The Universal Learning Lab - NLU, ASR and AI Enabled Voice and Text Based Research/Mini Lab

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Lab is one of the most important place wherein a User/Student learns by doing things. This project present's an idea wherein the Lab itself starts interacting with the learner using Natural Language Understanding (NLU), Automatic Speech Recognition (ASR) and Artificial Intelligence (AI). The Lab is endowed with Digital Voice Assistants (DVA) (Amazon' Alexa, Google's Home) and Chat Bots which allows Voice and Text based interaction between the lab and the learner. Since it is possible to teach the DVA's by making skills for Amazon's Alexa using Alexa Skill Kit and Conversation Actions for the Google's Assistant using Api.ai, the lab can be configured for a specific subject area. This lab is configured for a Mobile Robotics and Embedded Systems environment. The DVA's and Chat Bots are connected to the Lab using IoT devices (Particle Photon and Raspberry Pi). The lab has two dimensions to look at: A Subject Matter Expert comes in and teaches the lab about the things which are available in the lab and how a learner can perform an experiment. A learner then interacts with the lab and completes an experiment by interacting with the DVA's and Chat Bots. The DVA's used are Amazon's Echo and Google's Home and the Chat Bots are based on Amazon's Lex and Smartly.ai. Since the overall interaction in the lab is a conversation between lab and the learner, Google's Tensorflow based sequence to sequence library has been used to create a learning environment wherein the lab learns by conversing with the user. The learner performs an experiment of making a Piano Circuit on Breadboard. The Lab helps the user find various Circuits, get the Bill of Material (BOM), decode the resistor values and even helps in troubleshooting the circuit.

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