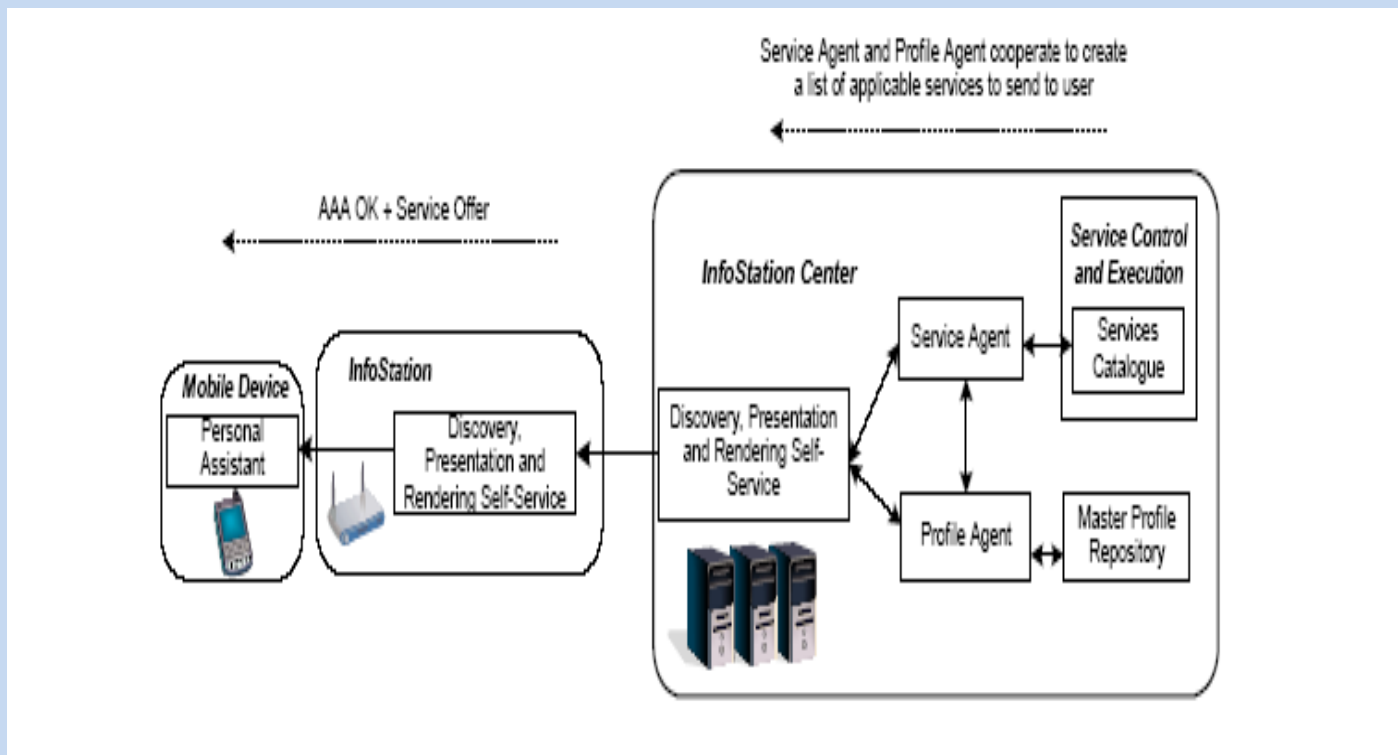


Dynamic CAR parking negotiation and guidance using an agent-based platform

Abstract

Modern prosperous cities strongly need advanced parking assistant systems, intelligent transportation systems providing drivers with parking information. Existing parking information systems usually ignore the parking price factor and do not automatically provide optimal car parks matching drivers' demand. Currently, the parking price has no negotiable space; consumers lose their bargaining position to obtain better and cheaper parking. This study uses an intelligent agent system, and considering negotiable parking prices, selects the optimal car park for the driver. The autonomous coordination activities challenge traditional.

Block Diagram of Dynamic parking:



This System is divided into three Different models:

1. User interface Command
2. Information Station
3. CAR Parking Agent

A. User interface Command

User command through to search the agent by SMS

1. Nearest car park Location(Current Location Name + DCAR)
2. Cost per hour
3. Available of slot to park in which Floor

B. Information Station

1. Info station for Service Agent control
2. Interface GSM Unit Control
3. Info station for Profile Agent control

a. Info station for Service Agent control

This is divided into two Services,

- a. Service control and Execution for data Agent
- b. Service Catalogue for Search Engine

