The programmable Robot

Livvy

By:
Yazan Arafat
Alaa Awartani

Supervisor:
Dr. Samer Arandi

Outline

- Introduction
- Overview
- Designing
- Implementing
- Challenges
- Future Work

Introduction

قدمة بسيطة

شو بعمل الروبوت تبعنا بشكل عام
اه

الخصائص بشوية تفاصيل ..

Livvy

- What is it ?
- What it aims to do ?

Main Features

- Voice Commands
- Movement
- Forklift
- Edge Detection
- Wall Detection
- Object Tracking
- Artificial Intelligence Chatting
- Voice synthesising

Technologies

- BeagleBoard MX
- Atmega168
- Java
- Lego Technic

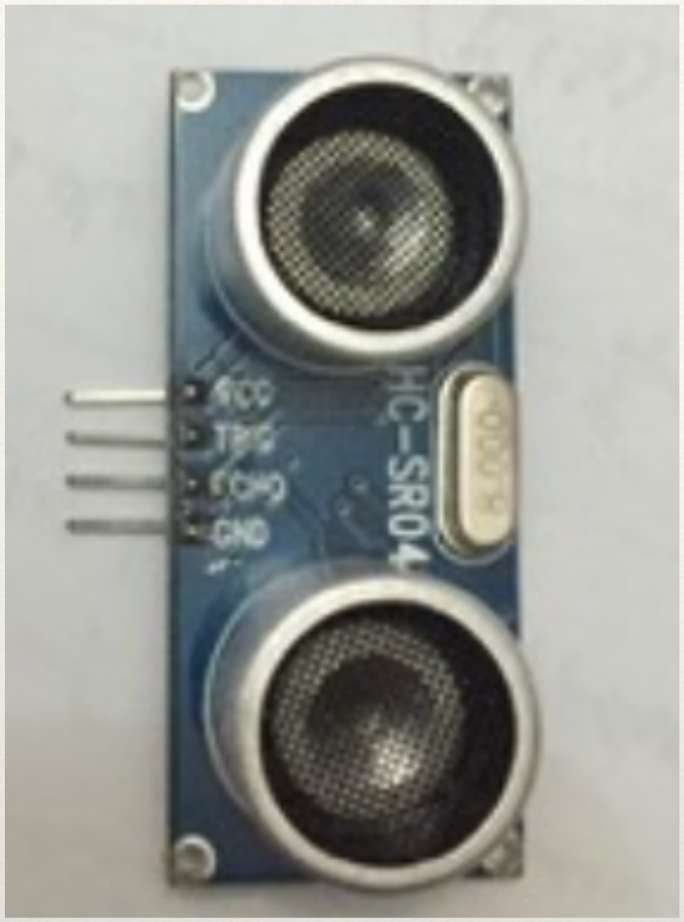
Designing

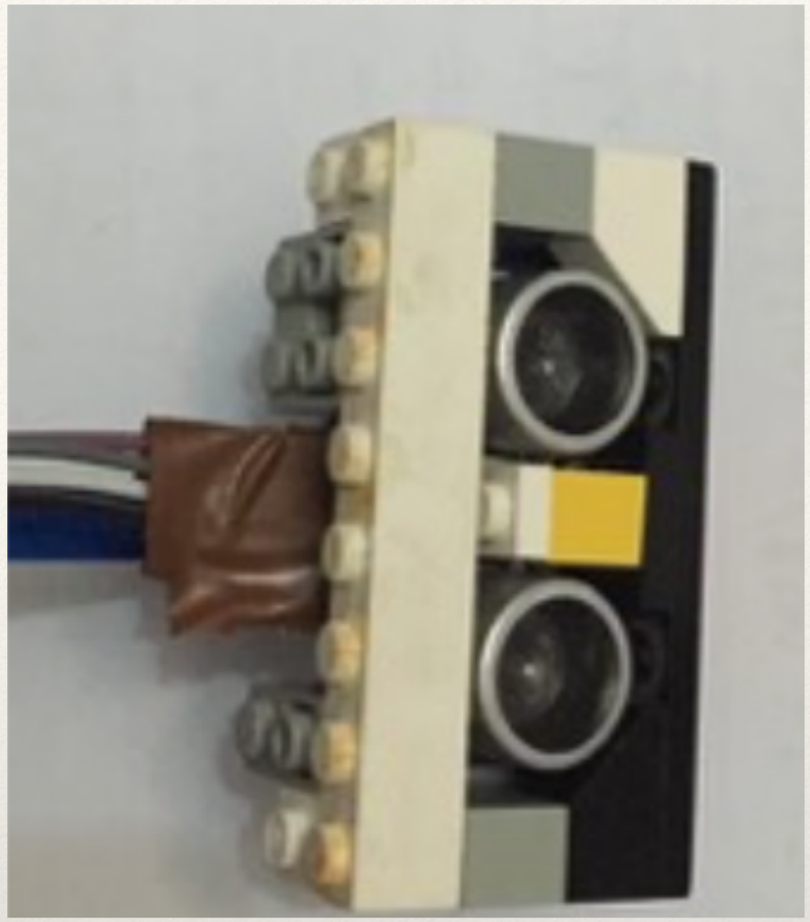
Designing

- Robot Body
- Motion Mechanics
- Driving Circuit
- Controlling Software
- Brain Software

Robot Body

- Made Of LEGO Blocks.
- Why LEGO ? (Lite, EasytoUse, reduces the efforts on mechanics)
- Problems ?





HC-SR04 Ultrasonic Module

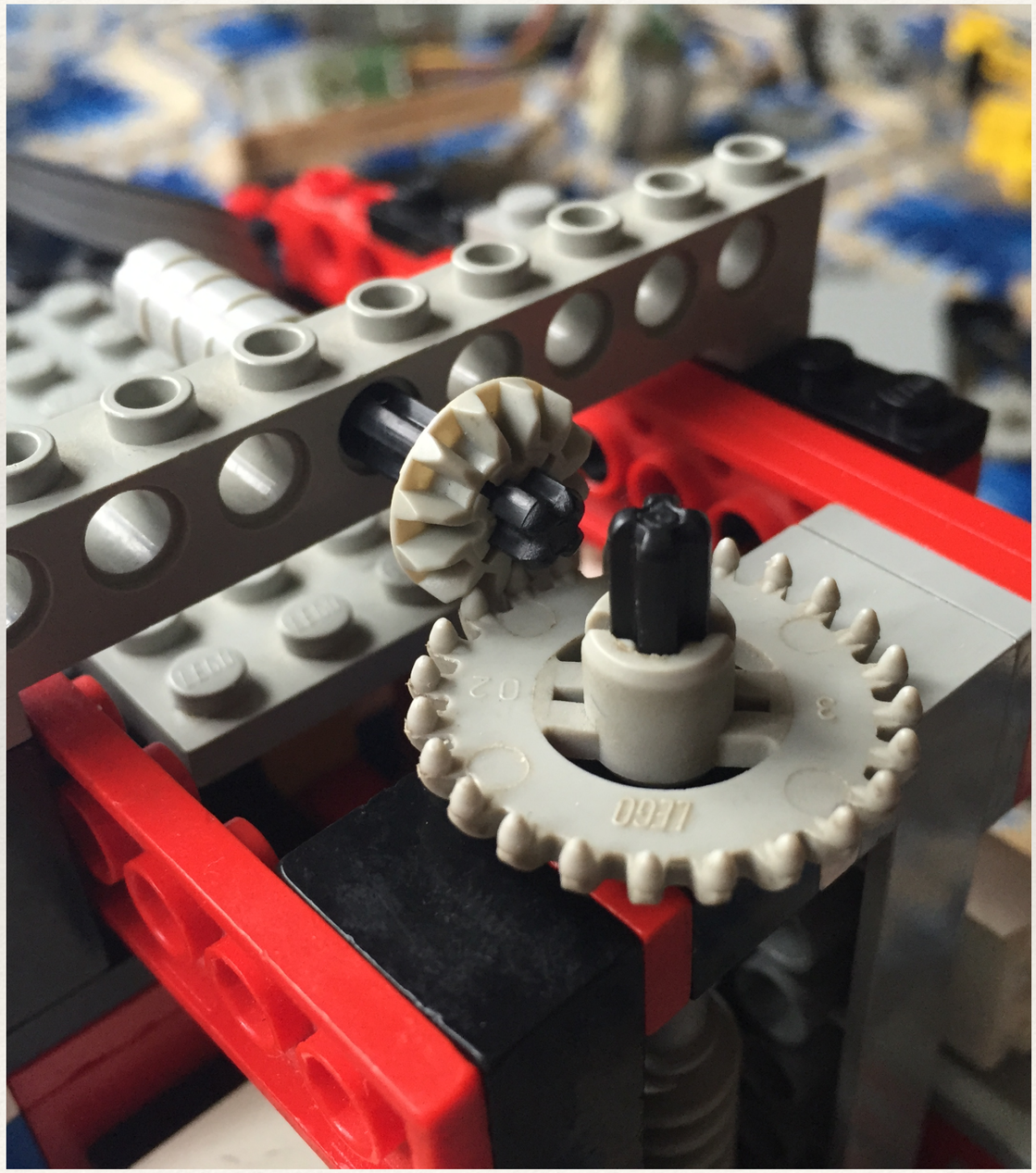
Robot Body - Problems

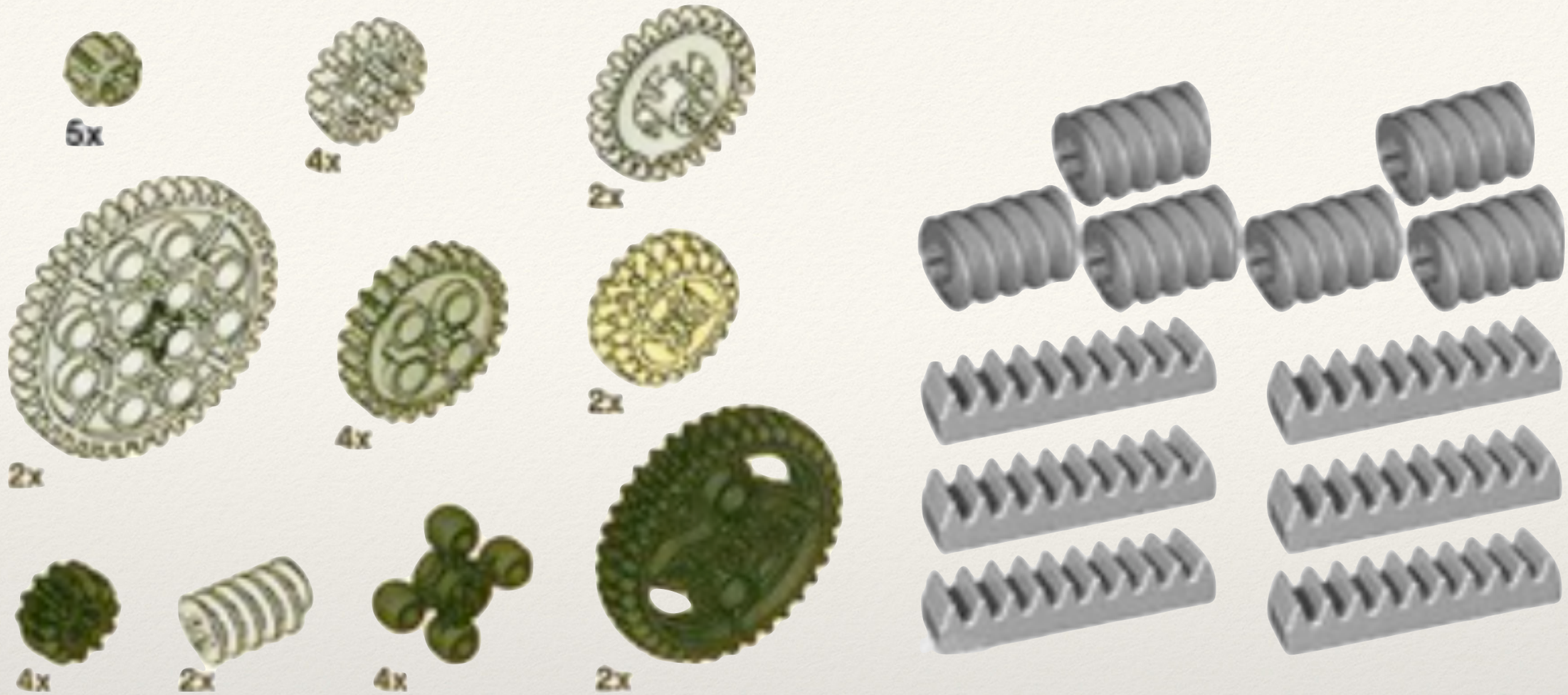
There Are No LEGO Peripherals Available.

