Investigating Teen Comfort and Engagement Using Nao

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Abstract—**This study examines the influence of attributes of robot interaction, such as approaching speed, stopping distance, and gesture speed, on the levels of comfort and engagement of teenagers with the Nao robot. Using Webots simulation software, the robot was programmed to perform a series of non-verbal gestures, beginning with a hand wave, followed by a nod, directional head movements towards people on its right and left, a shy gesture, straightening its head towards the person standing in front of him, and finally walking towards him. Ten adolescents rated their level of comfort, perceived friendliness, engagement, approachability, and stress in four interactive situations with different robot approach speeds (slow vs. fast), stopping distances (optimal vs. close), and gesture speeds (slow vs. fast). The results showed that slower robot movements and appropriate stopping distances significantly improved the comfort level, friendliness, and approachability of an adolescent.**

Index Terms—**Human-Robot Interaction, Social Robotics, Adolescent Engagement, Robot Gesture Speed, Robot Proximity, Nonverbal Communication, Comfort Level**

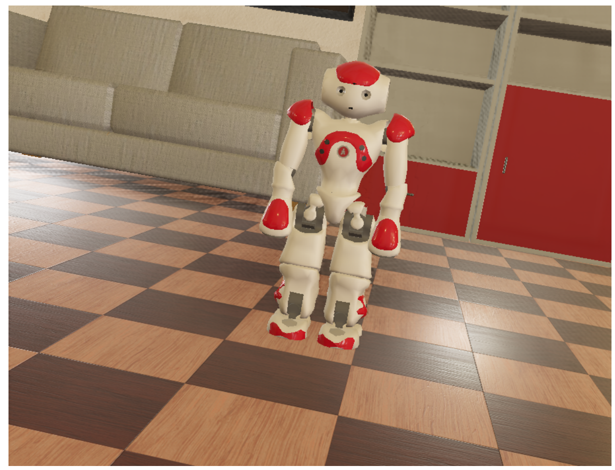

Fig. 1. Nao Robot

I. Introduction

Adolescence is a critical developmental stage that involves considerable emotional and social changes. During this period, teens commonly face difficulties like social anxiety, loneliness and difficulty building peer relationships. All these factors can have a negative impact on their mental well-being and academic performance.[1] In order to overcome these obstacles, social robotics research has concentrated largely on creating companionship-capable robotic systems that can reduce teenage mental stress through compassionate and non-threatening interactions.[2] Supportive relationships are critical in maintaining mental wellness and achieving optimal growth.

The small aspects of robotic behaviors, such as speed, closeness and gesture patterns, are particularly important in determining how comfortable youngsters feel in the company of robots.[3] Adolescents may become anxious and uncomfortable due to excessive anthropomorphic or sudden robotic motions, that can lead to the well-known "Uncanny Valley" effect, in which negatively charged emotional responses are evoked by human-like objects.[4] Therefore, it is still essential to carefully balance closeness, approachability and gesture dynamics when creating robot behaviors to ensure that adolescent-robot interactions are both comfortable and productive. Taking these factors into account, this research uses Webots simulation software with the humanoid Nao robot as shown in Figure 1. It is set up to carry out a number of nonverbal actions such as a friendly handwave, a nod, targeted head movements toward participants on the robot's right and left sides, a shy gesture, and finally straightening its head and walking towards the adolescent in front. This study systematically adjusts the robot's approach speed (fast vs slow), stopping distance (close vs optimal), and gesture speed (fast vs slow) to find out how these affect an adolescent's comfort, friendliness, interaction, approachability and anxiety levels.

This study aims to determine which set of robotic behavior parameters best fosters positive relationships, decreases anxiety, increases teenagers comfort and engagement levels with robots. It is done by analyzing adolescents reactions to the various interaction situations. In the end, this study offers useful insights into the design and deployment of socially supportive robots customized particularly for teenage populations.

II. Related Work

The numerous aspects of human-robot interaction studies the way individuals and robots can co-exist peacefully and efficiently. An essential element of HRI is comprehending the aspects that affect an individual's comfort levels and feelings of safety while interacting with robots. This literature review examines numerous studies that have analyzed factors like a robot's approach speed, closeness, recognizing gestures and psychological assistance. Each of these elements are essential for the design of socially accommodating robots, particularly for adolescents.

Social robots intended for human interaction notably affect reliability and ease by their behavioral attributes such as proximity and speed. Robots moving rapidly as well as maintaining near interpersonal distances reduce the level of human comfort as well as trust. The study employing Human-Robot Trust Scale have showed that slower pace and wider distances during robot encounter greatly boost user trust and comfort.[5]

Another research discussed the human behavior and comfort levels while placing a box on an autonomous mobile robot (AMR). The findings indicated that when the AMR's stopping distance decreased participants' walking speeds dropped and their likelihood of hesitating climbed. But rather than being motionless, participants felt more relaxed with the AMR coming close implying that an active robot approach is seen as more helpful while working on collective duties.[6]

The utilization of iconic gestures by robots greatly enhanced students ability to remember difficult topics. The importance of purposeful gesture usage in educational environments was highlighted by the fact that the children were more involved with robots that used gestures that were consistent with the subjects being taught.[7]

A research on the effect the speed of robot gesture on HRI discovered that participants felt more comfy when the robot matched the speed of their gestures speed rather than moving at a fixed pace. This implied that aligning robot gestures along with human expectations might improve the comfort and engagement levels.[8] Research has shown that children are more engaged when engaging with robots that utilize iconic gestures than when they do not, when it comes to language acquisition interactions between children and robots. Another benefit is that when the robot's movements matched the spoken content then the youngsters word memory also increased.[9]

A study evaluating the impact of long-term interactions between the children having autism and the robots on attention and engagement discovered that there was no significant reduction in kids attention and engagement with the robot over time. But the attention and engagement with parents increased, showing that customized and adaptable robot behaviors can maintain children's interest and possibly improve social connections with others.[10]

A study on the impacts of robot motion on the comfort dynamics of new users in close-proximity human-robot interaction discovered that the workspace overlap has a major impact on the perceived level of comfort and habituation. Reducing workspace overlap increased overall comfort and reduced comfort level variations across repeated interactions.[11] In another study on social robots in a project-based learning environment with adolescents revealed that while present-day technology limits the robots ability to be extensively used in public-school classrooms, well-designed strategies using social robots has the ability to inspire and involve young people. The introduction of social robots may increase teenage involvement in learning environments.[12]

Another essential feature of HRI is the detection and response to human engagement levels. A research described a robotic cognitive system developed for complicated situations that combines involvement, intent, and human-robot interaction models. This method makes it possible for robots to precisely identify human intents, emotions, and behaviors, resulting in more comfortable and natural interactions. An engagement model uses eye gaze, head attitude, and activity recognition to select acceptable times for interaction beginning, reducing possible discomfort related to eye contact.[13]

Comfort level of humans during Human Robot Interaction is greatly influenced by emotional strain and alertness. Higher robot speeds and longer idle times were linked to greater psychological stress and lower safety awareness levels. The results indicate that maintaining a comfortable and secure contact environment requires meticulously adjusting robot operating parameters like the speed of the robot and patterns of activity. When creating robots for use with teenagers, who can be more susceptible to sudden movements and erratic behaviors, this factor is very crucial.[14]

Another revealed that human perceptions, feelings and subsequent behaviors are affected by several kinds of affective gestures notably by humanlike nonverbal behaviors (HNB) and robot-specific nonverbal behaviors (RNB). When compared to robots that displayed robot-specific or no movements at all, the researchers discovered that human-like robots greatly increased their perceived animacy, generated more favorable emotional reactions and promoted higher self-disclosure from human participants. The humanlike motions were much more successful in promoting perceived emotional warmth and interaction quality as well as robot-specific gestures also had positive impacts.[15]

III. Research Questions

As discussed in the prior section, significant research has been conducted to better understand the level of comfort and engagement levels of humans during a HRI study. A number of researchers have investigated diverse robot behaviors, with a special emphasis on elements such as approach speed,[6] gesture style,[7] and contact distances[5] influence on the human reactions and adoption of robots in various social settings. Our study intends to give greater insight into the way teenagers perceive robotic actions when presented with different approach dynamics. The prior studies have usually looked at comfort and engagement independently and in broad human populations, occasionally ignoring complex reactions specific to teenagers.

