibility Distance Calculation System**
  It calculates the visibility distance automatically when weather is foggy, according to Visibilty Distance Table.
- **Route Calculation System**
  It calculates possible routes via GPS, according to some criterias such as distance cost, distance and traffic and presents the optimum route in each category to the driver.
- **Intelligent Speed Adaptation System**
  It gets the location of the car via GPS and indicates the speed limit according to that location and shows this to the driver in a message box.
- **Score Calculation System**
  It calculates the drivers score by calculating rules and sends a report to the driver.
- **The Secondary Anti-Collision System**
  It is a system which connected to the ABS unit prevents the vehicle from causing a second collision using detection of a primary collision by the airbag control unit.
- **Image Processing System**
  It detects Pedestrian, vehicle and road lanes via the camera which located on the rearview mirror .
- **Automatic Breaking System**
  It combines sensors and brake controls to help prevent high-speed collisions.
- **Seat Belt Warning System**
  It warns the driver when seat belt is not fastened.
- **Fatigue Detection System**
  It uses the camera at the rearview mirror to detect the drivers face and calculate the drivers level of fatigue with machine learning technologies and notifies the driver when it notices a distraction.
- **Uncontrolled Wheel Warning System**
  It uses weight detection and touch sensors to detect the steering wheel grip and when the steering wheel is released for 3 second by driver, the system shall give ‘uncontrolled wheel’ warning and also warns the driver audibly.

- **RPM-system**
  The RPM system warns if the driver drives the vehicle at high or low rpm.
- **Sign Detection System**
  This system consists of a forward-facing camera on the rearview mirror, which scans the road ahead for traffic signs and this camera is connected to character recognition software, which then makes a note of any changes described by the signs, and relaying it onto the car’s instrument panel to notify the driver.
- **Login System**
  It allows user to login, checks if the password is valid.

3. Explaination of Other Architectures

CLIENT-SERVER PATTERN

In this pattern, the functionality of the system is organized into services, with each service delivered from a separate server and clients are users of these services and access servers to make use of them. But in DAS, subsystems are not distributed across a network and there is only one user at a time.

THE MODEL-VIEW-CONTROLLER PATTERN

This pattern is used when there are multiple ways to view and interact with data or future requirements for interaction and presentation of data are unknown. But in DAS, there are not multiple ways to interact with data. Data is used for calculation by the system in a specific way and presentation of data is limited because it should not be distractive.

THE PIPE AND FILTER PATTERN

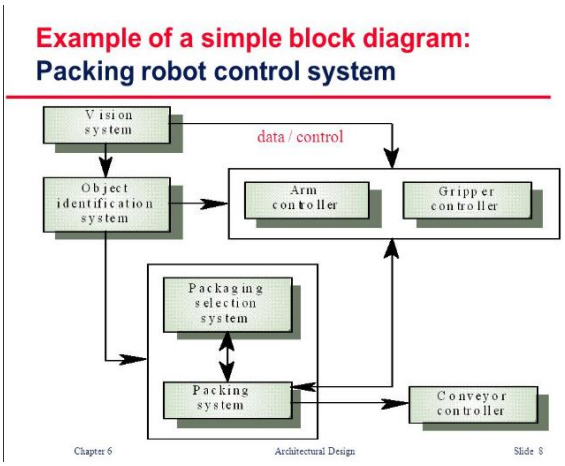
This pattern is used in data processing applications (batch/transaction based) where inputs are processed in separate stages to generate related outputs. But in DAS, components are independent and the data does not flow from one component to another for processing.

THE LAYERED ARCHITECTURE PATTERN

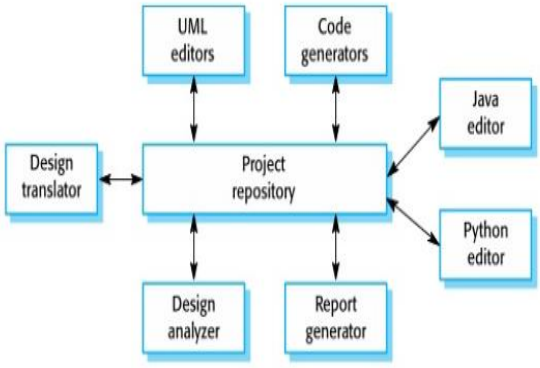
This pattern is used when building new facilities on top of existing systems or when there is a requirement for multi-level security. But in DAS, subsystems are not built on existing systems and the possibility of data is being reached in an unsafe way is very low.

