

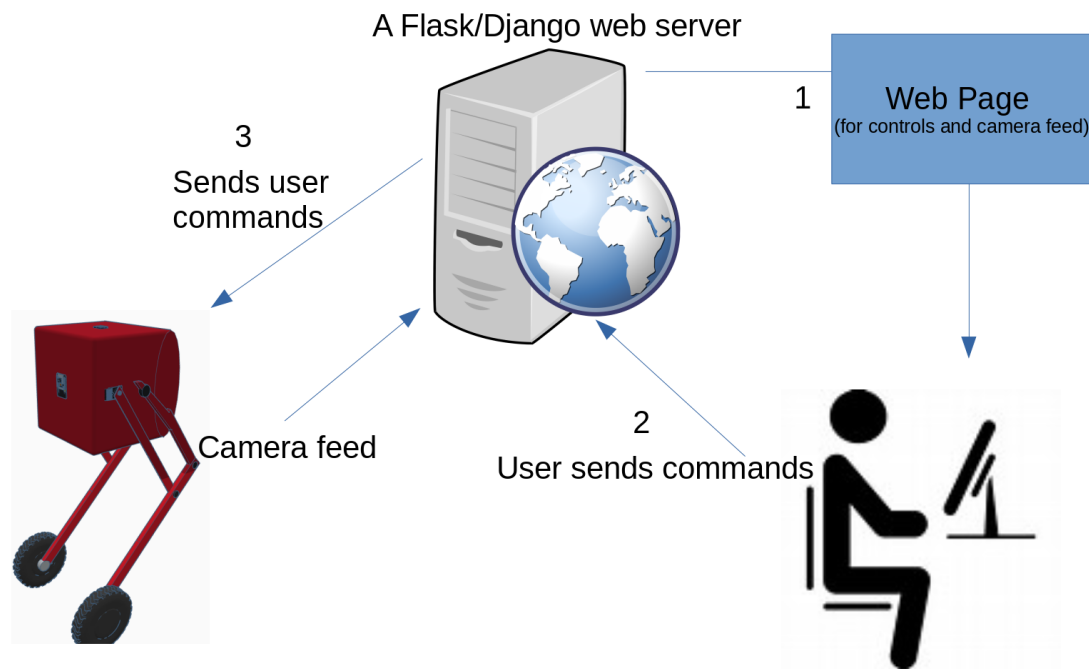
Project name: web-controlled robot inspector

Project description: An Arduino based two wheeled-legged, self-balancing robot with a camera attached, that can be driven by a user via a web page hosted on a local server using I2C communication.

Project concept design:



Communication architecture:



Hardware

Arduino Mega	Microcontroller
2 Servo motors	Hip motor
2 DC motors	Wheel motor
GY 521	Gyroscope
3s LiPo Battery 5000mAh	Power supply
3 5V buck converter	Power distribution to microcontroller and servos
2 6V buck converter	Power distribution to wheel motors
3D printing	Robot body and legs
Raspberry Pi camera	Robot POV camera feed
Raspberry Pi	Web server
HC 05 Bluetooth module	Wireless communication with server

Note: if the raspberry pi and camera are not available, a regular computer and a mobile phone can be used as a substitute.

Purpose of the project: the team wants to work on something which utilizes networking and software integrating both frontend and backend to control hardware. Once successful, the project will be open-sourced, the initial phase will lead to many upgrades and learning opportunities where other students can contribute.

Possible applications: security systems, dangerous and hazard workplace inspections, teaching aid for project-based learning

Benefits:

- Students on the campus will be able to drive the robot by logging into the webpage.
- The project will allow them to be inspired and further understand how a web-based control, communication systems.
- The project will let students apply materials learnt from school lectures on practical problems.
- The project can be a good extracurricular activity and the contributors can add their work on this on their resumes for pursuing future careers.

How the project works:

A computer or a raspberry pi with Ubuntu OS installed will run a Flask/Django web server. The web server itself will have wireless communication with the controller of the robot (Arduino). The server will be hosting an html template including a UI for streaming a camera feed and controlling the robot remotely. A PID controller will be implemented for balance and stability.

Future Dedicated upgrades

The team would like to keep working on certain upgrades such as

-deploying an AI LLM model fine-tuned with school information such as study programs and campus location. Eventually the robot will be able to serve as an AI receptionist for the school

-publishing the web server on cloud services such as AWS and Microsoft Azure for global accessibility

-documenting the whole project well for other students to follow along.