The following are the key problems that this project aims to address:

Q1: How does the stopping distance affect an adolescent's comfort level when a robot approaches?

The aim for this is to determine whether adolescents want robots to keep a particular interpersonal distance during interactions or not. Although being closer could be seen as a sign of friendliness and affection, it could also be uncomfortable because it invades someone's personal space. Thus, the ideal distance is an important factor in enabling pleasant encounters and influences robot design to promote higher adolescent acceptance.

Q2: Does doing a basic wave increases teens perceptions of someone's friendliness or approachability?

The goal is to determine whether teens perceptions of robots can be greatly influenced by a basic, universal gesture like waving, which could increase their willingness to interact. Examining how simple gestures impact adolescents' interpretation of social cues could significantly shape the design of socially interactive robots aimed at younger audiences.

Q3: Are slow, deliberate motions perceived as more reassuring and less threatening than abrupt or rapid movements in adolescent populations?

The study in question seeks to determine if slower, regulated robotic movements offer trust and predictability to teenagers and lower their anxiety or discomfort levels while interacting with the robots. Rapid and sudden robot motions, on the other hand, may create unpredictability and uneasiness. To ensure pleasant and interesting interactions, robot programming techniques can be significantly impacted by an understanding of teenagers perceptual reactions to different movement dynamics.

IV. Method

In order to conduct this study, we used a within-participant design in which each teenager was shown four systematically conditions using the Nao robot. This method allowed each participant to experience and assess various robot behaviors, each with a different approach speed, stopping distance, and gesture speed. Given that the sample size we have for this pretend study, a within-participant design allowed a practical way to collect comparison data while ensuring that every participant acted as an independent reference and had firsthand experience with every experimental condition.

Fig. 2. The layout of our Simulated Webots Environment

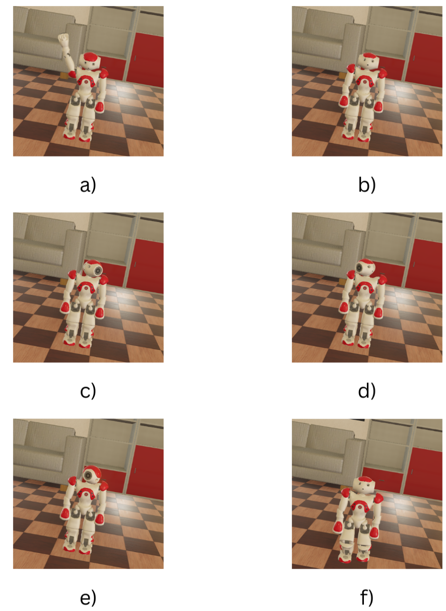

Fig. 3. Nao robot performs six gestures in the project (a) Hello (b) Nod (c) Right Upwards (d) Left Upwards (e) Shy (f) walk forward

A. *Overall Design*

The primary goal of this study was to investigate in detail the ways in which particular robot interaction attributes like approach speed, stopping distance and gesture speed affect adolescents comfort, friendliness perceptions and general levels of engagement when interacting with social robots. We made use of the Webots simulation software environment to achieve precise supervision as well as for the accurate execution of experimental conditions.

The simulated experimental environment was a big, welcoming interior room that resembled a huge community living space mimicking a real social scenario. Several teenagers were simulated as human avatars and were placed throughout the space to create a social setting resembling everyday interactions. The Nao robot was chosen for the purpose of this study and was placed centrally in our simulation environment as shown in Figure 2. The robot performed a pre-programmed series of nonverbal gestures for each situation in order to initiate a pleasant relationship with adolescents. It was designed to make a number of nonverbal signals before approaching a participant.

The specific gesture pattern that the Nao robot used in each situation was as follows:

- **Handwave** - The robot started the interaction with a handwave motion.
- **Nod** - It was next followed by a slight downward tilt of the head.
- **Head movements** - The robot then gazed upward and to the right, then upwards and to the left looking at two different individuals.

- **Shy gesture** - A slight lowering of the head and turning it slight back was performed next.
- **Straightening the head** - The robot then brought its head back to a neutral, straight position.
- **Approaching forward** - At last, the robot moved in the direction of a person standing just in front of it.

Participants viewed four different interactive scenarios created with Webots software:

- **Scenario 1:** Slow robot approach, optimal stopping distance and slow gesture speed.
- **Scenario 2:** Slow robot approach, close stopping distance and slow gesture speed.
- **Scenario 3:** Fast robot approach, optimal stopping distance and fast gesture speed.
- **Scenario 4:** Fast robot approach, close stopping distance and fast gesture speed.

This organized approach allowed for a thorough assessment of each factor's individual and combined impacts on the viewpoints of adolescents and emotions. It provided us the understanding about the best robot behavior configurations for adolescent groups.

B. *Participants*

As it is a pretend user study, we assumed participants to be adolescents between the ages of 13 and 18. It is a normal age range for teenagers. We primarily looked at teenagers overall understanding of and exposure to the internet, robotics and social media rather than the differences in demographics. Since adolescents are often used to dealing with technology and virtual platforms, they were ideally suited to be hypothetical participants who could participate in meaningfully simulated robot interactions.

Participants in our proposed scenario were used to driven by interactions using technology, virtual simulations and games. This basis made the hypothetical study credible and applicable to the setting by enabling youngsters to instinctively comprehend the simulated events. The experiment's goal and methodology were explained in detail to each participant. Even though the study was hypothetical, this approach provided realistic methodological detail in line with real HRI research methods.

C. *Artifacts*

We selected the Nao robot in the Webots open-source 3D simulator for this project's implementations because it offered a stable and adaptable environment for simulating real humanoid interactions. The Nao robot's expressive face, sensor suite and programmable joints suitably fulfill the requirements for performing the non-verbal motions that are essential to our study. It is already popular in a variety of social and educational applications. We created specific motion files to mimic each gesture such as wave, nod and shy gesture. The main controller was programmed in C. We used Webots built-in recording feature on a Windows-based system to record it. This method assured that we could precisely collect and capture the anticipated interactions in a regulated and a reproducible way.

*1) **Webots Simulation Environment**:* We created a realistic 3D world using Webots as our main simulation tool. It provided a rich visual environment and enabled us to have a fine control over the Nao robot's mobility, gestures and interaction distances. The space has objects like tables, chairs, computers and decorative pieces. Several human are positioned throughout the space to simulate a socially dynamic situation as shown in Figure 2.