LEGO Turned To Be Quite Heavy !.

Robot Mechanics

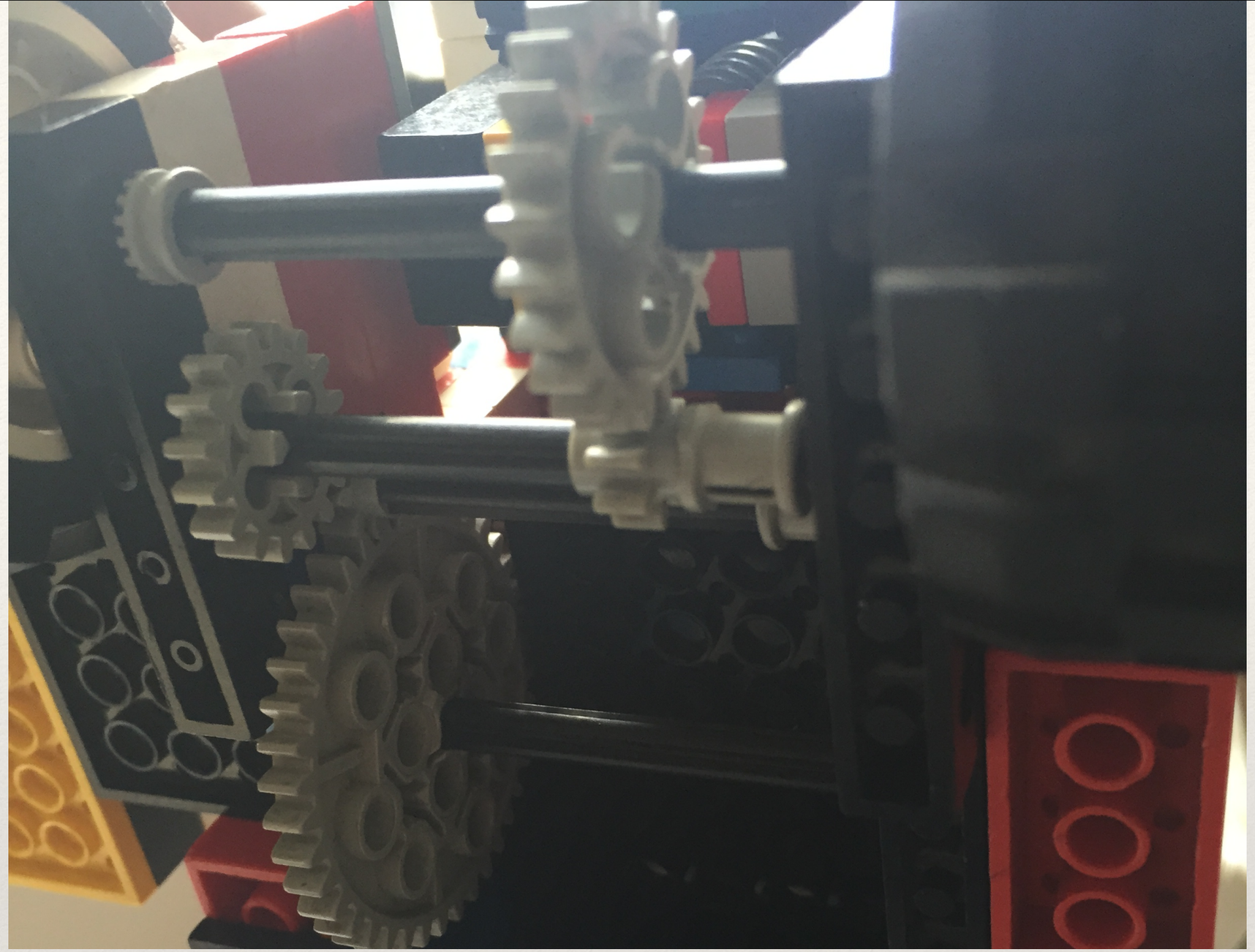
- LEGO Technic.
- LEGO Technic Gears.
- Problems ?





