Boogie Bugs (Factory Reset)

Company B Group 1

(Insert Render/ Image of the Final Robots)

Key Features

- **Snail (Rover)**
  - **Vibrant LED Array**
    - The Snail uses a vibrant LED array mounted to the side of its face. This LED array executes an assortment of coded patterns in time with the music
  - **Underbarrel Arm Attachment**
    - This underbarrel arm is a servo mechanism used to roll the rover, it utilises an arm that extends across the bottom length of the robot
- **Ladybug (Stamp Bug)**
  - **Head Spinning Puck Attachment**
    - This Puck attachment is a 3D printed piece which is mounted to a servo located at the top of the Stamp Bug
  - **Servo Motor Operated Shell**
    - The shell section is mounted to its own servo housed at the very front of the Stamp Bug plate. This plate shell flips the robot back into its original position
  - **Underbarrel Arm Attachment**
    - Much like the Rover counter part the Stamp Bug also has an underarm which is used to flip the robots orientation to its back

Sizing

Component	Width	Breadth	Height
Puck	50mm	N/A	4mm
SB Arm	158mm	85mm	35mm
Rover Arm	154mm	60mm	25mm
Stamp Bug Shell	90mm	143mm	55mm
Rover Shell	200mm	80mm	68mm
LED	All (97 x 7mm)	All (97 x 1mm)	All (97 x 12mm)

Component Details

Component	Voltage Rating	Current Rating	Power Rating
Batteries	1.2V	230mv	
LED	5V	1.3A	Approx 6.5W
Servo Motors for Arms	4.8V	1A	Approx 5W
Servo Motor for Puck	4.8V	1A	Approx 5W

Servo Motors Used

Servo Motor	Torque and Voltage
MG996R	11kg/cm, 4.8v

Stampbug Technical Drawing

The 3D printed mechanism, designed to enhance a robot's mobility by enabling rolling and flipping functionalities, is constructed using PETG (Polyethylene Terephthalate Glycol) as the primary material. PETG has been chosen over PLA (Polylactic Acid) due to its superior strength, durability, and chemical resistance properties, making it an ideal candidate for this application. The mechanism is an assembly of four distinct components, which are detailed below:

1. **Base Unit:** The base unit houses a pair of MG996R servos that actuate the flipping arms. These high-torque, metal-geared servos provide ample force and precision to drive the flipping mechanism, allowing the robot to perform various dance movements. The base unit is also responsible for maintaining structural integrity and distributing the forces exerted during the flipping process.
2. **Top Flipping Shell:** The top flipping shell is designed to flip the robot back into an upright position when it finds itself inverted. This component's geometry is optimized to provide maximum leverage, enabling the robot to self-right with minimal energy expenditure. The shell's attachment points are engineered to ensure secure coupling with the base unit and seamless transfer of forces from the servos.
3. **Bottom Flipping Arm:** Located beneath the robot, the bottom flipping arm is responsible for inverting the robot onto its back. This arm is strategically positioned and shaped to ensure optimal contact with the ground, allowing for efficient force transmission and minimal friction during the flipping motion. Like the top shell, the bottom arm is securely attached to the base unit to facilitate smooth operation.
4. **Puck:** The puck is a low-friction, cylindrical component placed at the center of the robot's topside, enabling it to spin while in the inverted position. This spinning motion is essential for the robot to perform various dance maneuvers. The puck's material selection and geometry are meticulously designed to minimize frictional losses and wear, ensuring consistent performance over extended periods of use.