*2) **Nao Robot Model**:* We used the Nao robot model because it is recognized for its anthropomorphic traits and adaptability in HRI research. The robot's movements such as wave, nod, shy gesture, etc. were meticulously synchronized with exact joint motion orders in each scenario. Different motion files were created for mimicking the motions that the robot performs. For creating four different simulation videos, we customized the approach patterns such as fast vs slow walking speeds, fast vs slow gestures and stopping distances as close vs optimal in Webots.

*3) **Simulation Videos**:* Four simulation videos were created using the meticulously created Nao behaviors and environment characteristics. One video for each experimental condition was made. Every video started with the robot being still and then showing a series of nonverbal signals at the specified gesture speeds before moving toward the participant standing in front at a the predetermined approach speed. The videos were generated with the same quality.

D. *Procedures and Measures*

This section gives a thorough explanation of how each participant in the user study went through the viewing of the simulated robot interaction situations, how their subjective responses were noted and how the eventual analysis of the data would be carried out. The process was created to mimic real HRI research methods involving teenagers.

The duration of each participant session was planned to be between 15 and 20 minutes in order to balance the attention spans of adolescents with the requirement for in-depth observation. I provided an orientation to participants upon their arrival, explaining the overall goal of the study, which was to determine how various robot behaviors such as variable approach speeds, stopping distances and gesture speeds may impact adolescents feelings of comfort, perceived friendliness, engagement and stress. Participants were told that they would view four brief videos. Each video will be around 30 to 60 seconds, displaying a humanoid robot Nao in motion within a Webots created simulated environment.

A quick description was provided to participants before the start of the video. It was done in order to assist them to put the next events in context. This included a simple verbal explanation of the simulation setting such as asking people to visualize the environment as a huge social area with themselves standing in front of the robot. Participants were told that before the Nao robot approached them, they would watch it make a series of movements such as nodding, waving, and making eye contact. They were explicitly instructed to observe the speed with which the robot traveled, how far away it stopped and the speed of its movements. Students were advised to consider how these behavioral aspects impacted their comfort level as well as the general impression of the robot.

Following these instructions, participants viewed the four scenario videos. The videos were displayed in an arbitrary manner. The purpose of this deliberate randomization was to remove any potential biases that would result from a predetermined order. The Nao robot started in the simulated space at a predetermined point in each video. Then depending on the condition being displayed, it performed the same set of gestures, including a wave, nod, shy gesture and directional head movements, but with intentional changes in three important areas: approach speed (fast or slow), stopping distance (close or optimal) and gesture speed (fast or slow). Once the robot had finished approaching and stopped at the specified location, the video came to an end. A one- to two-minute break was give in between each video so that participants understood the differences between scenarios and minimize cognitive overlap.

What is being measured	Question	Scale Anchors
Comfort Level	How comfortable did you feel when the robot approached you in this video?	1 = Very Uncomfortable to 5 = Very Comfortable
Perceived Friendliness	How friendly did the robot seem?	1 = Very Unfriendly to 5 = Very Friendly
Positive Engagement Intent	Did you feel like the robot was trying to engage with you in a positive way?	1 = Not at all to 5 = Very Much
Robot Approachability	Did the robot's wave, attentive and gestures make it feel more approachable?	1 = Not approachable at all to 5 = Very approachable
Relaxed or Tensed	How relaxed or tensed you felt when robot approached you?	1 = Very Tense to 5 = Very Relaxed

TABLE I
QUESTIONNAIRE USED TO EVALUATE PARTICIPANTS PERCEPTIONS OF THE ROBOT'S ACTIONS

After watching each video scenario, participants answered a structured questionnaire as shown in Figure 4. It was meant to record their initial thoughts about the robot's actions as well as their feelings. The questionnaire was created as a Google form. We used the Likert-scale to evaluate five key things like Comfort Level, Perceived Friendliness, Positive Engagement Intent, Robot Approachability and Relaxation or Stressed feelings. Participants were asked to rate their experiences on a five point scale for each question. The range was from very negative (like "Very Uncomfortable") to neutral in the middle to strongly positive (like "Very Comfortable"). The survey's use of the established scales allowed us to anchor the responses for comparisons of adolescents opinions under various robot movement settings. It also helped to standardizing data collecting across all four scenarios.

The analysis would start with the calculation of descriptive statistics such as the mean, median and standard deviation for each survey item across the four experimental conditions. These initially statistics would provide a basic summary of teenage reactions to adjustments in the robot's approach speed, stopping distance and gesture speeds. The design would allow for within-subject comparisons to look into the variations in robot behavior. Since, each participant would be exposed to each scenario, it will help us to record the result in in accordance to the changes in participants perceptions.

For improving the data's interpretability, visuals representations would be created to show mean responses along with intervals of confidence for each scenario. For example, bar charts will provide an average of comfort ratings for each situation. It will make it easy to compare behavioral differences. Similar visual representations would be created for the other categories to provide a clear graphical picture of emergent trends in the data.

V. Results

This section presents the quantitative results from the four surveys, each of which represents a different scenario of interaction with the robot. Every scenario was evaluated on five survey items: comfort level, perceived friendliness, positive engagement intent, approachability and relaxed or tensed.

Condition	Comfort	Friendly	Positive Engagement	Approachability	Relaxation
Video 1 (Slow Approach, Optimal Distance, Slow Gesture)	4.4	4.2	4.6	4.6	4.4
Video 2 (Slow Approach, Close Distance, Slow Gesture)	3.8	4.2	4	4	3.2
Video 3 (Fast Approach, Optimal Distance, Fast Gesture)	2.4	4	3.4	2.6	2.4
Video 4 (Fast Approach, Close Distance, Fast Gesture)	1.8	3.2	2.6	2	1.4

TABLE II
AVERAGE SURVEY SCORES FOR EVERY VIDEO

A. *Comfort Level*

Participants rated the greatest average comfort in Video 1 of 4.4. In this video, the robots approaching speed was slow, stopped at an ideal distance and performed motions at a slower pace. In Video 1, over 70% of participants indicated higher-tier comfort ratings. Comfort declined marginally in Video 2 to 3.8, indicating that a smaller stopping distance, even with a slow approach and gestures reduced the comfort level. Around 60% of the participants reported they were Comfortable or Very Comfortable with this scenario. However, in Video 3 when the robot moved quickly but stopped at an ideal distance, comfort levels decreased more significantly to 2.4. Only around 35% of the participants reported that they were comfortable in this Video. The lowest degree of comfort was found in Video 4 of 1.8. This video had combined a quick approaching speed and close proximity. 20% of the participants felt they were moderately comfortable with this type of situation. This trend indicates that both approaching speeds and stop distances are important factors in comfortability level of teenagers feel while engaging with a robot.

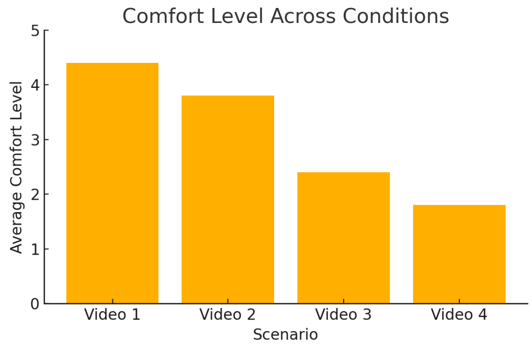

Fig. 4. Average comfort level across different scenarios

B. Perceived Friendliness

Perceived friendliness was continuously high in Video 1 and Video 2 of 4.2. 70% of the youngsters felt the robot was friendly in the first two videos. It suggested that people thought the robot was pleasant whenever it walked slowly and made relaxed motions. Although friendliness remained somewhat good in Video 3 at 4.0 but it dropped dramatically in Video 4 to 3.2. The perceived friendliness also decreased in Video 3 and 4 at 60% and 35% respectively. These findings indicate that quicker, more abrupt movements along with more close contact can have a negative impact on how friendly a robot is considered to be.