4. REFERENCE MODEL

We have modeled the packing robot control system, while creating model of driver assistant system. Two systems are very similar to each other in many respects. For example, they both have common repository as you can see figures that in below. The systems that we plan to use in data Exchange with repository. So that the repository has all data that will used in system or process.

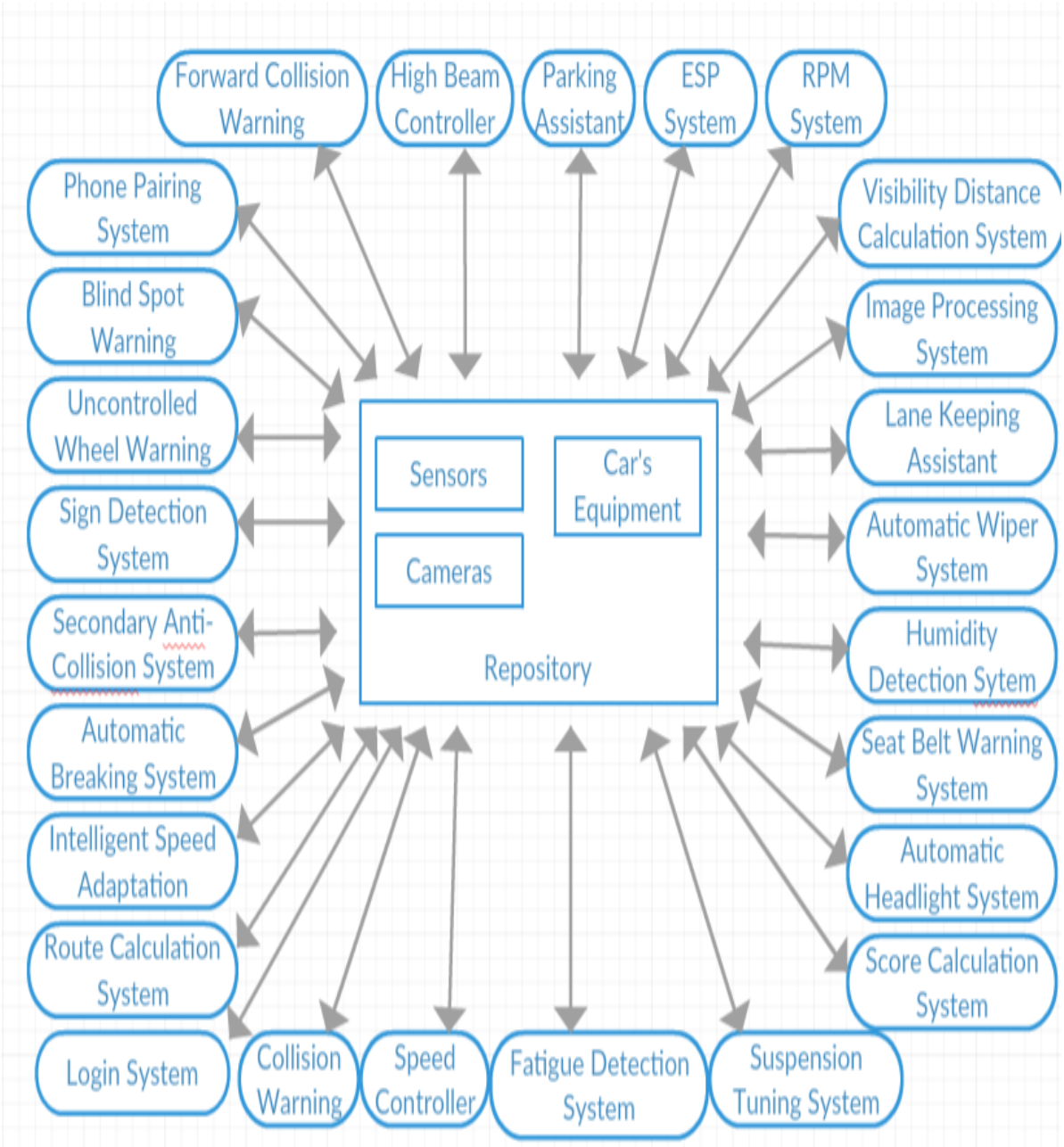


[1]Packing robot control system architecural model

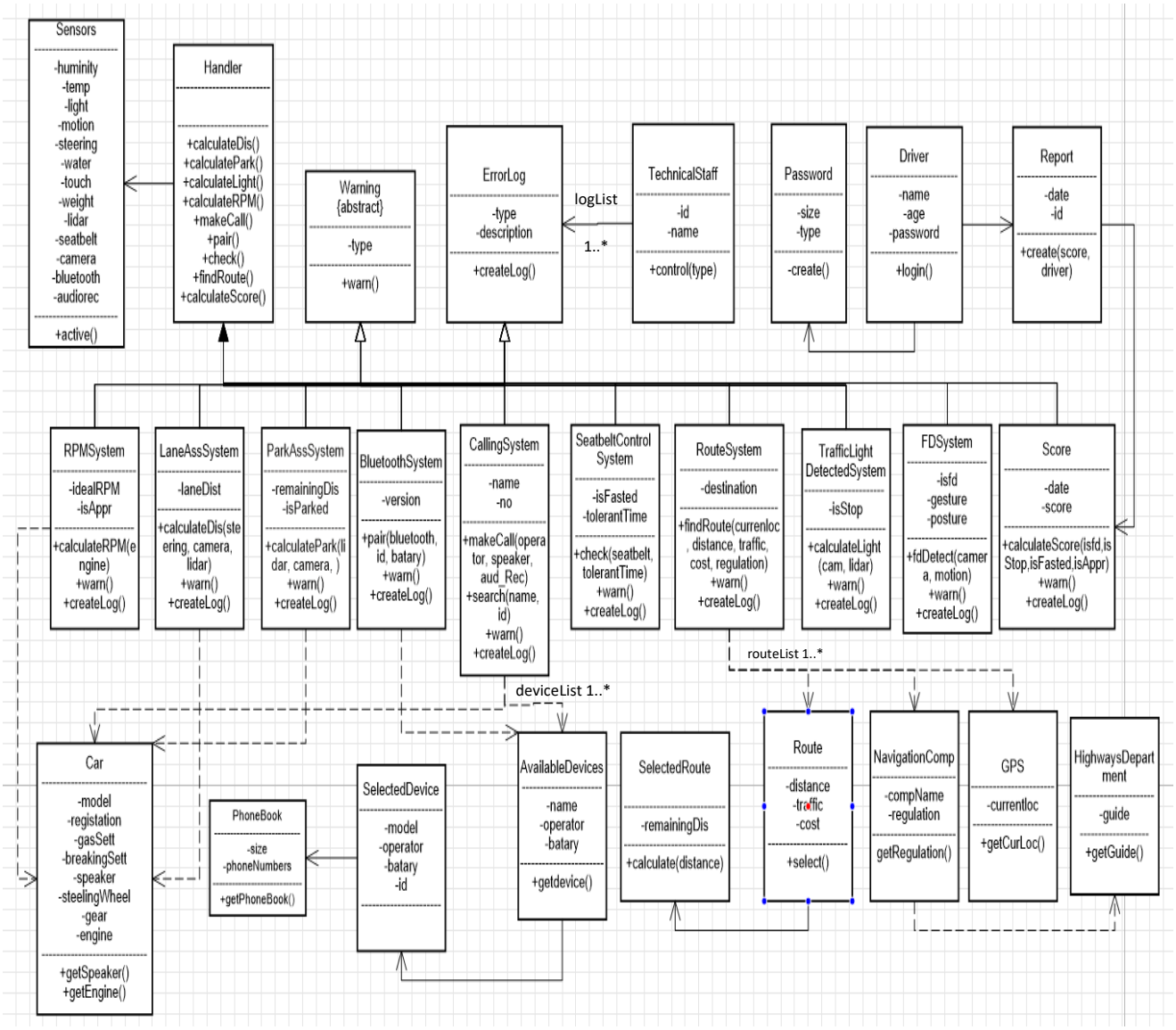


[2]A repository architecture for an IDE

4. BLOCK DIAGRAM



5. CLASS DIAGRAM



7. CONCLUSION

As a result, in this report, we evaluated the possible candidate architectures for the architecture of our system and chose a architecture model that we thought was appropriate for our system. We have created a block diagram and a class diagram for the selected architectural model, and have shown the structure and relationship of our system and subsystems. We also indicated the model that we referenced.

8. RESOURCES

[1]Packing robot control system architecural model

https://slideplayer.com/slide/2293422/

[2]A repository architecture for an IDE

https://www.slideshare.net/software-engineering-book/ch6-architectural-design