# CENG 491
# "Smart Shopping List" KickOff Document

## Description

The Shop Smart application makes it easier for anyone to create a shopping list by suggesting potential items to add to the list or autogenerating a shopping list based on your habits or general trends. You may also view and copy from various shopping lists based on a particular theme or activity. When you are unclear about which items to buy, the chatbot assists you by asking for your desires and suggesting items accordingly.

## Work Packages

| WP # | Term | WP Title | Estimated # of Man-Months |
|------|------|----------|---------------------------|
| 1 | 491 | Basic shopping list application | 2 |
| 2 | 491-492 | Item recommendation systems | 16 |
| 3 | 491 | Database infrastructure | 4 |
| 4 | 491-492 | Virtual shopping assistant | 9 |
| 5 | 492 | Social media integration | 2 |
| 6 | 491-492 | Server operations | 3 |
| *Bonus 1* | *492* | *Multiplatform support* | *5* |
| *Bonus 2* | *492* | *Partnership with companies* | *4* |

# Detailed Descriptions of High-Level Work Packages

## WP1 – Basic shopping list application

### 1. Basic shopping list interface and structure
- Basic Android application that can create lists of items
- Sign in/register page (homepage if new user)
- User's lists page
- New list page
- Chatbot page
- Filter lists page
- Simple user profile page
  - Note that this is not an inherently social network. There will not be a news feed where users can see others' posts. One can only see a user's public lists when they click on their username.

### 2. List operations
- Divide list into subcategories (e.g: Ali's gifts, Mehmet's gifts under a birthday list)
- List collaboration (i.e: multiple users contributing to the list)
- Set list to private/public
- Copy someone's public lists
- Filter lists
- Sort lists

### 3. List tagging
- Tag lists with multiple tags (later to be used in search and conceptual clustering)
- List all items associated with a tag (and related tags)

### 4. User operations
- User class implementation
- Account registration
- Account authentication

### 5. Item operation
- Implement fundamental item operations like add/delete, check/uncheck, change product, etc.

## WP2 – Item recommendation systems

**1. Search for relevant items based on keyword**
- String search
- Semantic search
- Personalized search results (depending on frequency of selection by user, frequency of product being searched under a keyword, etc.)

**2. Suggest items based on user's habits**
- Collaborative item-to-item and content based filtering

**3. Suggest items based on content of item**
- Content based collaborative filtering

**4. Suggest items based on other users**
- Item-to-item and user-to-user collaborative filtering

**5. Suggest items based on current list items**
- Association rule mining
  - Apriori Algorithm
  - FP-growth Algorithm

**6. Suggest items based on hybrid recommender systems**
- Combination of the aforementioned recommendation methods

**7. Android integration**


## WP3 – Database infrastructure

**1. Database design**
- Determine entities and relationships for items, lists, users, brands, etc.

**2. Database construction**
- Initially create the database with dataset to test the basic functionalities of our item recommendation algorithms
- Create another database from the data we scraped from online shops' websites.

**2. Web crawling**
- Parse domains of targeted online shops
- Extend by coding crawler for all targeted online shops


**3. Web scraping**

- Parse the specific websites of online shops to extract data about items
- Extend by coding scraper for all targeted online shops

## 4. Android integration
- Connect database to Android application
- Access database from within the app when necessary

# WP4 – Virtual shopping assistant

## 1. Conversational commerce bot
- Closed-domain (groceries and basic recipes to begin with, hopefully to be extended later), generative-based artificial intelligence
- Assist the user in their shopping by getting their voice input
- Prompt user to give clarification to generate better suggestions (e.g: Are you allergic to nuts? Do you avoid consuming gluten?)
- Use our suggestion system in tandem with extraction of relevant items from online recipes

## 2. Processing of natural language statements
- Perform semantic analysis on natural language statement
- Interpret intent and desires (e.g: wants(milk), allergic_to(nuts)) or user from statement
- Send generated model to be processed by the bot
- Needs to be in real time (restrict response time to a ~15 seconds at most)

## 3. Voice recognition
- Convert speech of the user to text to be processed by the bot
- Add spoken items to list

## 4. Voice generation
- Respond to/asks for more information from the user by converting the response generated by the chatbot to speech

## 5. Android integration
- Google Android speech-to-text API
- Google Android text-to-speech API

# WP5 – Social media integration

## 1. User authentication
- Confirm username and password by establishing a connection to Facebook and Twitter

## 2. Share lists via message
- Send list via text message

## 2. Publish lists via social media
- Publish list via Facebook
- Publish list via Twitter

## WP6 - Server operations

## 1. Setting up server
- Learn  basics of server
- Setup a basic server which communicate with Android App

## 2. Integration of recommender system
- Integrate all recommender systems with Android App

## 3. Integration of virtual assistant

- Integrate all functionalities of virtual assistant with Android App

# Risk Assessment

| Risk # | Description | Possible Solution(s) |
|---|---|---|
| 1 | Websites changing their HTML code halfway through our project | Modify the respective crawler/scraper for that website |
| 2 | Unable to partner with companies | Using data collected by web crawling and scraping |
| 3 | Datasets not extensive enough | Start by restricting recommendation to the dataset's scope initially (e.g: groceries) |
| 4 | Web crawling interpreted as DDOS attacks, resulting in banning of IP | Conduct web crawling at a controlled rate with a dynamic IP |