Project Intro: Poppy

Poppy is an interactive, educational, and intelligent robot that is able to communicate with users through physical movements and vocal speeches. Our vision is to make today's smart home systems more interactive and more lively. Instead of having your home assistant like Google Home or Amazon Echo be fixed in one place, we envision a future where your assistant is able to approach you physically and interact with you with an uniquely natural manner. Poppy will be a palm-sized robot that lives on any surfaces in your home. You will have the option to either use Amazon Alexa or Google Assistant as the answering engine of Poppy. You can talk to Poppy by simply saying "Hey Poppy", then Poppy will look around 360 degrees to determine your location and approaches you. Poppy is able to effectively walk around obstacles and terminate movement upon approach an edge on the surface. In addition, we also plan to make Poppy educational by allowing users to send movement commands to Poppy to see their code run in action (quite literally!).

Major Software Components:

- Google Assistant / Amazon Alexa integration with custom voice activiations
- Spacial awareness using proximity sensor to detect obstacles and surface edges
    - Controlling motors accordingly based on sensor inputs
- Facial Detection/Recognition Using OpenCV and TensorFlow
- Server backend that receives user input and sends the commands to Poppy.
- User client side that is able to write and upload command to server that are to be executed on Poppy.
- A control system on the Raspberry Pi (using pi-blaster) to control the motors.

Prototype Plan

We are going to use horizontal evolutionary prototype approach. Horizontal because it allows us to easily test the integration between of the systems. Systems including the control system, which controls the movement of the wheels, and the assistant system, which is the brains of the robot.

Hardwares:

Raspberry Pi, Arduino (maybe), Camera, Microphone(s), Speaker, 2 Motors, Dual channel full H-bridges, Ultrasonic Proximity Sensor, 2 wheels, skeletal structure (might be 3D printed)

Anticipated Challenge

- Implementing a control system to control the motors.
- Facial detection difficulties when there is complex lighting.
- Power supply and power distribution for the components.
- Utilizing and optimizing a Raspberry Pi for computationally expensive tasks such as facial recognition.