Fujitsu Ten released the world’s first AVN and created a new market centering on Japan. Meanwhile, from a global viewpoint, PND (portable) has become widely used in countries other than Japan. When considering the characteristics of the overseas market, we perceived the possibility of a new market incorporating the element of PND, as well as conventional AVN, and so we planned and developed the portable navigation combination unit.

We introduced this product in January 2007, and released it also in Europe and Australia, starting with release in North America as an ECLIPSE product in May of the same year. Furthermore, we have started to deliver the same model to Toyota Europe and the product has attracted a great deal of attention as a new-category product in car navigations.

In this article, we introduce the concept / summary of product, hardware / software technology and implementation method.
Introduction

Project Background and Development Objectives

2.1 Market Trends

2.2 Product Concept
2.3 Project Objectives

The primary objective of this project is to design and implement a new system that will significantly improve the efficiency and accuracy of data processing. The system is intended to be used in various industries, including manufacturing, finance, and healthcare, to automate and streamline complex processes.

3.1 Introduction of Features

The system includes a range of advanced features designed to meet the specific needs of each industry. These features include real-time data analysis, automated reporting, and predictive analytics. The system is scalable and can be adapted to fit the unique requirements of each client.

3.2 System Architecture

The system is built on a robust cloud-based architecture that ensures high availability and security. The architecture includes a central processing unit that communicates with various peripheral devices through dedicated interfaces. The system is designed to be highly resilient, with redundant components to prevent downtime.

The inclusion of advanced security features ensures that data remains protected from unauthorized access. The system also includes comprehensive monitoring and management tools to help administrators maintain optimal performance and troubleshoot issues in a timely manner.
4.1 Development Objectives

4.2 PND Detachment/Attachment Mechanism

4.3 Measures for Meeting Design Objectives and Results

4.3.1 Structural Design for Easy Detachment

PND Detachment/Attachment Technology

Development of portable navigation combination unit
4.3.2 Inclination Angle Range

4.3.3 Vibration Countermeasure

5.1 Interface

5.2 Factors Affecting Design for Each Signal
5.2.2 Sound Signal

The sound signal is an audio output signal that consists of a combination of audio and voice signals. This signal is used to provide audio output to the user.

Audio

5.2.3 Power Supply Signal

The power supply signal is a signal that provides power to the device. This signal is used to ensure that the device is powered on and functioning properly.

5.2.4 GPS Signal

The GPS signal is a signal that is used to determine the location of the device. This signal is used to provide location information to the user.

![Diagram of a portable navigation combination unit](image)

![Diagram of a portable navigation combination unit](image)

![Graph of GPS Loss w/ and w/o Spacer](image)
6.1 Selecting a Communication Method

6.2 Data Structure

6.3 Communication Speed Issues
Development of portable navigation combination unit

6.4 Collaborative Development with TomTom

<table>
<thead>
<tr>
<th>Activities</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>· Examine the contents of the data transmitted from audio unit to PND</td>
<td>· Examine the contents of the data transmitted from audio unit to PND</td>
</tr>
<tr>
<td>· Compose and send pseudo commands to the audio unit</td>
<td>· Compose and send pseudo commands to the audio unit</td>
</tr>
<tr>
<td>· Monitor the state of communication between the audio unit and PND</td>
<td>· Monitor the state of communication between the audio unit and PND</td>
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</table>

6.5 Development Issues

<table>
<thead>
<tr>
<th>6.5.1 Overview of the PC Simulator</th>
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<tbody>
<tr>
<td>· Command transmission</td>
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<tr>
<td>· Command reception</td>
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<tr>
<td>· Data storage</td>
</tr>
<tr>
<td>· Data editing</td>
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<tr>
<td>· Automatic ACK/NAK response</td>
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6.5.2 Functions and Features of Simulator

<table>
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<th>Features</th>
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<td>· Command transmission</td>
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<td>· Command reception</td>
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