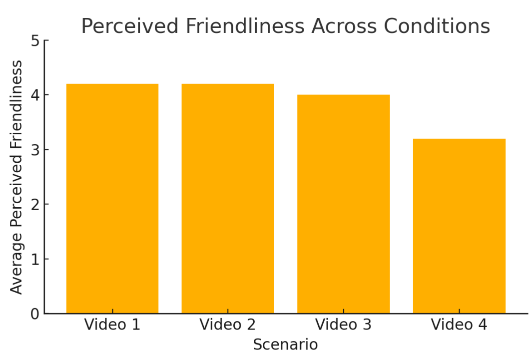

Fig. 5. Average perceived friendliness level across different scenarios

C. Positive Engagement Intent

A similar pattern was observed in the findings of the robot's positive engagement intent i.e whether respondents believed the robot was actively attempting to connect in a kind and inviting manner. The best score of 4.6 was obtained in Video 1, when slower motions and appropriate spacing clearly indicated a calm and a thoughtful approach. Video 2 had a little lower average of 4.0.

But Video 3 and Video 4 had progressively worse ratings of 3.4 and 2.6 respectively. These findings point out that how crucial thoughtful pacing and a welcoming interpersonal environment is to projecting a feeling of generous involvement, especially when working with teenage participants.

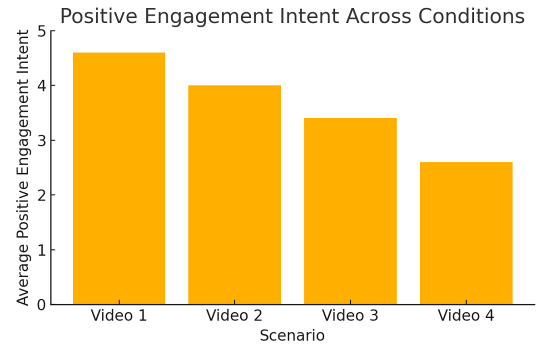

Fig. 6. Average positive engagement intent across different scenarios

D. Approachability

Approachability followed the above patterns. It peaked in Video 1 at 4.6 and dropped in Video 2 at 4.0. It then fell more sharply under the faster approach situations of Video 3 at 2.6 and Video 4 at 2.0. The variation between Videos 1-2 and Videos 3-4 suggests that approach speed, rather than stopping distance have a greater influence on the robot's apparent willingness for engagement.

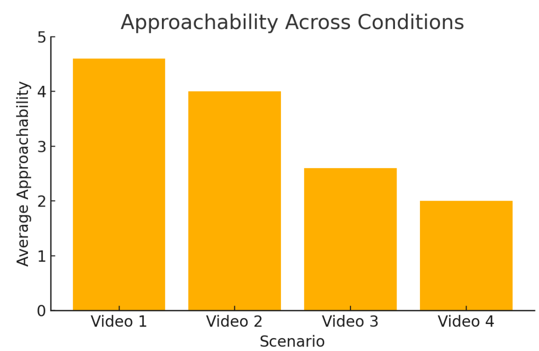

Fig. 7. Average approachability across different scenarios

E. Relaxation or Tension

Participants felt most comfortable in Video 1 at an average score of 4.4 and moderately relaxed in Video 2 giving the average rating of 3.2. Around 65% and 50% of the respondents felt they were either Very Comfortable of Comfortable in scenarios depicted in Video 1 and Video 2 respectively.

However, in Videos 3 and 4 relaxation decreased significantly at 2.4 and 1.4 respectively. Only 25% and 15% of the participants felt they were comfortable with a robot approaching and performing motions at a faster speed in Video 3 and Video 4 respectively. A fast approach when paired with close distance provoked tenseness, suggesting that teenagers can perceive rapid robot movements as invasive or uncomfortable.

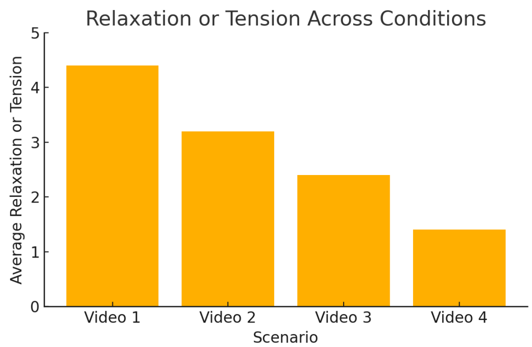

Fig. 8. Average relaxation or tension levels across different scenarios

VI. Discussion

The outcomes show that adolescents responded most enthusiastically to robotic behaviors with slower speeds and comfortable interpersonal distances. It is evident by higher comfort, friendliness and approachability scores in the scenario. Adolescents are known for their acute social awareness and emotional sensitivity, thus it should not come a surprise that closer distance and fast movement caused noticeable stress and discomfort.

A important observation concerns the robot's motions and how people interpret friendliness. Though gestures like waving, nodding and shy motions contributed to a general sense of friendliness, their beneficial effects faded when the robot approached quickly or had a short stopping distance. Participants were still able to recognize friendly indications but they expressed hesitation when the robot's motions were unexpected. This difference shows the significance of complementing cautious, comfortable gestures with a working style that values one's privacy and avoids sudden transitions.

Another major outcome is that perceived approachability decreased significantly when the robot moved rapidly. This pattern signifies that walking speed can be one of the first influencing factors whether teenagers feel comfortable engaging with a robot and can outweigh other initially positive indications. It would seem necessary to maintain consistent, gentle gestures that show a continued readiness to participate on safe terms and encourage trust.

Additionally shy or pleasing behaviors can potentially make the robot look non-threatening but their influence was decreased when participants felt that their personal space was in danger. The interaction of spatial dynamics as well as gesture behaviors highlights the need of designers taking a holistic approach to robot movement. A pleasant gesture might not be enough if done at high velocity or in uncomfortably close proximity to humans. Robots designed can recognize and modify their approach in response to indications of discomfort might be advantageous for adolescents.

The study's limitations such as its dependence on a simulated environment and a pretend user sample should be noted regardless of these findings. Adolescents emotions in real-world encounters can differ, particularly when their sense of physical presence amplifies or weakens their reactions. Furthermore, practical factors like as cultural diversity, individual familiarity with robots and the difference in tolerance levels for personal space need to be thoroughly studied. T hese findings provide a foundation for developing and implementing socially friendly robots in teenage settings. It suggests that slower, more thoughtful approaches and respectable stopping distances can considerably improve comfort and generate a sense of positive engagement.

VII. Conclusion

The results of the study highlight how crucial it is to carefully adjust robot approach behaviors, especially in relation to speed, stopping distance and gesture speed. Adolescents consistently responded positively to slower, more measured movements and respecting space boundaries. It resulted in greater scores for comfort, friendliness, approachability and perceived engagement. In contrast, situations with quick approaches and near stopping distances aroused substantial uneasiness and anxiety meaning that even thoughtful gestures like waving or nodding might be overshadowed by too aggressive or invasive actions.

