

Human-Tracking Creepy Robot:
Project Proposal
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Introduction

This product will aim to vastly improve the movement and navigation abilities of a simple walking robot. The original project can be found on Instructables.com and was built and published by the user edwindertien.^[1] His project, the *Simple Walker 4-legged 2-servo Walking Robot*, as the name suggests, uses two servos (as well as battery power) to move four legs, allowing the walker to move forward.

Novel Contribution

The original design of this project results in a robot that is only capable of walking in a straight line; it has no steering capabilities and cannot navigate either towards a goal or around an obstacle. My goal, therefore, is to enhance the robot with a camera enabling it to identify humans, and to steer towards them by turning to the left or right. If no human is detected, the robot should remain motionless to conserve battery life.

I intend to use an Android smartphone to send signals via Bluetooth to the Arduino, allowing the robot to respond to what the camera sees. To make up for my lack of experience in using Bluetooth and Arduino together, I will likely rely heavily on tutorials and apps such as GemCode Studios' Arduino Object Detection Tracking.^[2]

If time allows, I would like to alter the robot's appearance by adding a 3D-printed model to conceal and protect the electronic components. The model should have a secondary function of making the robot look scary.

Motivation

The idea of a robot that responds to its environment, rather than blindly marching forward, is appealing to me. I want to create a robot that is likely to cause a reaction in [potentially unsuspecting] humans who encounter it. After all, an interactive gadget should, by definition, involve some sort of two-way communication, and the original project does not fill this requirement.

I would like people to feel that this robot is aware of their presence and engaging with them the same way a curious animal would.

Materials Required

Original Project:

- Arduino UNO or other microcontroller board
- Two RC servos (something more robust than a tiny plastic micro servo)
- Battery pack with at least 4 AAs (original project designer recommends rechargeable ones)
- M2 and M3 screws and nuts
- Battery pack and batteries (recommended: 4 niMh rechargeable batteries)
- 3D printer material for the body and legs (the original project actually recommends 4 mm plywood, but other materials are allowed)

Extra Parts to be Added:

- Smartphone (with functioning camera)
- HC-05 Bluetooth receiver
- Lightweight plastic mount to hold smartphone on robot's "head"

Optional Materials (for stretch milestone):

- A face-hugger 3D-printed model such as this one from Thingiverse^[3]
- Vaguely flesh-coloured paint

Milestones

Milestone 1	Thursday, October 31st	Bluetooth successfully communicating in simple tests between phone and HC-05 on Arduino. At this stage, the smartphone does not need to control the servos and make the robot walk; just prove that meaningful communication is occurring (e.g. by sending a message via Bluetooth to appear in Arduino IDE's serial monitor, for example).
Milestone 2	Thursday, November 7th	All parts should be acquired and ready for assembly. This includes electronic components like servos as well as the body and legs of the robot. Ideally, the non-electronic parts will be 3D-printed.
Milestone 3	Thursday, November 14th	All parts should be assembled. Arduino, phone, and servos should be positioned appropriately so that the robot does not tip over.

Milestone 4	Thursday, November 28th	Coding is complete; robot is able to detect and follow a human standing in front of it. If the human steps to the side, the robot should respond to this by steering to the left or right.
Milestone 5	Sunday, December 1st	Print off a creepy 3D model with articulated limbs (preferably the above-mentioned Thingiverse “face-hugger” from the Aliens franchise) and attach it so that it sits atop the walker. The model may need to be resized using software like Tinkercad or Fusion 360.

Roles

I am not in a group, so will be solely responsible for the creation [and likely extensive trouble-shooting] of the robot, as well as updating GitHub regularly and composing a final report.

However, I have an engineer friend (not a student) with a 3D printer. His services will likely be exploited. I have been informed that, as compensation for the cost of his raw printing material, he will require payment in the form of beer. I have not been advised as to what variety will be required, or in what quantities; the amount of beer I purchase will likely be directly proportional to how many mistakes I make with the 3D model's dimensions, which will be another role of mine.

Summary

If this project is successful, the result should be a robot that can unexpectedly kick into motion when a human comes into sight. It should follow the human and possibly cause them great distress, especially if the stretch goal is achieved and its appearance is satisfactorily sinister.

This is my first class working hands-on with electronics. We were encouraged in the first lecture to create something that we would not otherwise think ourselves capable of making. While I am a bit daunted by the project, I believe all the tools needed are accessible to me and the end result should be exciting and well worth the effort.

Citations

[1] <https://www.instructables.com/id/simpleWalker-4-legged-2-servo-walking-robot/>

[2] https://play.google.com/store/apps/details?id=com.studios.code.gem.ardobjecttracker&hl=en_CA

[3] <https://www.thingiverse.com/thing:1116392>