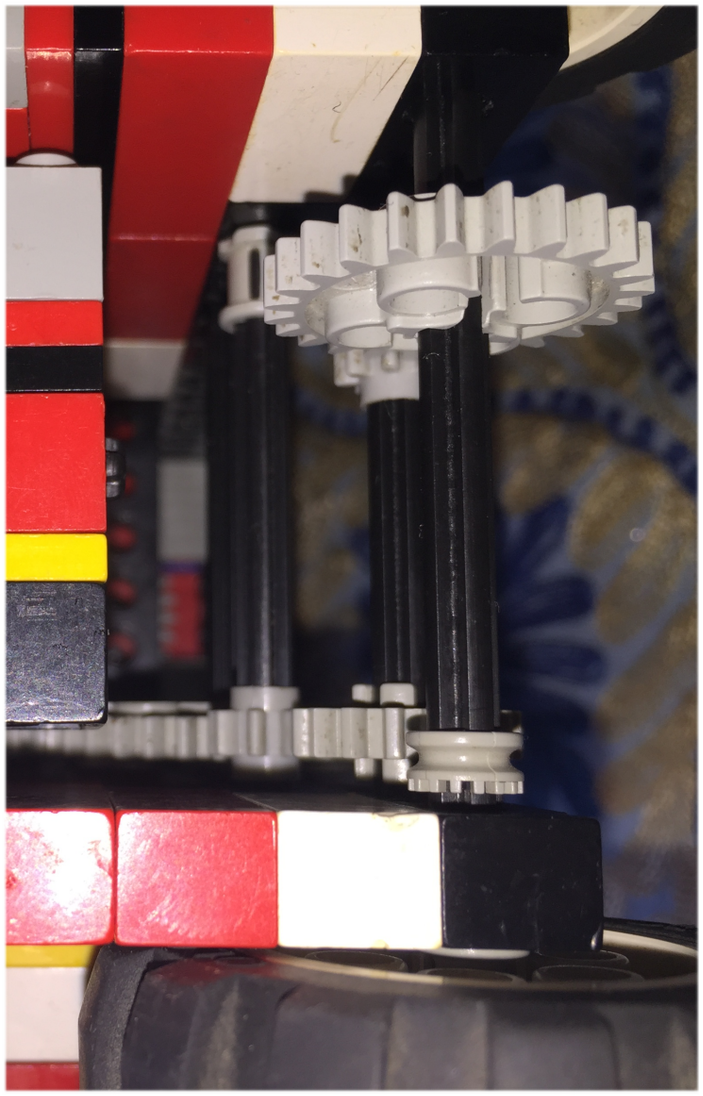
Robot Mechanics

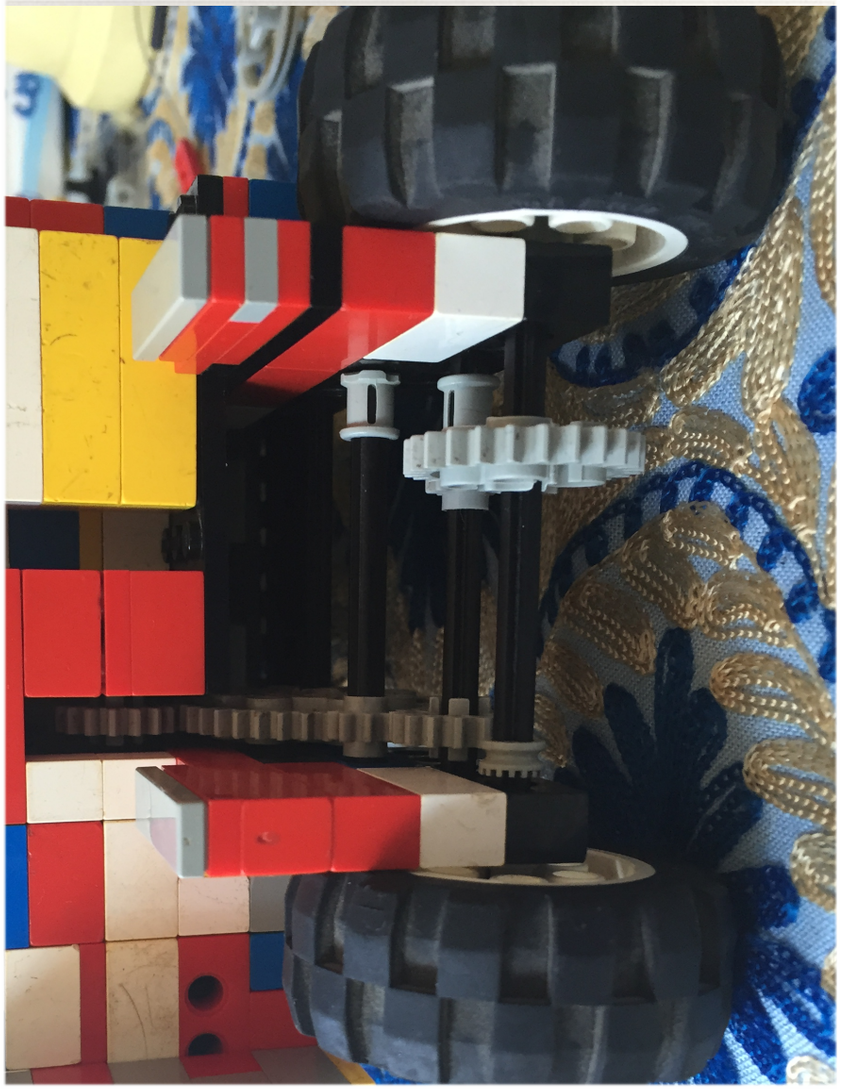
Available Gears

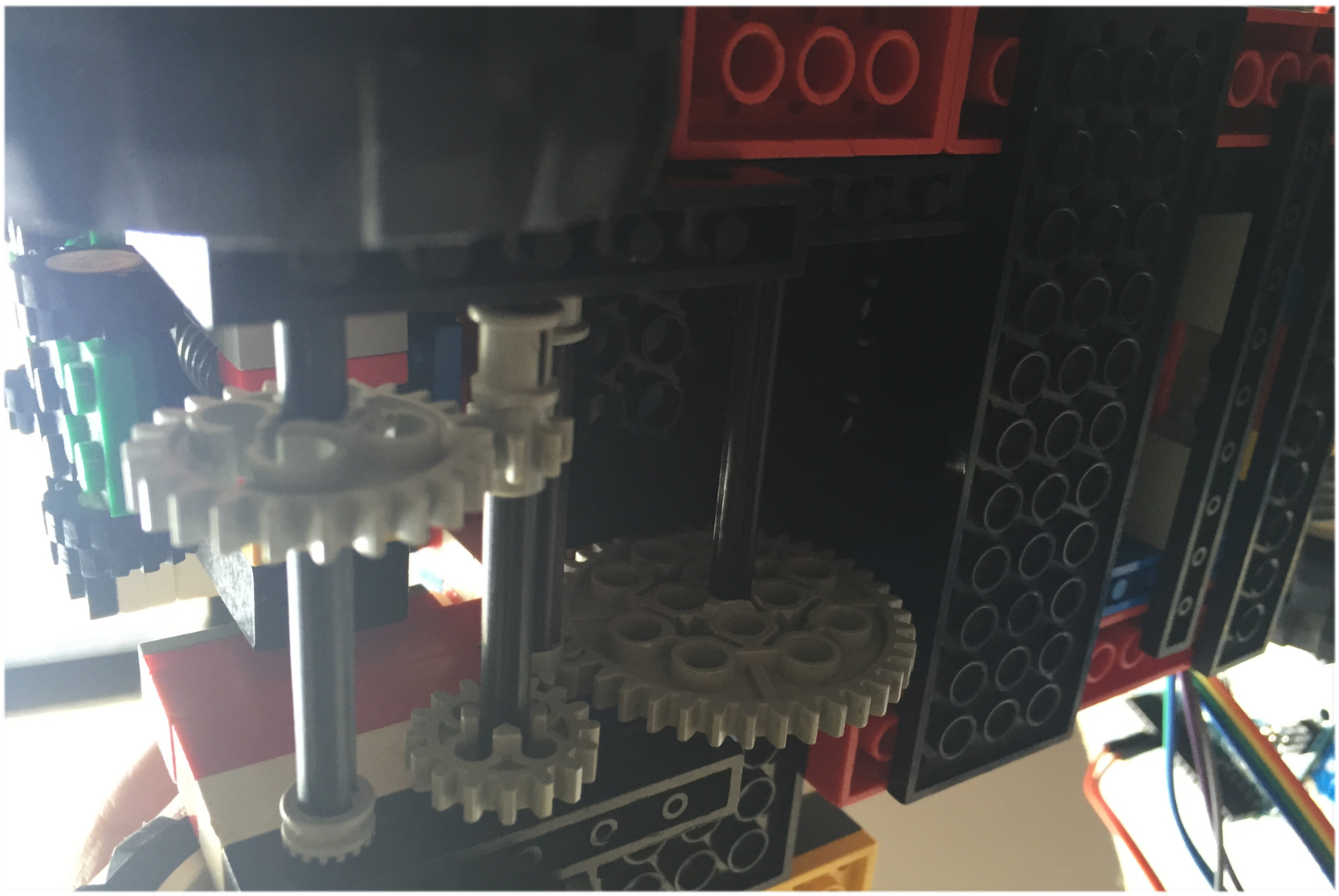


Robot Mechanics

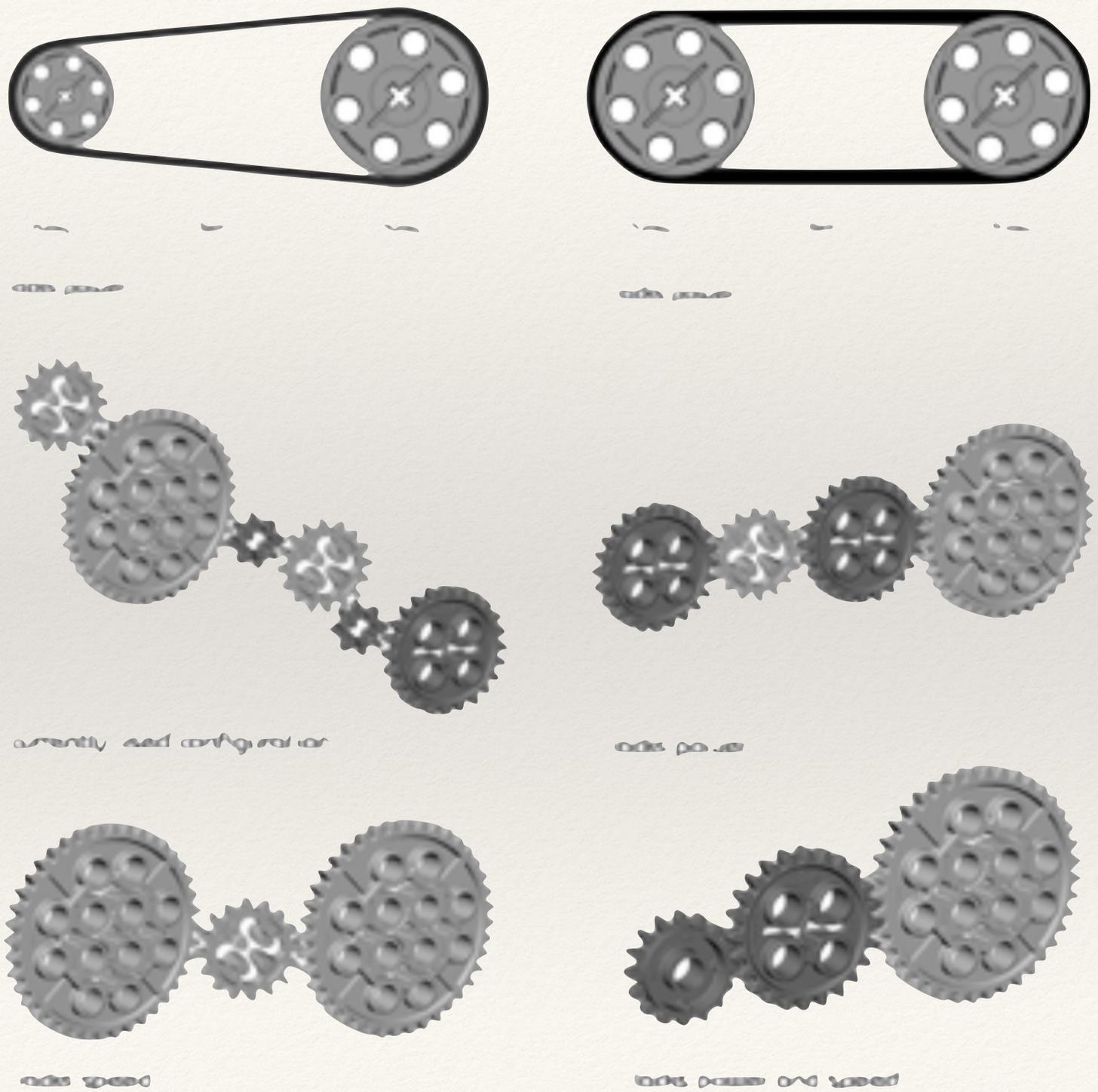
Movement Gear

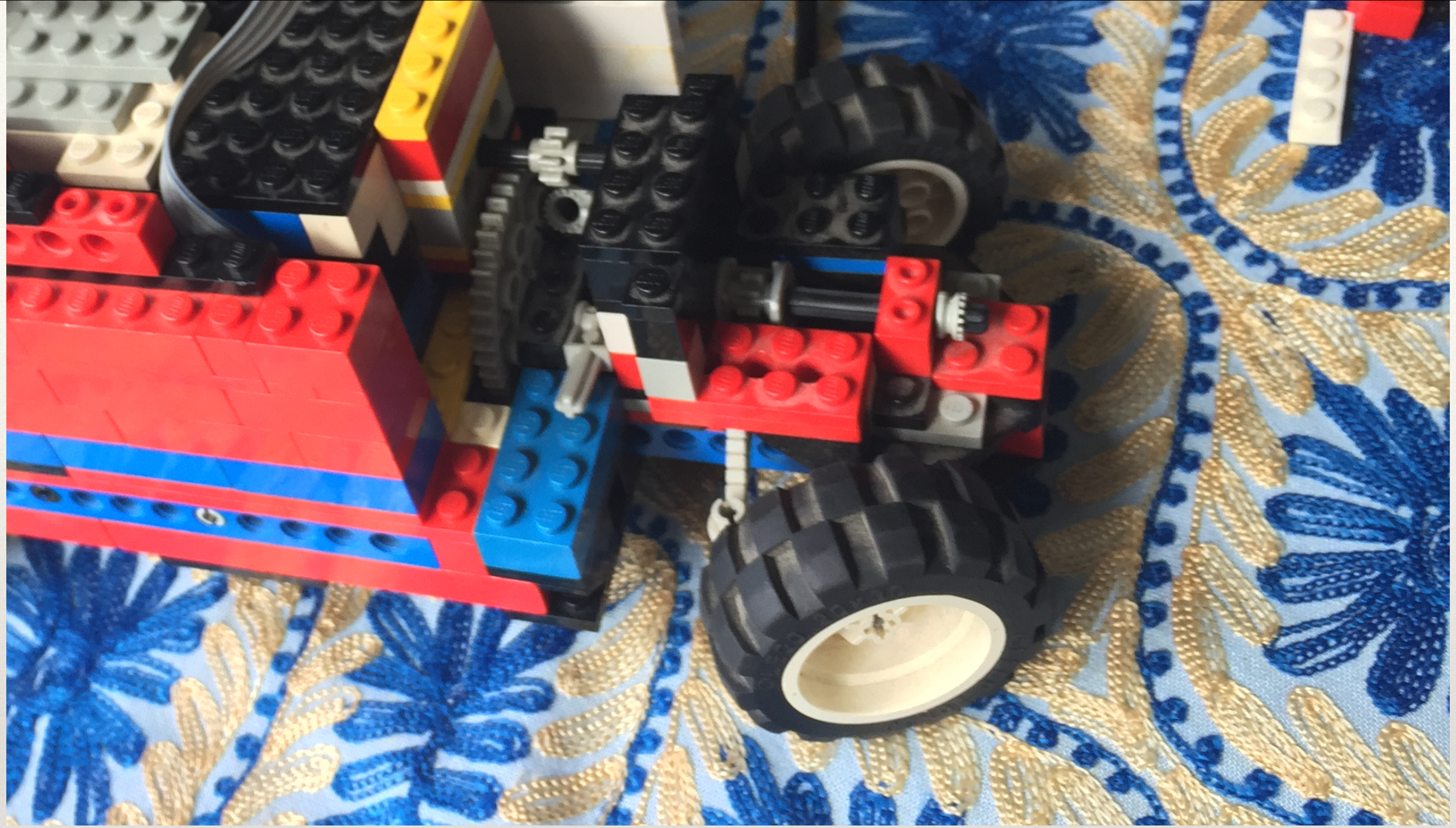






Robot Mechanics - Gears Config.