These findings may be utilized by designers who want to include humanoid robots into adolescent-focused environments, such as educational, therapeutic and recreational areas to make sure the robots move at a comforting speed and retain a non-invasive sense of space. It may be possible to increase trust and willingness to engage by focusing on nonverbal clues that demonstrate intentional, friendly intent in conjunction with regulated approach speeds. Although simulated situations were used in this pretend user study instead of real-world robot interactions but the patterns found are congruent with more general studies on human-robot interaction that repeatedly shows harmonious and reliable robot behaviors increase acceptance levels.

Adolescents might need an extra degree of care when calibrating robot movements due to their increased sensitivity to social and emotional circumstances. The results shown here provide a basis for improving and assessing robotic systems designed for adolescent users in the future. Developers can promote more positive encounters that resonate with adolescents developmental needs by adjusting movement parameters and prioritizing personal space. It will improve the incorporation of social robots into conditions where levels of trust, comfort and constructive engagement are vital.

VIII. Future Work

The findings of this project could be further explored in research by using real-world live testing with teenagers. While the simulation-based method offered a controlled setting, testing with an actual Nao robot engaging face-to-face with adolescent users can reveal small changes in perceived comfort, especially in terms of sensory signals like sound, closeness and physical feeling of distance. Adolescents natural reactions to a robot's physical presence especially if the robot can read and adjust to body language as well as the vocal tones. It can provide more insights into the threshold level at which invasions of personal space are considered offensive along with when the robot speed is considered perturbing.

The use of bigger and more varied participant samples is another encouraging option. Including teenagers from different age groups and cultural backgrounds such as early teens vs. late teens can help clarify how comfort levels as well as demands for personal space vary within this large group. We might better understand individual variations by including individuals with different levels of technology familiarity such as those who are new to virtual reality or interactive robots against the ones who have used them frequently. The potential that teenagers may get more used to particular robot behaviors via repeated encounters or training sessions might also be addressed by longitudinal designs.

Another interesting direction is the study of adaptive robotic systems. Future robots might employ real-time data such as from eye tracking, motion sensors systems. This can be used to automatically modify their stopping distances, gesture tempos and approach speeds based on users perceived reactions. By making sure that the robot's closeness and speed are dynamically adjusted to teenagers reactions in real time, the adaptable actions could maximize comfort and foster a persistent sense of security and trust across a variety of situations. The exploration of more complex nonverbal cues like facial emotions on a robot's display or subtle reaction actions can further improve the robot's perceived friendliness and understanding.

Finally, a wider objective for future study is to investigate cultural and psychological aspects that influence responses to robot approaches. Culture has a huge impact on personal space and comfort. For example, teenagers raised in collectivist environments might have a different level of tolerances for closeness than those nurtured in individualistic environments. People may react differently to a robot's pace and gestures depending on their personal characteristics such as their introversion, extroversion or the past bad encounters with technology. A more thorough and inclusive knowledge of what acceptable robot conduct is for a worldwide young demographic may be possible through methodically examining these factors. Researchers and designers may create social robots that are sensitive to the subtle variations across adolescent groups as well as to general adolescent preferences by taking these factors into consideration.