b. Interface GSM Unit Control

This is divided into two interfaces

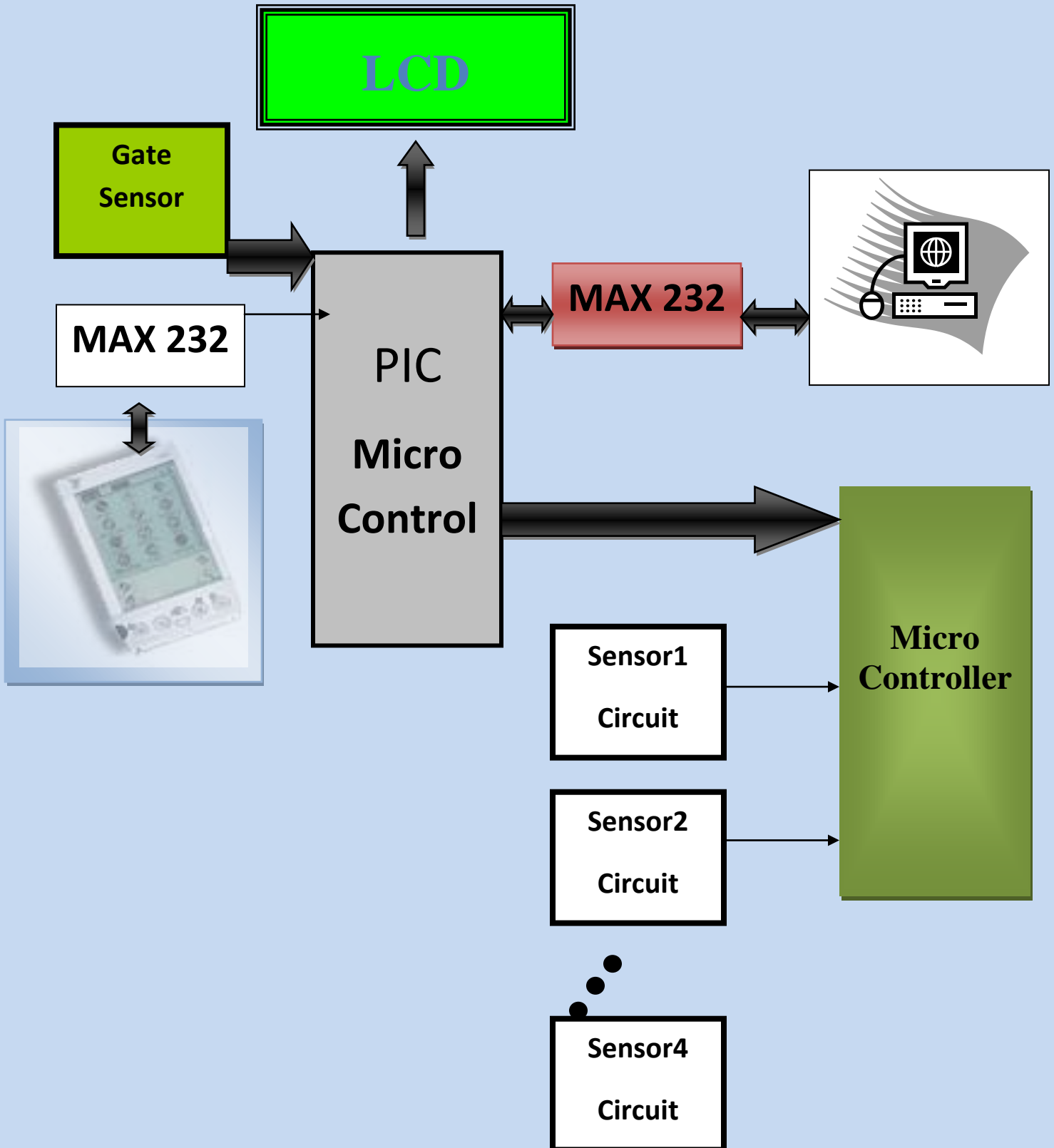
- a. GSM Protocol Development in Software and Hardware
- b. Serial interface to PC

