Juice House
dare to live well

Smart RV: AI System

Project Description

In 2023, public access to AI has boomed, and now more than ever modern technology is pioneering to greater scales that will continue to impact our daily lives and work in incredible ways still waiting to be thought of and implemented.

Juice House's iCode "Blend" is partnering with a local R&D company who is developing a smart RV control dashboard that features all the luxury of a smart home, but in a miniature, automotive version. iCode BOOST students will work on a project that intersects recreational leisure with engineering, machine learning, natural language processing and data analytics to ultimately create and deploy an AI assistant (like Alexa) into the smart RV. The AI assistant will be designed to manage the RV's power system, analyze real-time energy consumption data and optimize energy efficiency and usage.

Using Python Jupyter Notebooks, students will develop, train and test a model that

1. measures energy usage and makes decisions to either keep using power or conserve energy and
2. takes speech and converts it into an action that will determine, share and implement the best creative solution for energy optimization.

This will include turning on/off various devices and managing power inputs (i.e. battery, inverter and solar). Models and algorithms created will eventually be deployed onto a Nvidia Jetson Board for enabling voice control locally when offline.

Project Scope

Through team-based projects, independent learning, mentorship and real-world applications, students will:

1. Understand basic machine learning models (Decision trees, Neural networks, etc.) and how to select an appropriate model
2. Learn how to use machine learning/AI specific Python libraries (pandas, NumPy & scikit-learn, TenserFlow, etc.)
3. Develop a decision model that provides options for energy consumption and management.
4. Develop an AI system that will replace the current Alexa system found in the RV. The system will process a user's natural language and turn it into a command that the dashboard executes. (Goal is to begin in Fall 2023)

5. Complete a Python bootcamp (optional)
6. Complete a machine learning certification (optional)

Project Workflow

1. Collaborate with team members and communicate with project mentors on The Juice app forum > iCode > iCode BOOST > Smart RV: AI System > Group Workspace
2. Attend regular iCode meetings
    a. Prepare a short group presentation on current project status
    b. Meet in person or remotely with project mentors for feedback and further directions
    c. Gain inspiration and provide a visionary outlook for the project
3. Post a progress update every Friday on The Juice app forum > iCode > iCode BOOST > Smart RV: AI System > Weekly Project Update and include the following:
    a. What you completed this week
    b. What you did not complete this week
    c. What you have planned for next week
    d. Include attachments or links to any documents or files created for mentors to review
4. Format all source code following proper documentation under source control
5. **BONUS** Attend a workshop given by an expert in the field, local university or company.

Project Timeline

Week Due	Deliverables
1	● Sign Juice House Operational Honor Pledge ● Register on The Juice app forum
2	The objective of this week is for all AI project team members to 1) Research career paths and review optional learning courses and suggested self-paced certifications 2) Communicate with project mentors in group meetings to set up a personalized career goal and decide a best plan of actions in the certification process. Make a summer schedule

	of completing the Python bootcamp and machine learning certificate as learning deliverables
3 - 4	The objective of these two weeks is for all AI project team members to: 1) Complete an optional Python bootcamp if needed 2) Understand Smart RV system design and create a system of features based on the current RV system
5 - 6	The objective of these two weeks is for all AI project team members to: 1) Review Python machine learning/AI specific libraries for the decision model 2) Decide model parameters and variables 3) Create a plan for working in teams with specialization obtaining training dataset and model creation and testing procedures
7 - 9	We will divide the AI group into: 1) Team A: The Data Team ● Obtain training dataset ● Clean and preprocess the data 2) Team B: The AI Model Team ● Create and test the model
10 - 11	In these two weeks, we will combine Team A and Team B to 1) Deploy the model onto RV dashboard (computer deployment) 2) Look into Nvidia Jeston board deployment
12	Final Presentation

Resources

Optional Learning Courses:

- Python Beginner/Intermediate bootcamp (10 hours) - YouTube
- Python for Data Science, AI & Development - Coursera
- Supervised Machine Learning: Regression and Classification - Coursera
- Deep Learning Specialization - Coursera

- AI For Everyone - Coursera
- Tensorflow 2.0: Deep Learning and Artificial Intelligence - Udemy
- Deep Learning Prerequisites: The Numpy Stack in Python V2 - Udemy
- Practical Machine Learning with Scikit-Learn - Udemy
- Learn Keras: Build 4 Deep Learning Applications - Udemy
- Learn Machine Learning algorithms, softwares, deep learning - Udemy

Suggested Self-Paced Certifications:

- TensorFlow Developer Certificate
- Google Cloud Professional Machine Learning Engineer
- Microsoft Certified Azure Data Scientist Associate
- Amazon AWS Certification
- Nvidia Jetson AI Courses and Certifications

Nvidia Resources:

- Nvidia Deep Learning Institute
- Nvidia NGC Catalog
    - NGC Getting Started
    - Nvidia End to End AI Deployment
- ASR/NLP/TTS For Jetson
- JetPack SDK