IX. Acknowledgement

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Appendix

```c
// Your entire C code here
/*
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 *
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 * limitations under the License.

 * Modified by: Harmehak Singh Khangura
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 * Waterloo, Canada
 */
//----------------------------------------------------------------------------------
//  Description:  Example C controller program for Nao robot.
//                This demonstrates how to access sensors and actuators
//----------------------------------------------------------------------------------

#include <assert.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <webots/accelerometer.h>
#include <webots/camera.h>
#include <webots/distance_sensor.h>
#include <webots/gps.h>
#include <webots/gyro.h>
#include <webots/inertial_unit.h>
#include <webots/keyboard.h>
#include <webots/led.h>
#include <webots/motor.h>
#include <webots/robot.h>
#include <webots/touch_sensor.h>
#include <webots/utils/motion.h>

#ifdef _MSC_VER
#define snprintf sprintf_s
#endif

#define PHALANX_MAX 8

static int time_step = -1;

// simulated devices
static WbDeviceTag CameraTop, CameraBottom;  // cameras
static WbDeviceTag us[2];                    // ultra sound sensors
static WbDeviceTag accelerometer, gps, gyro, inertial_unit;
static WbDeviceTag fsr[2];                        // force sensitive resistors
static WbDeviceTag lfoot_lbumper, lfoot_rbumper;  // left foot bumpers
static WbDeviceTag rfoot_lbumper, rfoot_rbumper;  // right foot bumpers
static WbDeviceTag leds[7];                       // controllable led groupsstatic WbDeviceTag
    lphalanx[PHALANX_MAX];
static WbDeviceTag rphalanx[PHALANX_MAX];         // right hand motors
static WbDeviceTag lphalanx[PHALANX_MAX];         // left hand motors
static WbDeviceTag RShoulderPitch;
static WbDeviceTag LShoulderPitch;
```

```c
// motion file handles
static WbMotionRef hand_wave, forwards, backwards, side_step_left, side_step_right,
    turn_left_60, turn_right_60, nod,
  wipe_forehead, RightUp,LeftUp,Shy,HeadStraight;
static WbMotionRef currently_playing = NULL;

static double maxPhalanxMotorPosition[PHALANX_MAX];
static double minPhalanxMotorPosition[PHALANX_MAX];

static void find_and_enable_devices() {
  // camera
  CameraTop = wb_robot_get_device("CameraTop");
  CameraBottom = wb_robot_get_device("CameraBottom");
  wb_camera_enable(CameraTop, 4 * time_step);
  wb_camera_enable(CameraBottom, 4 * time_step);

  // accelerometer
  accelerometer = wb_robot_get_device("accelerometer");
  wb_accelerometer_enable(accelerometer, time_step);

  // gyro
  gyro = wb_robot_get_device("gyro");
  wb_gyro_enable(gyro, time_step);

  // gps
  gps = wb_robot_get_device("gps");
  wb_gps_enable(gps, time_step);

  // inertial unit
  inertial_unit = wb_robot_get_device("inertial unit");
  wb_inertial_unit_enable(inertial_unit, time_step);

  // ultrasound sensors
  us[0] = wb_robot_get_device("Sonar/Left");
  us[1] = wb_robot_get_device("Sonar/Right");
  int i;
  for (i = 0; i < 2; i++)
    wb_distance_sensor_enable(us[i], time_step);

  // foot sensors
  fsr[0] = wb_robot_get_device("LFsr");
  fsr[1] = wb_robot_get_device("RFsr");
  wb_touch_sensor_enable(fsr[0], time_step);
  wb_touch_sensor_enable(fsr[1], time_step);

  // foot bumpers
  lfoot_lbumper = wb_robot_get_device("LFoot/Bumper/Left");
  lfoot_rbumper = wb_robot_get_device("LFoot/Bumper/Right");
  rfoot_lbumper = wb_robot_get_device("RFoot/Bumper/Left");
  rfoot_rbumper = wb_robot_get_device("RFoot/Bumper/Right");
  wb_touch_sensor_enable(lfoot_lbumper, time_step);
  wb_touch_sensor_enable(lfoot_rbumper, time_step);
  wb_touch_sensor_enable(rfoot_lbumper, time_step);
  wb_touch_sensor_enable(rfoot_rbumper, time_step);

  // There are 7 controlable LED groups in Webots
  leds[0] = wb_robot_get_device("ChestBoard/Led");
  leds[1] = wb_robot_get_device("RFoot/Led");
  leds[2] = wb_robot_get_device("LFoot/Led");
  leds[3] = wb_robot_get_device("Face/Led/Right");
  leds[4] = wb_robot_get_device("Face/Led/Left");
  leds[5] = wb_robot_get_device("Ears/Led/Right");
  leds[6] = wb_robot_get_device("Ears/Led/Left");

  // get phalanx motor tags
  // the real Nao has only 2 motors for RHand/LHand
```

```c
  // but in Webots we must implement RHand/LHand with 2x8 motors
  for (i = 0; i < PHALANX_MAX; i++) {
    char name[32];
    sprintf(name, "LPhalanx%d", i + 1);
    lphalanx[i] = wb_robot_get_device(name);
    sprintf(name, "RPhalanx%d", i + 1);
    rphalanx[i] = wb_robot_get_device(name);

    // assume right and left hands have the same motor position bounds
    maxPhalanxMotorPosition[i] = wb_motor_get_max_position(rphalanx[i]);
    minPhalanxMotorPosition[i] = wb_motor_get_min_position(rphalanx[i]);
  }

  // shoulder pitch motors
  RShoulderPitch = wb_robot_get_device("RShoulderPitch");
  LShoulderPitch = wb_robot_get_device("LShoulderPitch");

  // keyboard
  wb_keyboard_enable(10 * time_step);
}

// load motion files
static void load_motion_files() {
  hand_wave = wbu_motion_new("../../motions/HandWave.motion");
  forwards = wbu_motion_new("../../motions/Forwards60.motion");
  backwards = wbu_motion_new("../../motions/Backwards60.motion");
  side_step_left = wbu_motion_new("../../motions/SideStepLeft.motion");
  side_step_right = wbu_motion_new("../../motions/SideStepRight.motion");
  turn_left_60 = wbu_motion_new("../../motions/TurnLeft60.motion");
  turn_right_60 = wbu_motion_new("../../motions/TurnRight60.motion");
  nod = wbu_motion_new("../../motions/Nod.motion");
  wipe_forehead = wbu_motion_new("../../motions/WipeForehead.motion");
  RightUp = wbu_motion_new("../../motions/RightUp.motion");
  LeftUp = wbu_motion_new("../../motions/LeftUp.motion");
  Shy = wbu_motion_new("../../motions/Shy.motion");
  HeadStraight = wbu_motion_new("../../motions/HeadStraight.motion");
}

static void start_motion(WbMotionRef motion) {
  // interrupt current motion
  if (currently_playing)
    wbu_motion_stop(currently_playing);

  // start new motion
  wbu_motion_play(motion);
  currently_playing = motion;
}

static double clamp(double value, double min, double max) {
  if (min > max) {
    assert(0);
    return value;
  }
  return value < min ? min : value > max ? max : value;
}

// the accelerometer axes are oriented as on the real robot
// however the sign of the returned values may be opposite
static void print_acceleration() {
  const double *acc = wb_accelerometer_get_values(accelerometer);
  printf("Welcome");
  printf("acceleration: [ x y z ] = [%f %f %f]\n", acc[0], acc[1], acc[2]);
}

// the gyro axes are oriented as on the real robot
// however the sign of the returned values may be opposite
static void print_gyro() {
```

```c
  const double *vel = wb_gyro_get_values(gyro);
  printf("----------gyro----------\n");
  printf("angular velocity: [ x y ] = [%f %f]\n", vel[0], vel[1]);
}

static void print_gps() {
  const double *p = wb_gps_get_values(gps);
  printf("----------gps----------\n");
  printf("position: [ x y z ] = [%f %f %f]\n", p[0], p[1], p[2]);
}

// the InertialUnit roll/pitch angles are equal to naoqi's AngleX/AngleY
static void print_inertial_unit() {
  const double *rpy = wb_inertial_unit_get_roll_pitch_yaw(inertial_unit);
  printf("----------inertial unit----------\n");
  printf("roll/pitch/yaw: = [%f %f %f]\n", rpy[0], rpy[1], rpy[2]);
}

static void print_foot_sensors() {
  const double *fsv[2] = {wb_touch_sensor_get_values(fsr[0]), wb_touch_sensor_get_values(fsr[1])};  // force sensor values

  double l[4], r[4];
  double newtonLeft = 0, newtonRight = 0;

  // The coefficients were calibrated against the real
  // robot so as to obtain realistic sensor values.
  l[0] = fsv[0][2] / 3.4 + 1.5 * fsv[0][0] + 1.15 * fsv[0][1];  // Left Foot Front Left
  l[1] = fsv[0][2] / 3.4 + 1.5 * fsv[0][0] - 1.15 * fsv[0][1];  // Left Foot Front Right
  l[2] = fsv[0][2] / 3.4 - 1.5 * fsv[0][0] - 1.15 * fsv[0][1];  // Left Foot Rear Right
  l[3] = fsv[0][2] / 3.4 - 1.5 * fsv[0][0] + 1.15 * fsv[0][1];  // Left Foot Rear Left