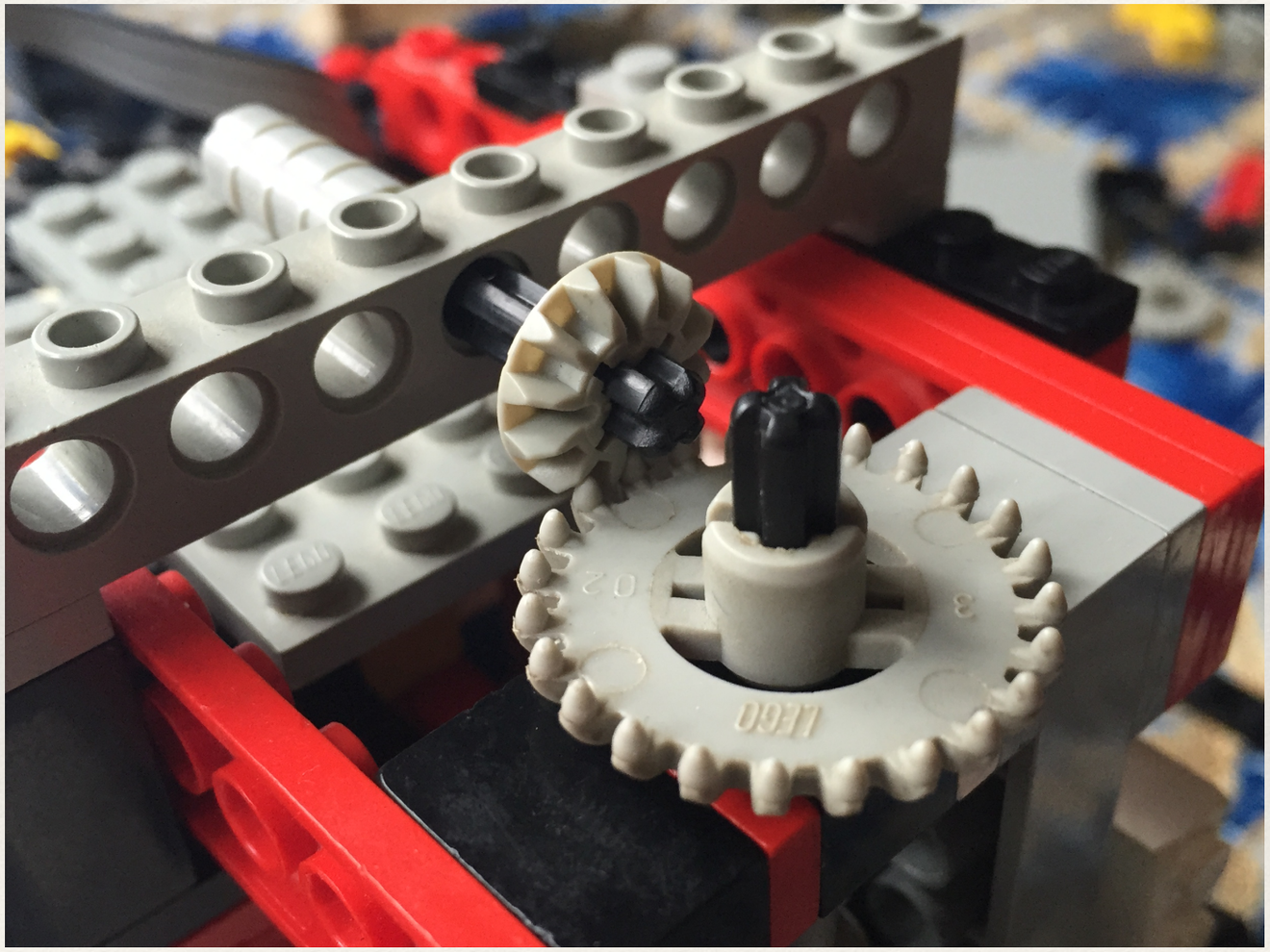


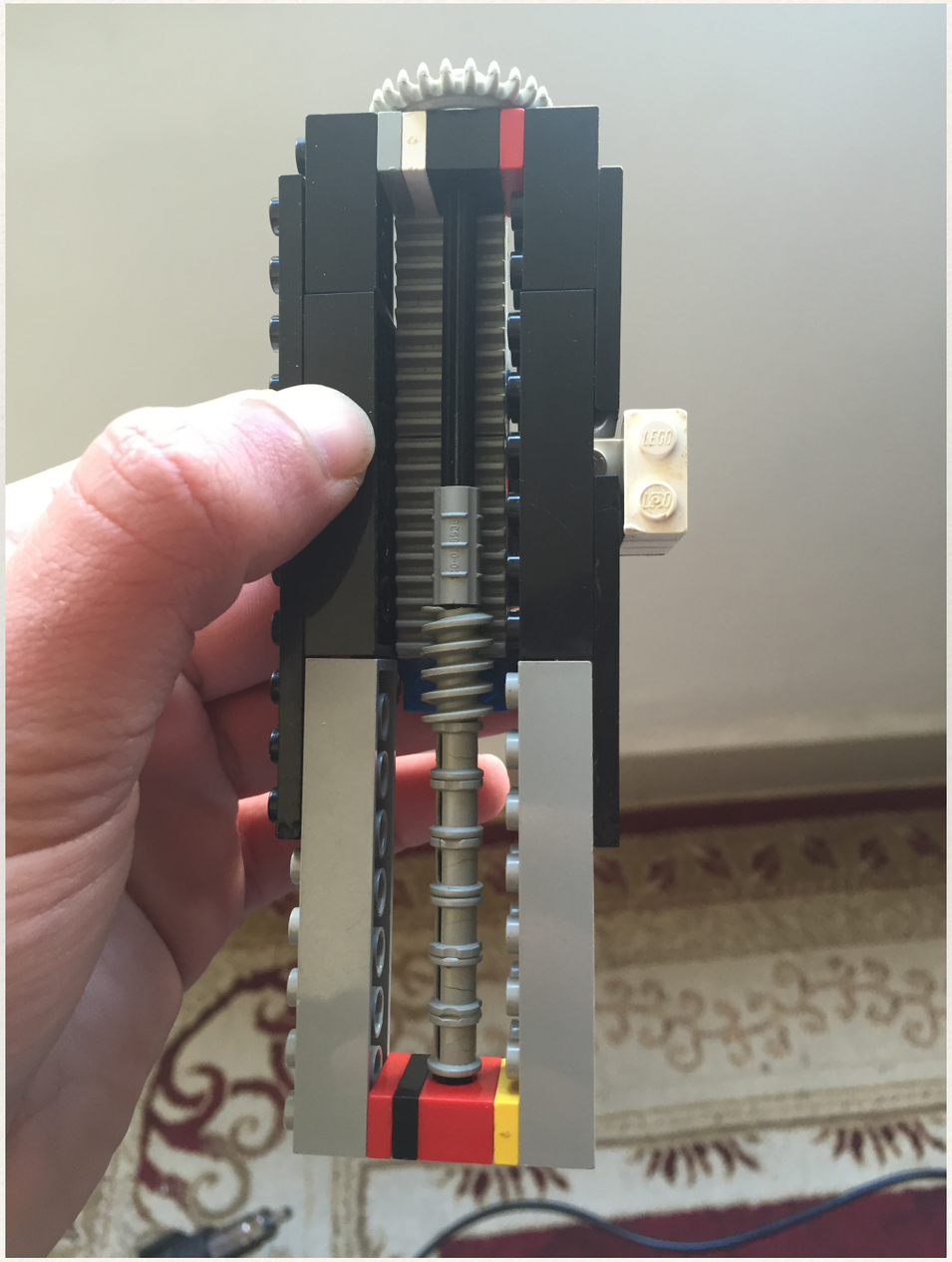


Robot Mechanics

Direction Gear

Robot Mechanics - Camera Direction





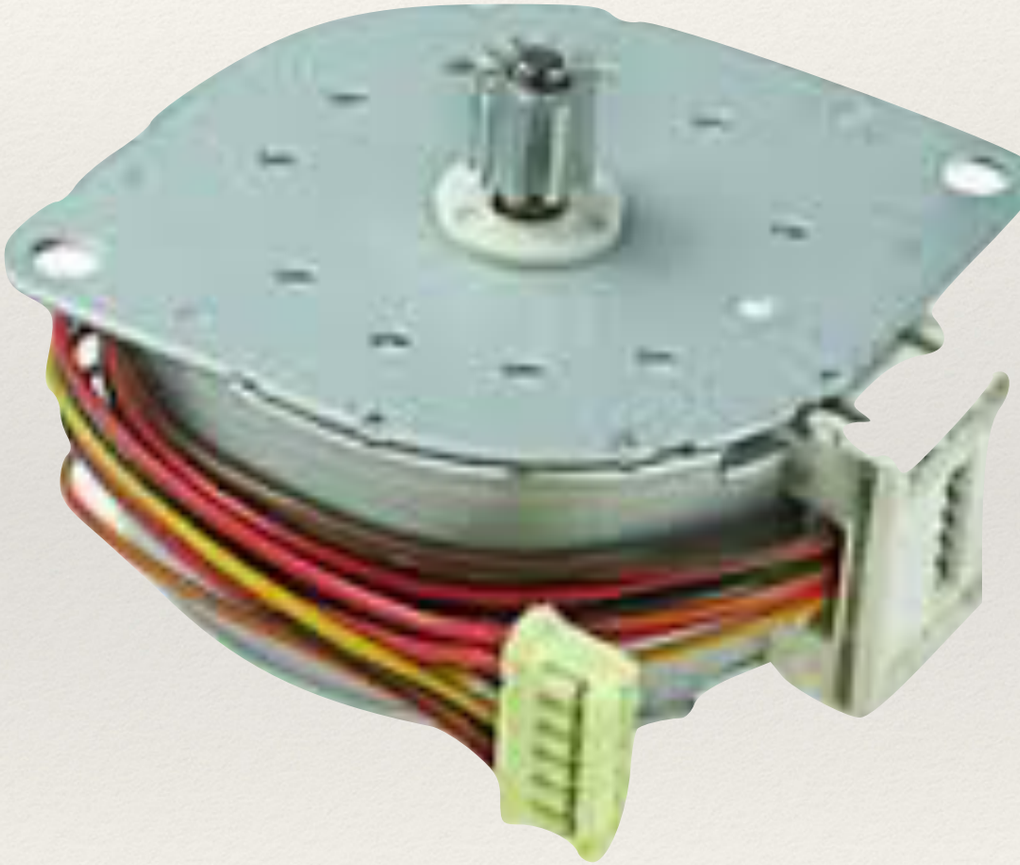
Driving Circuit

Main Components

Motors	X 3
Ultrasonic Sensors	X 2
L293 Chip	X 3
ATmeg168 Microcontroller	X 1
Camera	X1
BeagleBoard XM	X1
Microphone	X1
Speakers	X1

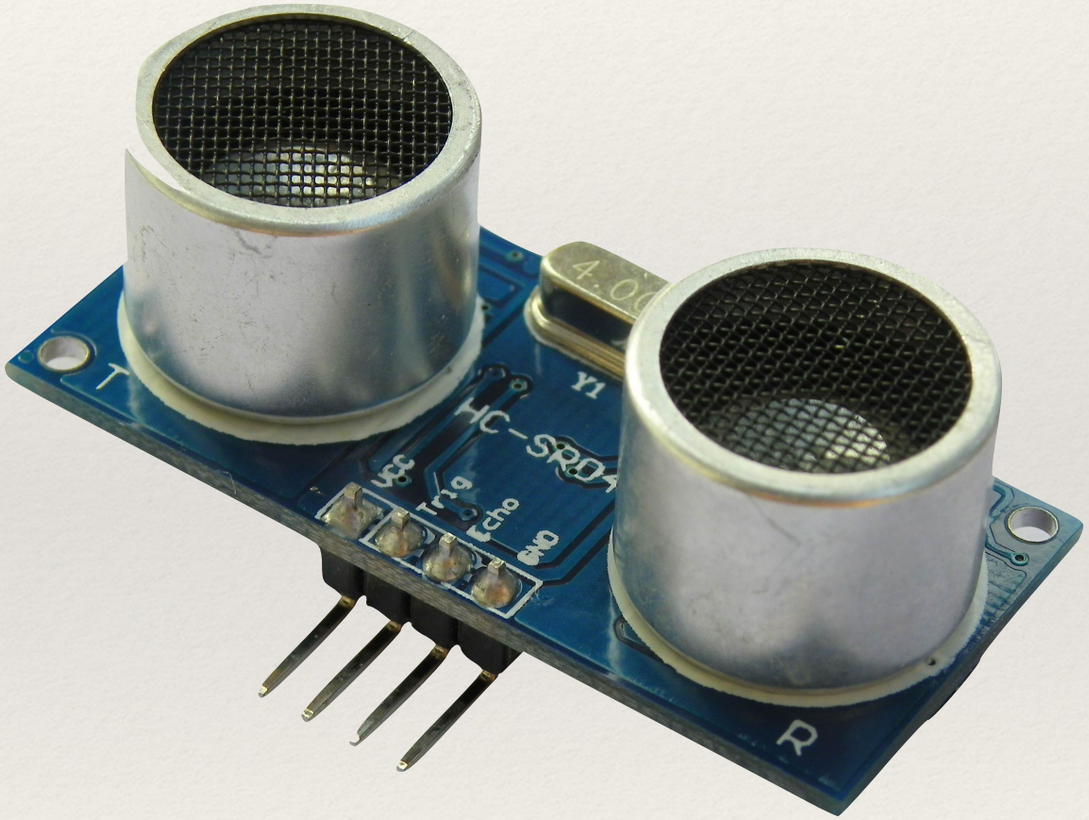
Motors

- Three Medium Size Stepper Motors.
- Direction Stepper
- Movement Stepper
- Camera (and Forkleft) Motor