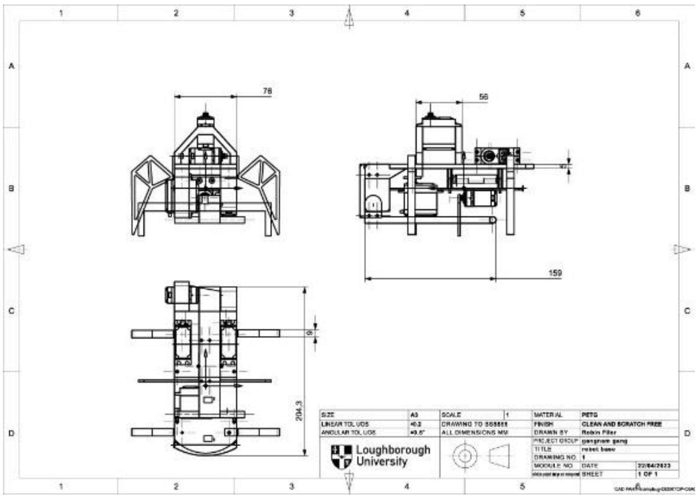


Figure 1 Show a engineering sketch of the Ladybug (Stamp Bug) with the appropriate dimensions

Software

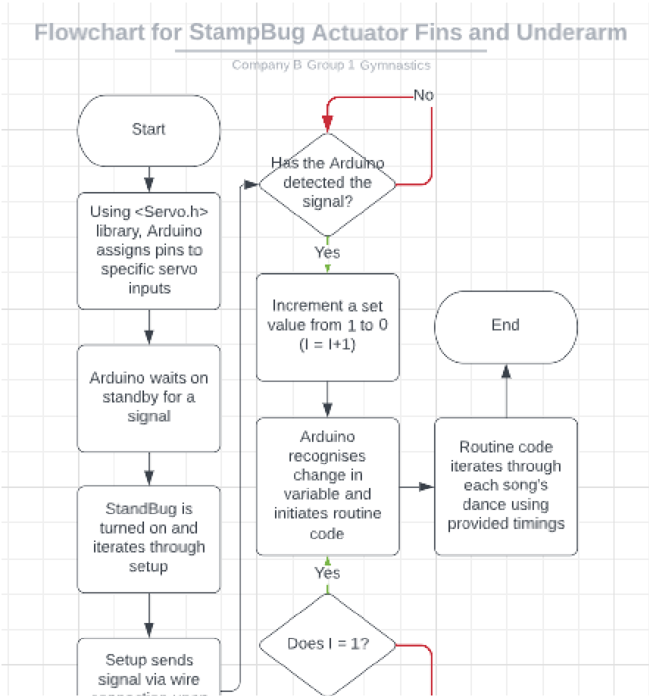


Figure 2 Shows the initial setup program for the communication between the Stamp Bug and the mounted Arduino Uno

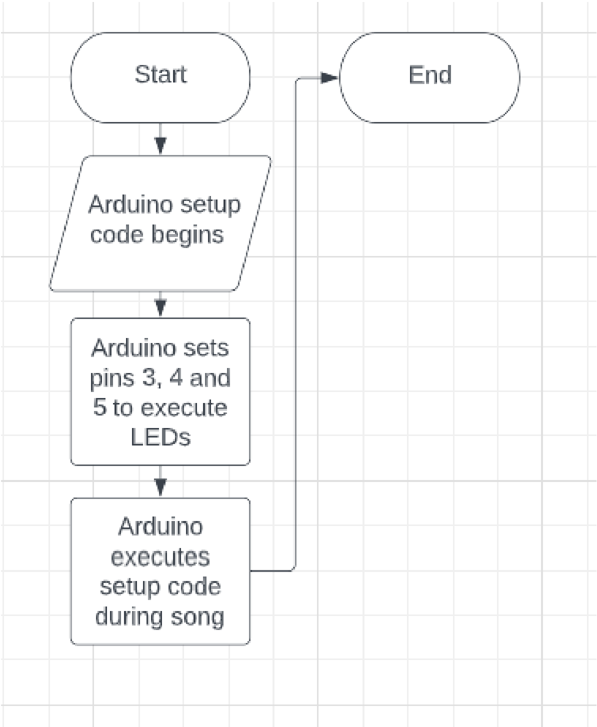
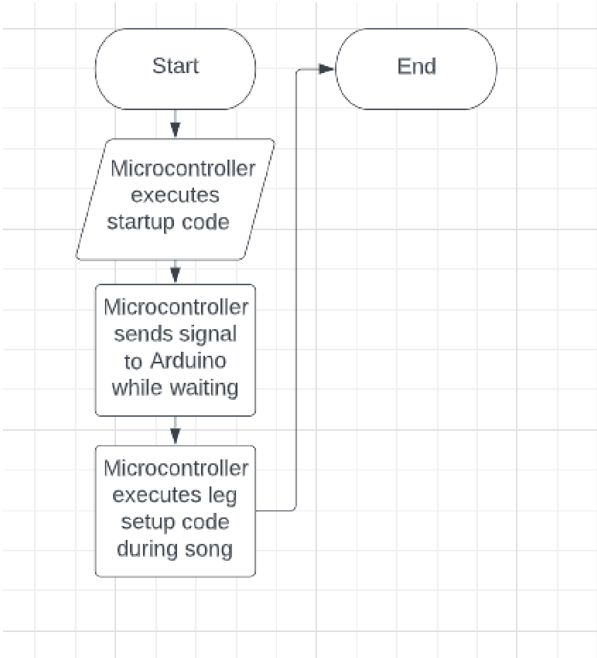