  r[0] = fsv[1][2] / 3.4 + 1.5 * fsv[1][0] + 1.15 * fsv[1][1];  // Right Foot Front Left
  r[1] = fsv[1][2] / 3.4 + 1.5 * fsv[1][0] - 1.15 * fsv[1][1];  // Right Foot Front Right
  r[2] = fsv[1][2] / 3.4 - 1.5 * fsv[1][0] - 1.15 * fsv[1][1];  // Right Foot Rear Right
  r[3] = fsv[1][2] / 3.4 - 1.5 * fsv[1][0] + 1.15 * fsv[1][1];  // Right Foot Rear Left

  int i;
  for (i = 0; i < 4; ++i) {
    l[i] = clamp(l[i], 0, 25);
    r[i] = clamp(r[i], 0, 25);
    newtonLeft += l[i];
    newtonRight += r[i];
  }

  printf("----------foot sensors----------\n");
  printf("   left       right\n");
  printf("+--------+ +--------+\n");
  printf("|%3.1f  %3.1f| |%3.1f  %3.1f|  front\n", l[0], l[1], r[0], r[1]);
  printf("|        | |        |\n");
  printf("|%3.1f  %3.1f| |%3.1f  %3.1f|  back\n", l[3], l[2], r[3], r[2]);
  printf("+--------+ +--------+\n");
  printf("total: %g Newtons, %g kilograms\n", newtonLeft + newtonRight, (newtonLeft + newtonRight) / 9.81);
}

static void print_foot_bumpers() {
  int ll = (int)wb_touch_sensor_get_value(lfoot_lbumper);
  int lr = (int)wb_touch_sensor_get_value(lfoot_rbumper);
  int rl = (int)wb_touch_sensor_get_value(rfoot_lbumper);
  int rr = (int)wb_touch_sensor_get_value(rfoot_rbumper);

  printf("----------foot bumpers----------\n");
  printf("   left       right\n");
  printf("+--------+ +--------+\n");
  printf("|%d      %d| |%d      %d|\n", ll, lr, rl, rr);
  printf("|        | |        |\n");
```

```
  printf("|         | |         |\n");
  printf("+---------+ +---------+\n");
}

static void print_ultrasound_sensors() {
  double dist[2];
  int i;
  for (i = 0; i < 2; i++)
    dist[i] = wb_distance_sensor_get_value(us[i]);

  printf("-----ultrasound sensors-----\n");
  printf("left: %f m, right %f m\n", dist[0], dist[1]);
}

static void print_camera_image(WbDeviceTag camera) {
  const int SCALED = 2;

  int width = wb_camera_get_width(camera);
  int height = wb_camera_get_height(camera);

  // read rgb pixel values from the camera
  const unsigned char *image = wb_camera_get_image(camera);

  printf("----------camera image (gray levels)---------\n");
  printf("original resolution: %d x %d, scaled to %d x %d\n", width, height, width / SCALED,
      height / SCALED);

  int y, x;
  char *line = malloc(width / SCALED + 1);
  line[width / SCALED] = 0;  // add line termination
  for (y = 0; y < height; y += SCALED) {
    int count = 0;
    for (x = 0; x < width; x += SCALED) {
      unsigned char gray = wb_camera_image_get_gray(image, width, x, y);
      line[count++] = '0' + gray * 9 / 255;
    }
    line[count++] = 0;
    printf("%s\n", line);
  }
  free(line);
}

static void set_all_leds_color(int rgb) {
  // these leds take RGB values
  int i;
  for (i = 0; i < 5; i++)
    wb_led_set(leds[i], rgb);

  // ear leds are single color (blue)
  // and take values between 0 - 255
  wb_led_set(leds[5], rgb & 0xff);
  wb_led_set(leds[6], rgb & 0xff);
}

static void set_hands_angle(double angle) {
  // we must activate the 8 phalanx motors
  int j;
  for (j = 0; j < PHALANX_MAX; j++) {
    double clampedAngle = angle;
    if (clampedAngle > maxPhalanxMotorPosition[j])
      clampedAngle = maxPhalanxMotorPosition[j];
    else if (maxPhalanxMotorPosition[j] < minPhalanxMotorPosition[j])
      clampedAngle = minPhalanxMotorPosition[j];

    if (rphalanx[j])
      wb_motor_set_position(rphalanx[j], clampedAngle);
    if (lphalanx[j])
```

```
      wb_motor_set_position(lphalanx[j], clampedAngle);
  }
}

static void print_help() {
  printf("----------Nao----------\n");
  printf("Select the robot and use the keyboard to control it:\n");
  printf("(The 3D window need to be focused)\n");
  printf("[Up][Down]: move a few steps forward/backwards\n");
  printf("[<-][->]: make a few side steps left/right\n");
  printf("[Shift] + [<-][->]: turn left/right\n");
  printf("[U]: print ultrasound sensors\n");
  printf("[A]: print accelerometer\n");
  printf("[G]: print gyro\n");
  printf("[S]: print gps\n");
  printf("[I]: print inertial unit (roll/pitch/yaw)\n");
  printf("[F]: print foot sensors\n");
  printf("[B]: print foot bumpers\n");
  printf("[Home][End]: print scaled top/bottom camera image\n");
  printf("[PageUp][PageDown]: open/close hands\n");
  printf("[7][8][9]: change all leds RGB color\n");
  printf("[0]: turn all leds off\n");
  printf("[T]: perform a nod\n");
  printf("[W]: wipe its forehead\n");
  printf("[H]: print this help message\n");
}

static void terminate() {

  wb_robot_cleanup();
}

static void simulation_step() {
  if (wb_robot_step(time_step) == -1)
    terminate();
}

static void run_command(int key) {
  switch (key) {
    case WB_KEYBOARD_LEFT:
      start_motion(side_step_left);
      break;
    case WB_KEYBOARD_RIGHT:
      start_motion(side_step_right);
      break;
    case WB_KEYBOARD_UP:
      start_motion(forwards);
      break;
    case WB_KEYBOARD_DOWN:
      start_motion(backwards);
      break;
    case WB_KEYBOARD_LEFT | WB_KEYBOARD_SHIFT:
      start_motion(turn_left_60);
      break;
    case WB_KEYBOARD_RIGHT | WB_KEYBOARD_SHIFT:
      start_motion(turn_right_60);
      break;
    case 'A':
      print_acceleration();
      break;
    case 'G':
      print_gyro();
      break;
    case 'S':
      print_gps();
      break;
    case 'I':
```

```c
      print_inertial_unit();
      break;
    case 'F':
      print_foot_sensors();
      break;
    case 'B':
      print_foot_bumpers();
      break;
    case 'U':
      print_ultrasound_sensors();
      break;
    case 'T':
      start_motion(nod);
      break;
    case 'R':
      start_motion(RightUp);
      break;
    case 'L':
      start_motion(LeftUp);
      break;
    case 'Z':
      start_motion(Shy);
      break;
    case 'K':
      start_motion(HeadStraight);
      break;
    case 'W':
      start_motion(wipe_forehead);
      break;
    case WB_KEYBOARD_HOME:
      print_camera_image(CameraTop);
      break;
    case WB_KEYBOARD_END:
      print_camera_image(CameraBottom);
      break;
    case WB_KEYBOARD_PAGEUP:
      set_hands_angle(0.96);
      break;
    case WB_KEYBOARD_PAGEDOWN:
      set_hands_angle(0.0);
      break;
    case '7':
      set_all_leds_color(0xff0000);  // red
      break;
    case '8':
      set_all_leds_color(0x00ff00);  // green
      break;
    case '9':
      set_all_leds_color(0x0000ff);  // blue
      break;
    case '0':
      set_all_leds_color(0x000000);  // off
      break;
    case 'H':
      print_help();
      break;
  }
}

// main function
int main() {
  printf("Hello\n");

  wb_robot_init();
  time_step = wb_robot_get_basic_time_step();

  find_and_enable_devices();
```

```c
  load_motion_files();
  print_help();

  // Play hand_wave motion
  wbu_motion_set_loop(hand_wave, false);
  wbu_motion_play(hand_wave);
  currently_playing = hand_wave;

  // Wait 5 seconds
  int elapsed_time = 0;
  while (elapsed_time < 5000) {
    simulation_step();
    elapsed_time += time_step;
  }

  // Play nod motion
  wbu_motion_set_loop(nod, false);
  wbu_motion_play(nod);
  currently_playing = nod;

  // Wait 5 seconds
  elapsed_time = 0;
  while (elapsed_time < 5000) {
    simulation_step();
    elapsed_time += time_step;
  }

  // Play RightUp motion
  wbu_motion_set_loop(RightUp, false);
  wbu_motion_play(RightUp);
  currently_playing = RightUp;

  // Wait 5 seconds
  elapsed_time = 0;
  while (elapsed_time < 5000) {
    simulation_step();
    elapsed_time += time_step;
  }

  // Play LeftUp motion
  wbu_motion_set_loop(LeftUp, false);
  wbu_motion_play(LeftUp);
  currently_playing = LeftUp;

  // Wait 5 seconds
  elapsed_time = 0;
  while (elapsed_time < 5000) {
    simulation_step();
    elapsed_time += time_step;
  }

  // Play shy motion
  wbu_motion_set_loop(Shy, false);
  wbu_motion_play(Shy);
  currently_playing = Shy;

  // Wait 5 seconds
  elapsed_time = 0;
  while (elapsed_time < 5000) {
    simulation_step();
    elapsed_time += time_step;
  }

  wbu_motion_set_loop(HeadStraight, false);
  wbu_motion_play(HeadStraight);
  currently_playing = HeadStraight;