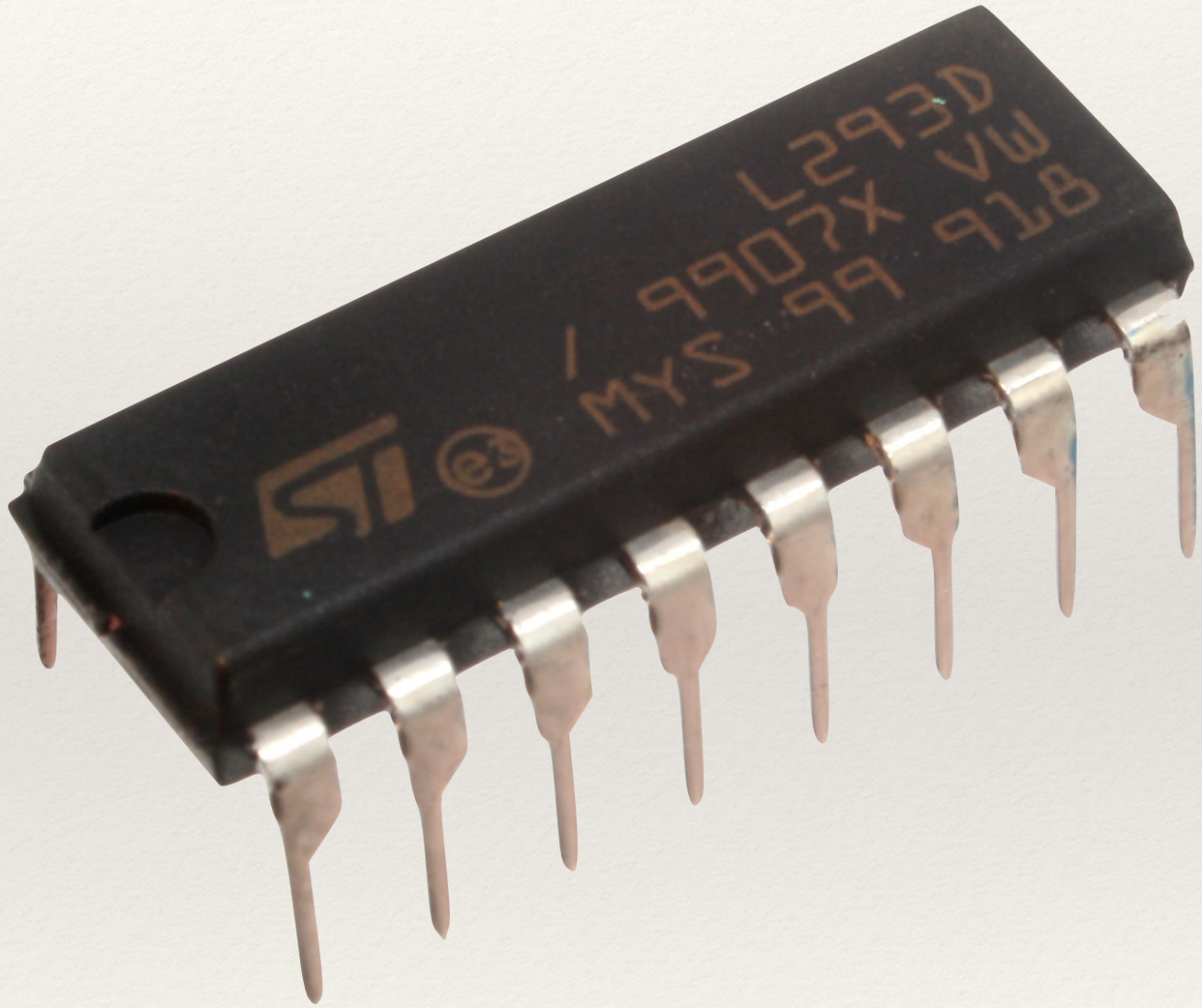
Ultrasonic Sensors

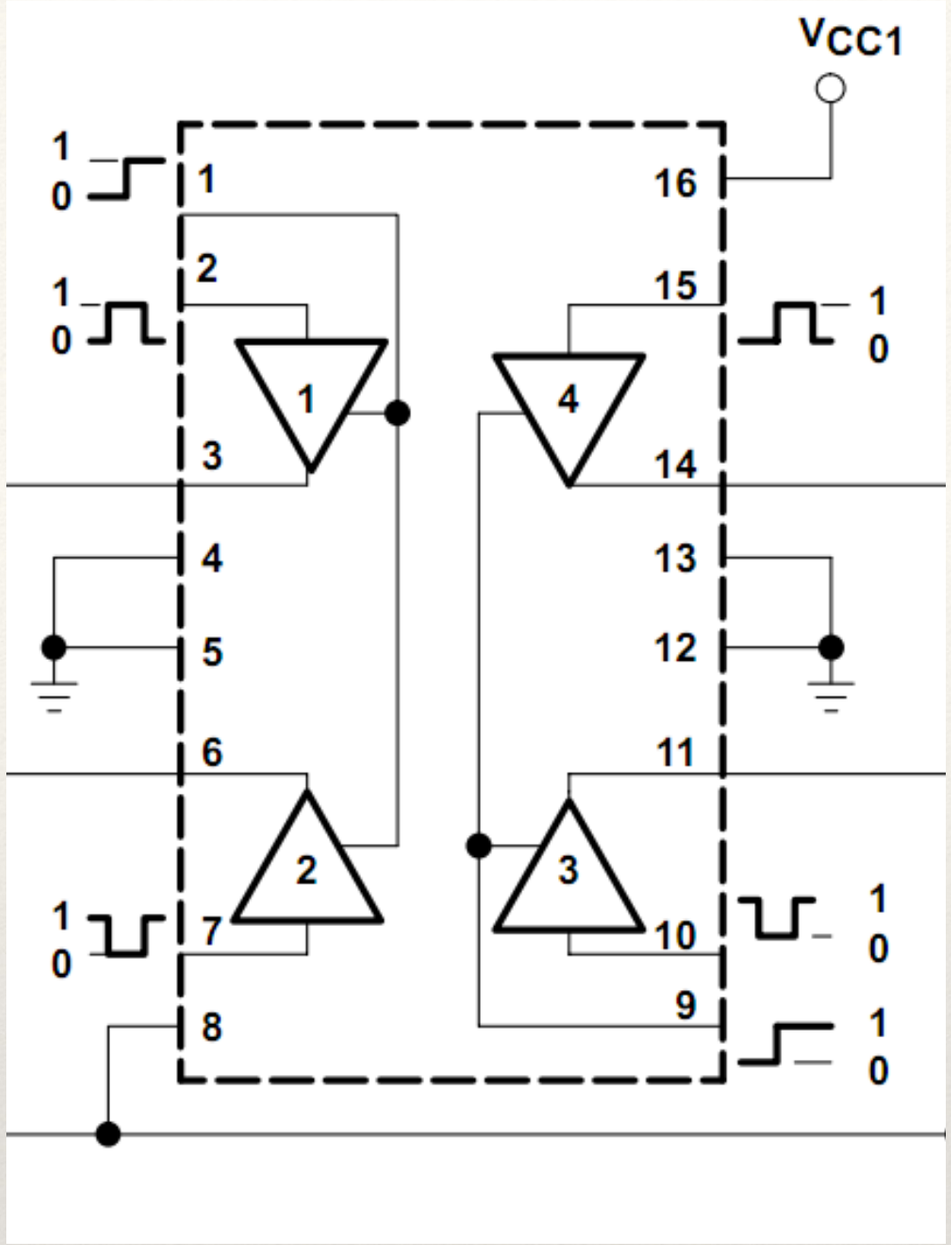
- Two HC-SR04 Ultrasonic Modules
- Edge Detection Sensor
- Follow / Wall Detection Sensor



L293 Chip

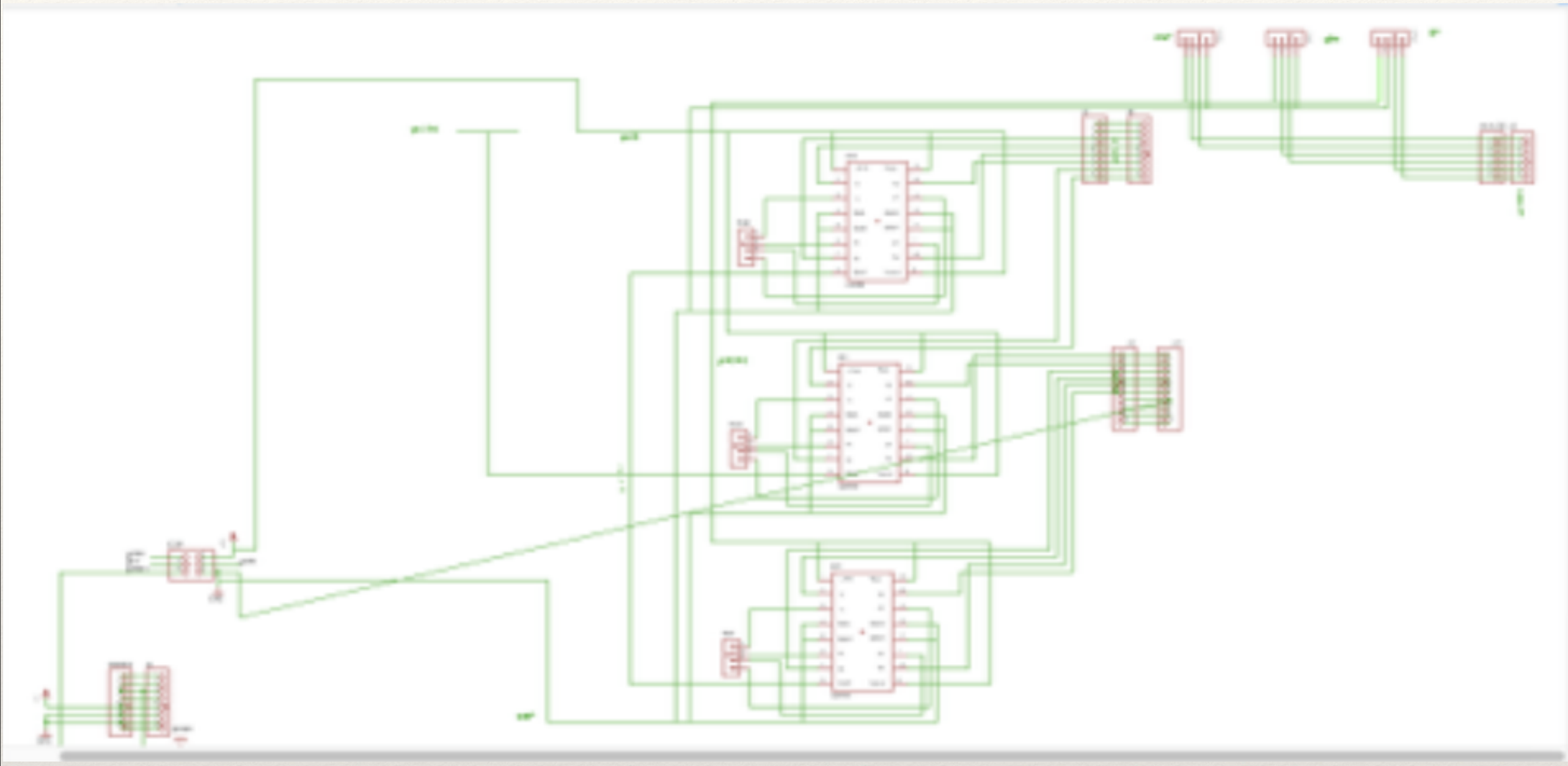
- Three Chips
- One For Each Motor
- Current Driver