c. Info station for Profile Agent control

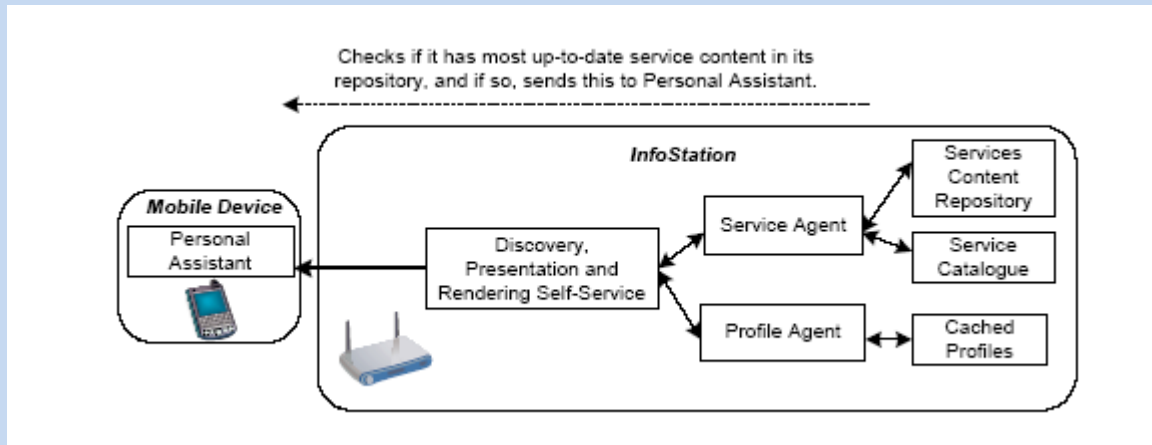
This is divided into two Services,

- a. Master profile storage Agent to Database
- b. Master profile Retrieve Agent from Database

C. CAR Parking Agent



The Info Station System Architecture



Intelligent Parking Locator Service:

A multi-agent approach is adopted as most suitable approach to structuring our system. In order to facilitate flexible and adaptable service provision, intelligent agents, residing within each of the three tiers of the system architecture must interact so as to satisfy, in the 'best' possible way, any user requests they might encounter. The following description outlines the entity interactions that take place during the Intelligent Parking Locator service provision.

In the delivery of this service, the content must be adapted and customized according to the capabilities of the user device and the user preferences. For example if the user has access to a resource any mobile device. If however the user only has access to a device with unlimited capabilities (e.g. a mobile phone), then the details of the available parking spaces would be specified in a simple format which 'best' suits the device (e.g. SMS). This trimming (adaptation) of the services is one way to address the shortcomings of some mobile devices, while still delivering the service. We use the "Composite Capabilities / Preference Profile" (CC/PP) as the uniform format for the implementation of the user profiles. The master profile repository in the InfoStation Center contains descriptions of all registered user devices, i.e. their capabilities and technical characteristics. During the initial AAA request, the user's Personal Assistant sends as parameters the make and the model of the user device. An agent working on the InfoStation (or the InfoStation Center) reads the corresponding device's description from the repository and according to this, selects and forwards the best format of the service content. However a problem arises when a user uses a non-registered device as s/he might receive the service

content in unsuitable format. Thus the user needs first to register any new mobile device s/he wants to use within the system. In this case, during the initial AAA request the Personal Assistant sends a full description of the user device's capabilities towards the InfoStation Center. As the user enters the campus area in a vehicle, s/he enters the coverage area of an InfoStation, positioned at the entrance to the campus. The Personal Assistant, installed in the user mobile device, and the InfoStation mutually discover each other. The Personal Assistant sends a request to the InfoStation for user's Authorization, Authentication and Accounting (AAA). During this initial AAA request, the user's Personal Assistant sends also the make and the model parameters of the user device, and any updates of user profile and user service profile.

The InfoStation registers the user in its local Virtual Address Book and updates the profile, before forwarding the user request onto the InfoStation Center along with profile updates. In the case of successful AAA, the Profile Agent within the InfoStation Center (updates and) analyses the user profile stored in its Master Profile Repository. The Service Agent, in collaboration with the Profile Agent, creates a list of services applicable to the user and makes a service offer to the user. However the user may specify in his/her profile that a request for the Parking Locator service be sent automatically after the successful AAA (and profile update) procedure. Or alternatively, if the user makes regular use of the service, the Personal Assistant could proactively anticipate the users request, i.e. once this service becomes available, the Personal Assistant automatically requests the location of parking for the user's vehicle. The InfoStation forwards on the user request to the InfoStation Center. Sensor networks within the car parks constantly update the InfoStation Center as to the availability of spaces. Different time periods of the day require more regular updates, especially from morning to mid-afternoon, as the user would require the information be as up-to-date as possible. However the updates can occur at much larger intervals during the evening and weekends when many more spaces would be available. In the case of Staff user's, the InfoStation Center discerns the location of the user's office from the user profile, and as such compiles a sorted list of available parking spaces according to their proximity to the user's office (desired destination). The InfoStation Center will also consult the user profiles to order the parking spaces according to criterion such as convenience to final destination and in particular for students, the cost associated with each parking space. The InfoStation Center then determines the approximate position of the user based on the location of the InfoStation from which the request was received. The InfoStation Center then discerns the best directions from user's current location to each of the available spaces.

Any messages not transmitted due to this temporary disconnection can be buffered and delivered when the connection is re-established. This store-and-forward mechanism (implemented in both the FrontEnd and the BackEnd) is especially important to the efficient facilitation of the Parking Locator Service, where the user will pass in and out of coverage range of a number of different Info

Stations, and as such data will have to be buffered and transmitted after a period of time by another Info Station.

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