Figure 3 Shows the general structure of the code used by the rover to start the routine



Test Data

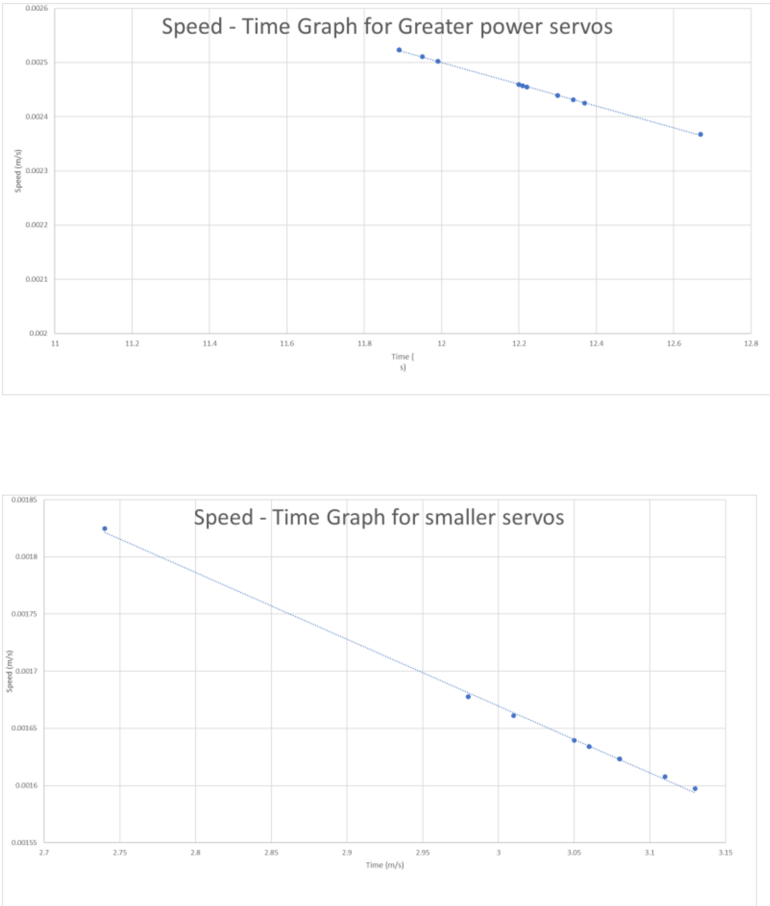


Figure 4 This plot compares the speed of the larger servos to the smaller previously used in prior iterations to show that they juxtapose much greater in performance