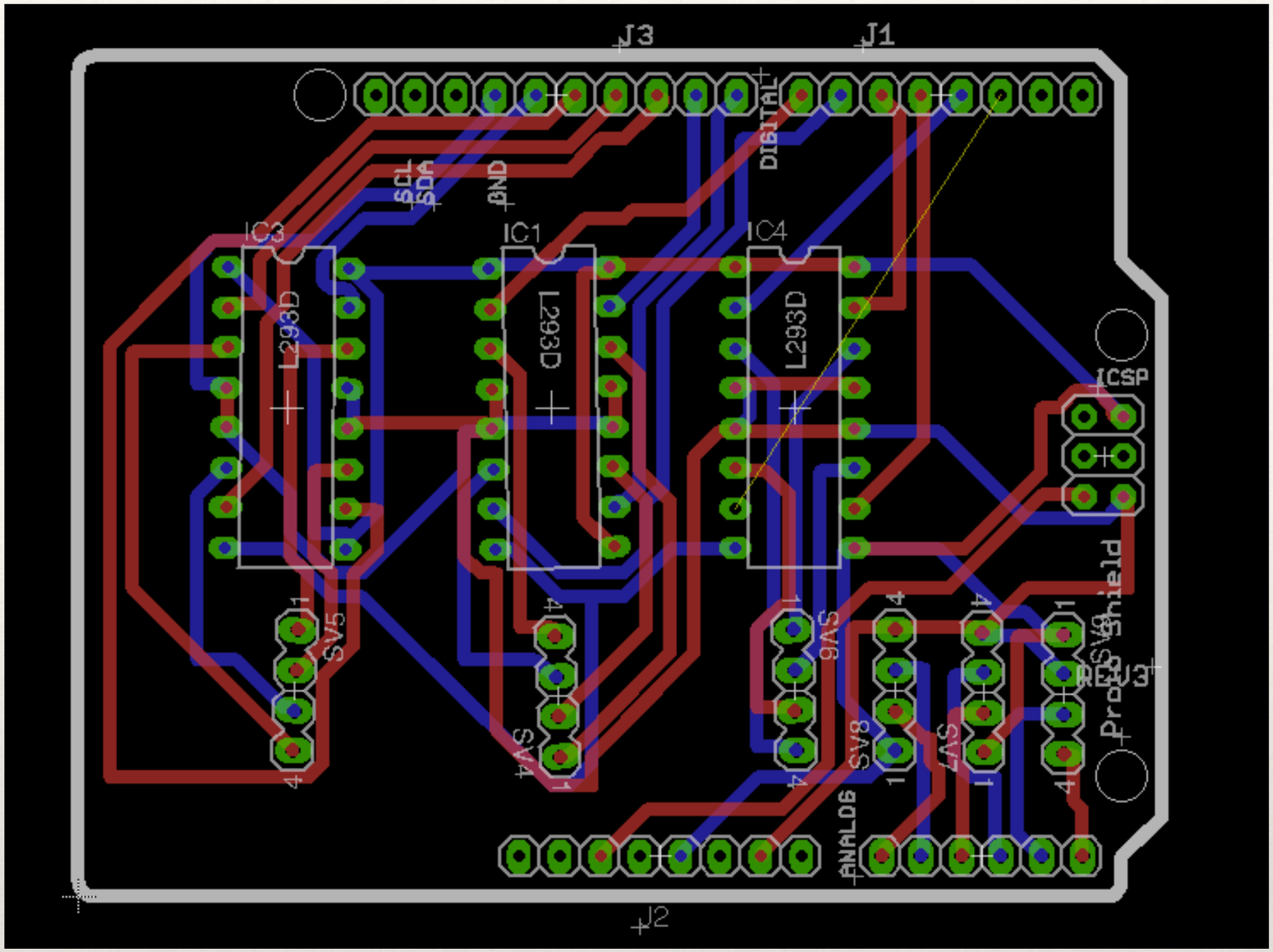
L293 Chip

Overview



Circuit Schematic

Overview

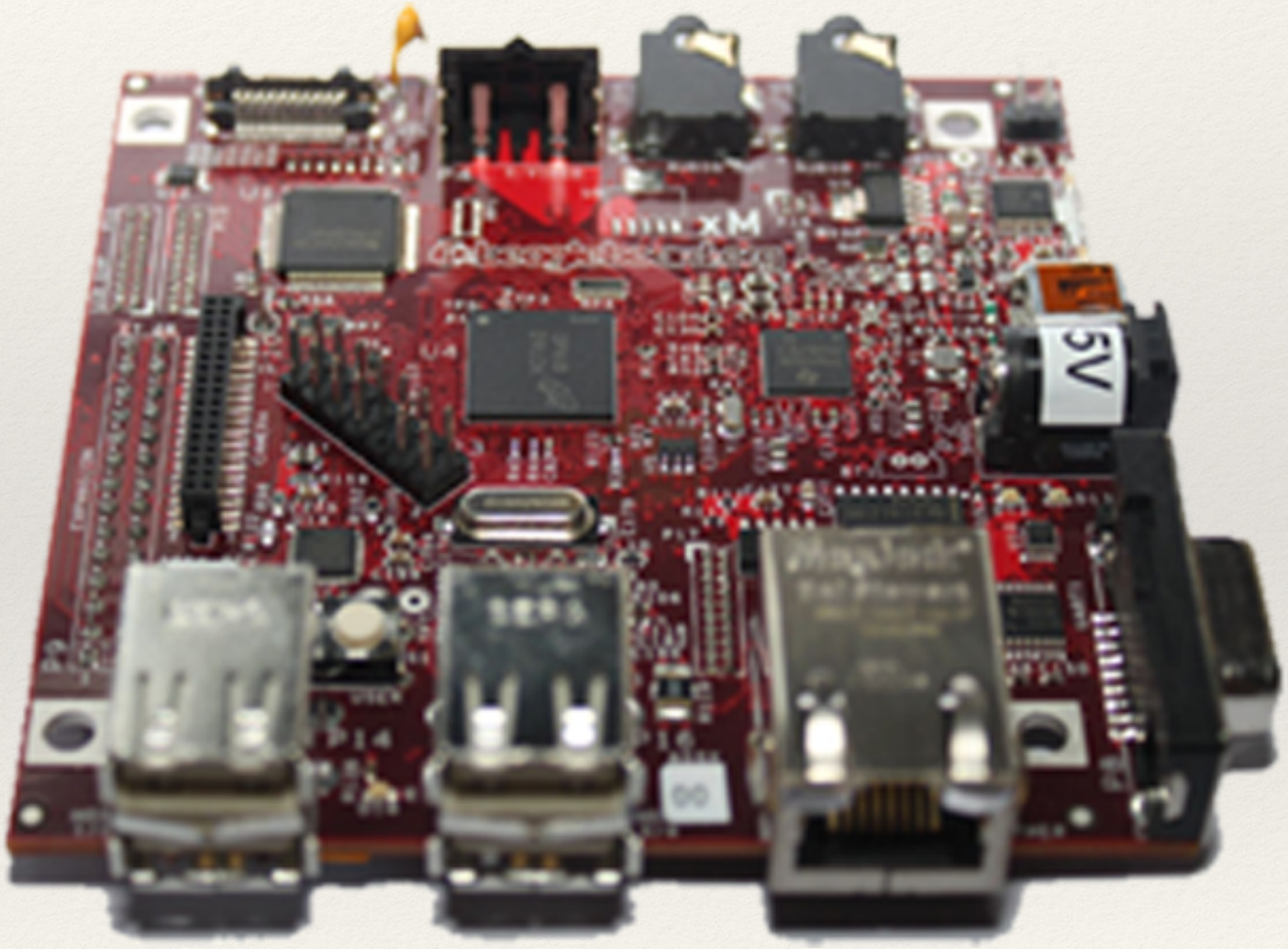


Schematic To PCB

More Than Six Configurations

Mini-Computer

- Features require high processing
- BeagleBoard-xM



BeagleBoard-xM

600 MHz ARM Cortex

128MB RAM

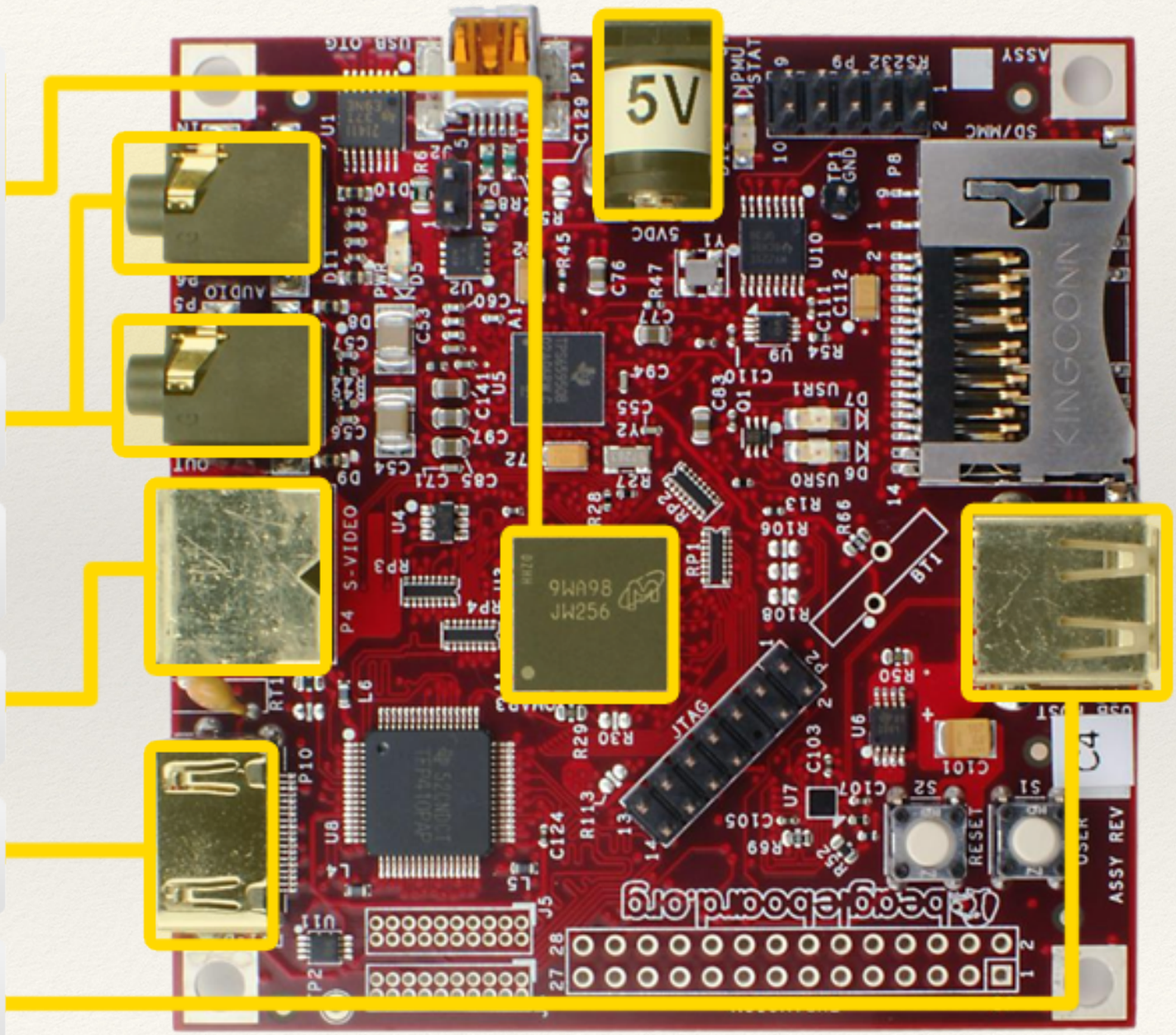
Stereo IN/Out

5V Power Supply

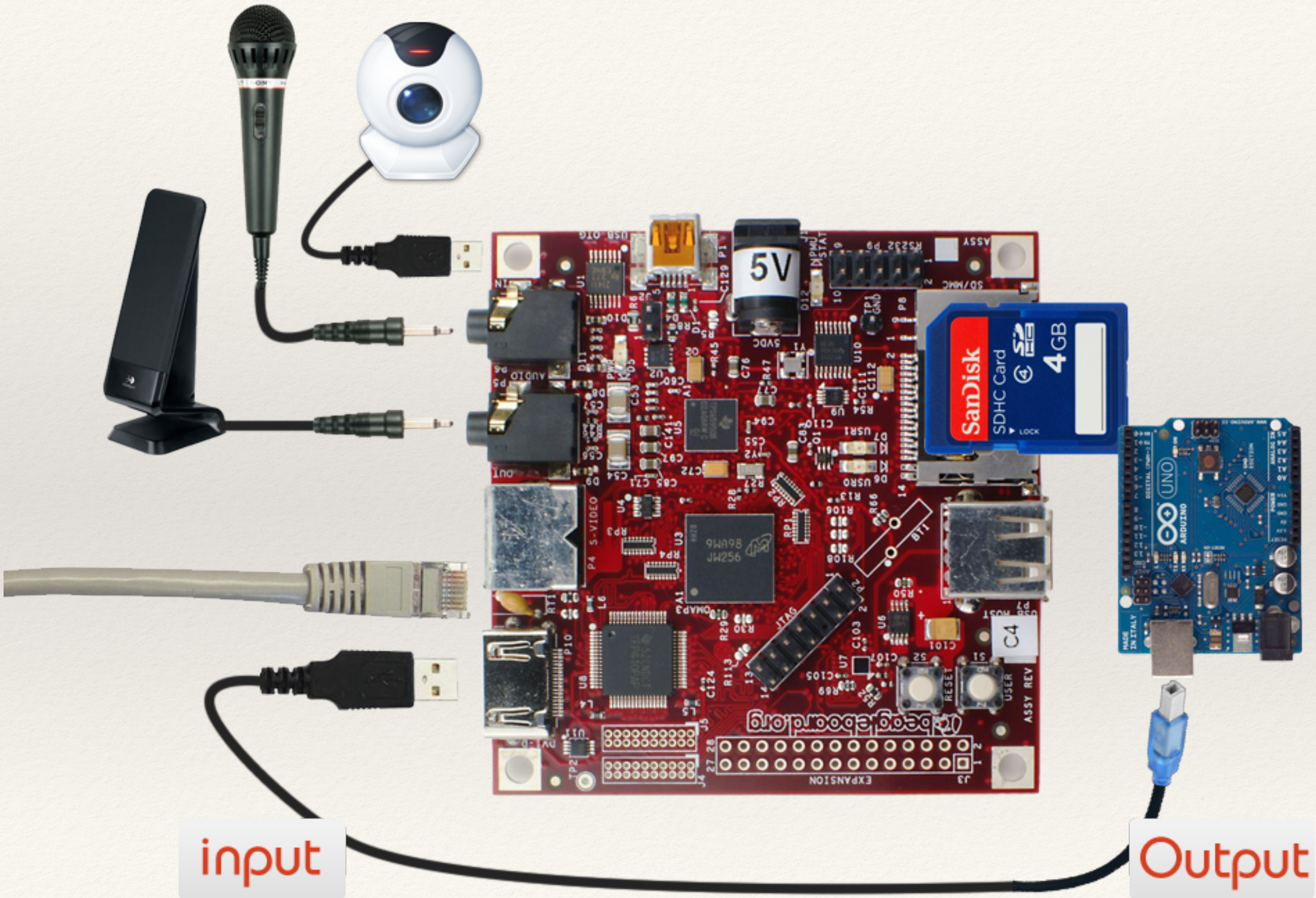
USB 2.0

DVI-D Display

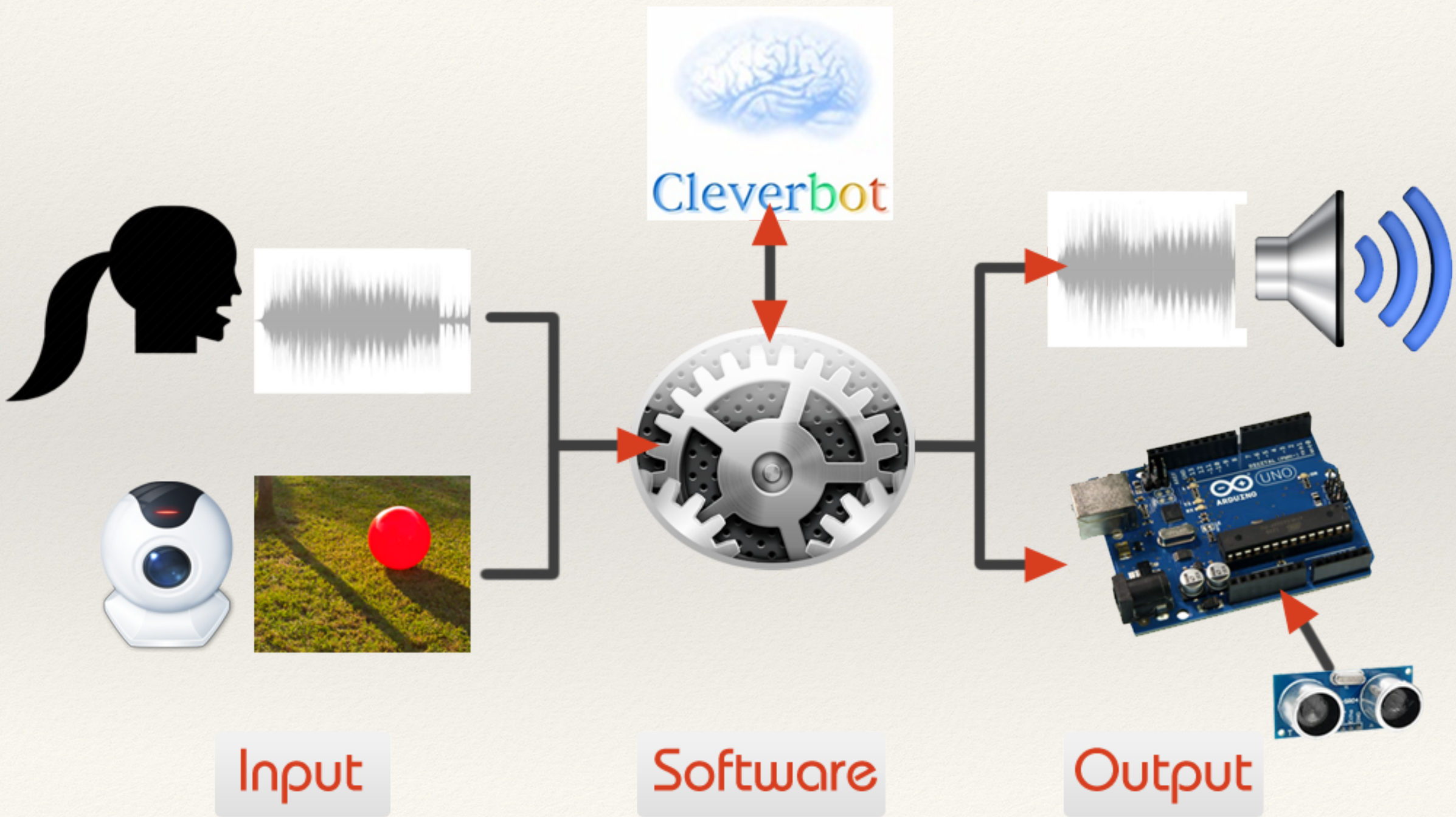
Eathernet RJ45



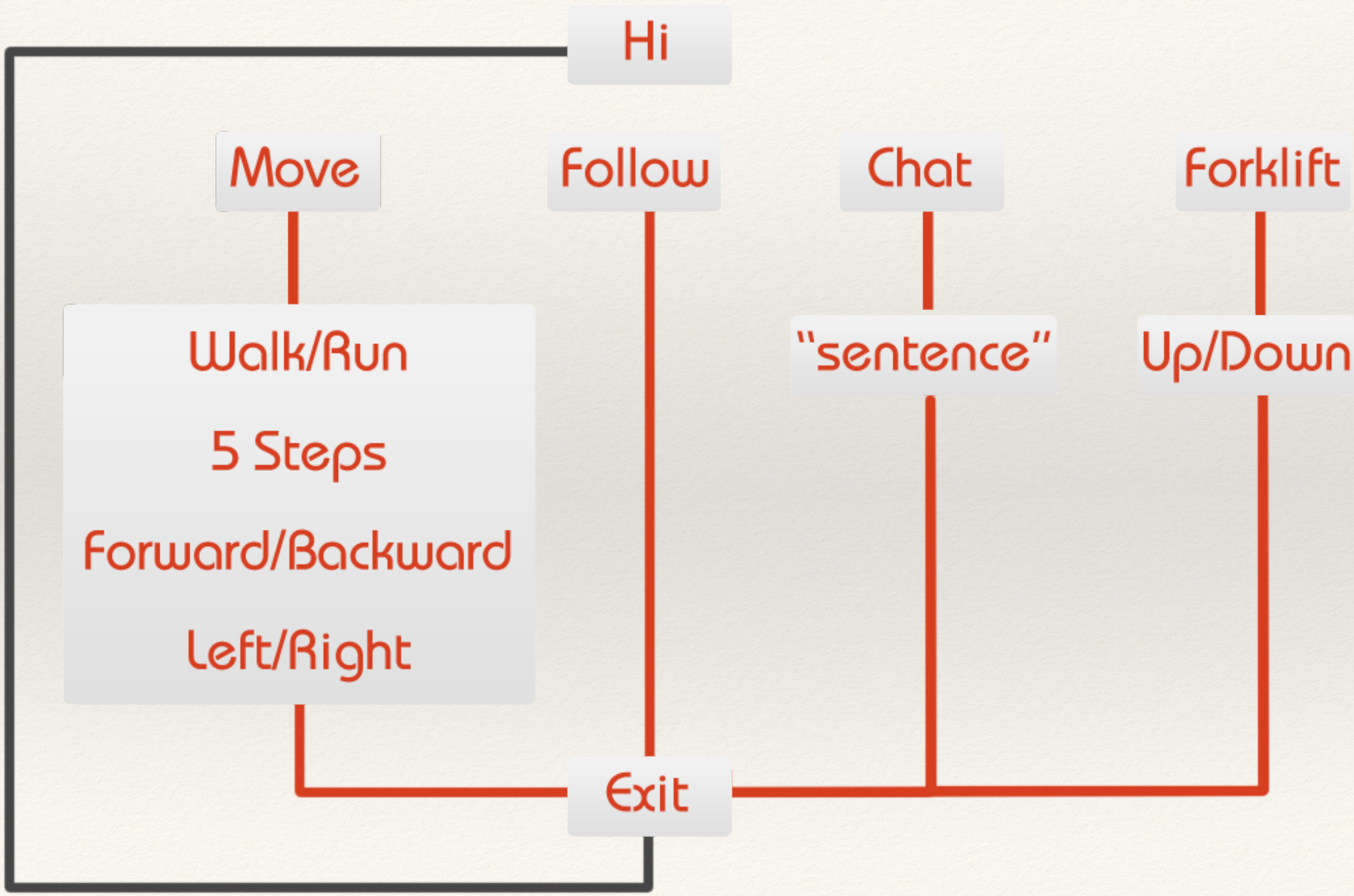
BeagleBoard role



BeagleBoard Software

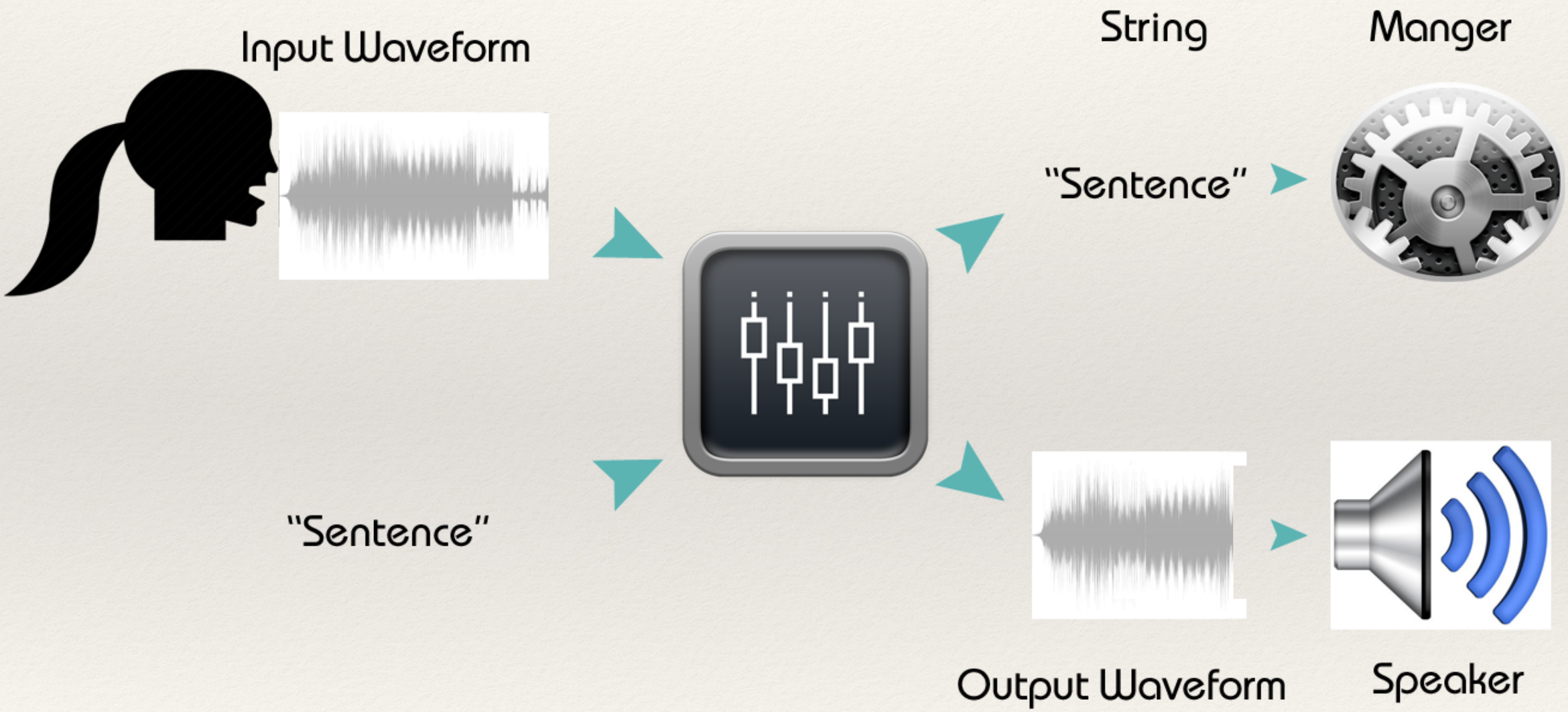


Controlling Commands



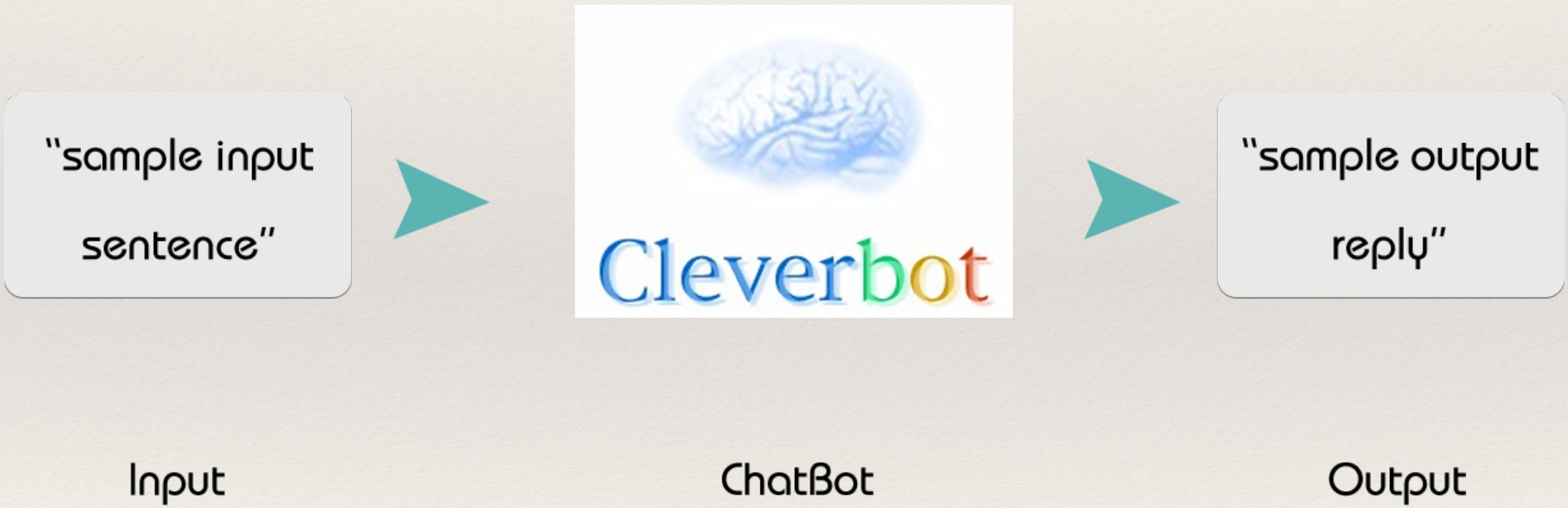
Libraries and APIs

- Voce



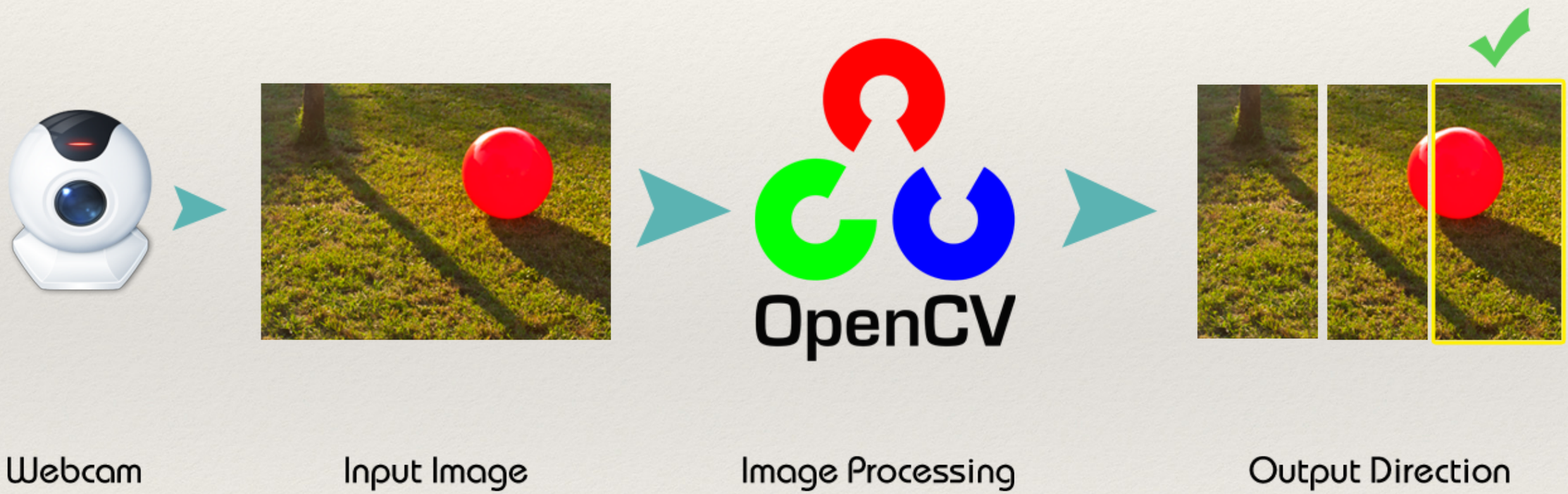
Libraries and APIs

- ChatBot



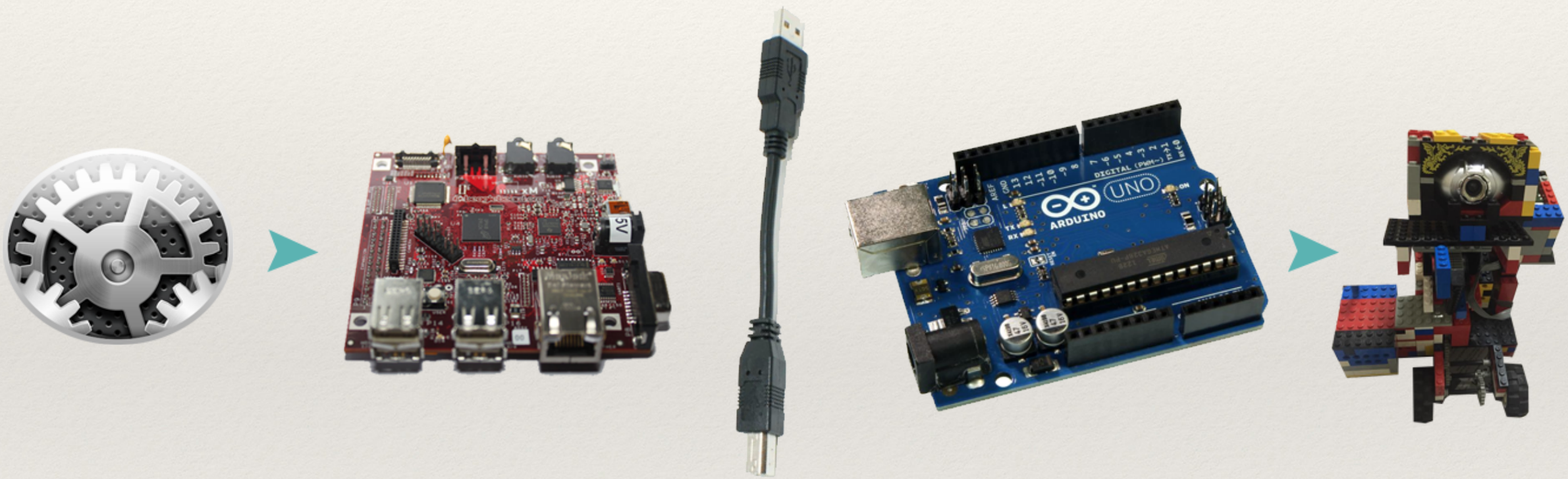
Libraries and APIs

- Image Processing



Libraries and APIs

- Serial Communication



Challenges

- Different Environments
- Mechanical Work
- BeagleBoard
- ICs Heat
- Weight

BeagleBoard Pros and Cons

- Pros:
  - Small, mobile, average performance, Low power
- Cons:
  - Unstable(always crashes!), slow

Future Work

- Adding a Display To Reflect The Robot Emotions
- Decrease Its Size
- Enhance The Materials and Looking, Non-LEGO.

Thank You