```

```
  // Wait for a key press
  int key = -1;
  do {
    simulation_step();
    key = wb_keyboard_get_key();
  } while (key <= 0);

  // Stop hand_wave loop just in case
  wbu_motion_set_loop(hand_wave, false);


  // Read keyboard and execute user commands
  while (1) {
    if (key > 0)
      run_command(key);

    simulation_step();
    key = wb_keyboard_get_key();
  }

  return 0;
}
```

Nod.motion file:

```
#WEBOTS_MOTION,V1.0,HeadPitch
00:01:000,Pose1,-0.60
00:02:000,Pose2,0.20
00:03:000,Pose3,-0.60
00:04:000,Pose4,0.20
00:05:000,Pose5,-0.60
00:06:000,Pose6,0.20
```

Nod60.motion file: (For Faster Speed)

```
#WEBOTS_MOTION,V1.0,HeadPitch
00:01:000,Pose1,-0.60
00:01:050,Pose2,0.20
00:02:000,Pose3,-0.60
00:02:050,Pose4,0.20
00:03:000,Pose5,-0.60
00:03:050,Pose6,0.20
```

LeftUp.motion file:

```
#WEBOTS_MOTION,V1.0,HeadPitch,HeadYaw
00:00:001,Pose1,-0.10,0.60
00:00:250,Pose1.2,-0.12,0.62
00:00:500,Pose1.4,-0.14,0.64
00:00:750,Pose1.6,-0.16,0.66
00:01:000,Pose1.8,-0.18,0.68
00:01:250,Pose2,-0.20,0.70
00:01:500,Pose2.4,-0.24,0.74
00:01:750,Pose2.8,-0.28,0.78
00:02:000,Pose3.2,-0.32,0.82
00:02:250,Pose3.6,-0.36,0.86
00:02:500,Pose4,-0.40,0.90
00:02:750,Pose4.5,-0.45,0.93
00:03:000,Pose4.6,-0.50,0.95
```

LeftUp60.motion file: (For Faster Speed)

```
#WEBOTS_MOTION,V1.0,HeadPitch,HeadYaw
00:00:001,Pose1,-0.10,0.60
00:00:200,Pose1.2,-0.12,0.62
00:00:400,Pose1.4,-0.14,0.64
00:00:600,Pose1.6,-0.16,0.66
00:00:800,Pose1.8,-0.18,0.68
```

```
00:01:000,Pose2,-0.20,0.70
00:01:200,Pose2.4,-0.24,0.74
00:01:400,Pose2.8,-0.28,0.78
00:01:600,Pose3.2,-0.32,0.82
00:01:800,Pose3.6,-0.36,0.86
00:02:000,Pose4,-0.40,0.90
00:02:200,Pose4.5,-0.45,0.93
00:02:4000,Pose4.6,-0.50,0.95
```

RightUp.motion file:

```
#WEBOTS_MOTION,V1.0,HeadPitch,HeadYaw
00:00:001,Pose1,-0.10,-0.60
00:00:250,Pose1.2,-0.12,-0.62
00:00:500,Pose1.4,-0.14,-0.64
00:00:750,Pose1.6,-0.16,-0.66
00:01:000,Pose1.8,-0.18,-0.68
00:01:250,Pose2,-0.20,-0.70
00:01:500,Pose2.4,-0.24,-0.74
00:01:750,Pose2.8,-0.28,-0.78
00:02:000,Pose3.2,-0.32,-0.82
00:02:250,Pose3.6,-0.36,-0.86
00:02:500,Pose4,-0.40,-0.90
00:02:750,Pose4.5,-0.45,-0.95
00:03:000,Pose5,-0.50,-1.00
```

RightUp60.motion file: (For Faster Speed)

```
#WEBOTS_MOTION,V1.0,HeadPitch,HeadYaw
00:00:001,Pose1,-0.10,-0.60
00:00:200,Pose1.2,-0.12,-0.62
00:00:400,Pose1.4,-0.14,-0.64
00:00:600,Pose1.6,-0.16,-0.66
00:00:800,Pose1.8,-0.18,-0.68
00:01:000,Pose2,-0.20,-0.70
00:01:200,Pose2.4,-0.24,-0.74
00:01:400,Pose2.8,-0.28,-0.78
00:01:600,Pose3.2,-0.32,-0.82
00:01:800,Pose3.6,-0.36,-0.86
00:02:000,Pose4,-0.40,-0.90
00:02:200,Pose4.5,-0.45,-0.95
00:02:400,Pose5,-0.50,-1.00
```

Shy.motion file:

```
#WEBOTS_MOTION,V1.0,HeadPitch,HeadYaw
00:00:000,Pose1,0.10,0.60
00:00:250,Pose1.2,0.15,0.65
00:00:500,Pose1.4,0.20,0.70
00:00:750,Pose1.6,0.25,0.75
00:01:000,Pose1.8,0.30,0.80
00:01:250,Pose2,0.35,0.85
00:01:500,Pose2.4,0.40,0.90
00:01:750,Pose2.8,0.45,0.95
00:02:000,Pose3.2,0.50,1.00
00:02:250,Pose3.6,0.45,1.05
00:02:500,Pose4,0.40,1.10
00:02:750,Pose4.5,0.35,1.15
00:03:000,Pose5,0.30,1.20
```

HeadStraight.motion file:

```
#WEBOTS_MOTION,V1.0,HeadPitch,HeadYaw
00:00:001,Pose1,-0.50,0.00
```

Forwards60.motion file: (For Faster Speed)

```
#WEBOTS_MOTION,V1.0,LHipYawPitch,LHipRoll,LHipPitch,LKneePitch,LAnklePitch,LAnkleRoll,
    RHipYawPitch,RHipRoll,RHipPitch,RKneePitch,RAnklePitch,RAnkleRoll
00:00:000,Pose1,0,0,-0.611,1.222,-0.611,0,0,0,-0.611,1.222,-0.611,0
00:00:020,Pose2,0,0,-0.608,1.215,-0.608,0,0,0,-0.608,1.215,-0.608,0
00:00:040,Pose3,0,0,-0.572,1.144,-0.572,0,0,0,-0.572,1.144,-0.572,0
00:00:060,Pose4,0,0,-0.543,1.086,-0.543,0,0,0,-0.543,1.086,-0.543,0
00:00:080,Pose5,0,0,-0.525,1.05,-0.525,0,0,0,-0.525,1.05,-0.525,0
00:00:100,Pose6,0,0,-0.525,1.05,-0.525,0,0,0,-0.525,1.05,-0.525,0
00:00:120,Pose7,0,0,-0.525,1.05,-0.525,0,0,0,-0.525,1.05,-0.525,0
00:00:140,Pose8,0,-0.001,-0.525,1.05,-0.525,0.001,0,-0.001,-0.525,1.05,-0.525,0.001
00:00:160,Pose9,0,-0.003,-0.524,1.05,-0.525,0.003,0,-0.003,-0.524,1.05,-0.525,0.003
00:00:180,Pose10,0,-0.004,-0.524,1.05,-0.525,0.004,0,-0.004,-0.524,1.05,-0.525,0.004
00:00:200,Pose11,0,-0.008,-0.524,1.049,-0.526,0.008,0,-0.008,-0.524,1.049,-0.526,0.008
00:00:220,Pose12,0,-0.01,-0.523,1.049,-0.526,0.01,0,-0.01,-0.523,1.049,-0.526,0.01
00:00:240,Pose13,0,-0.014,-0.522,1.049,-0.527,0.014,0,-0.014,-0.522,1.049,-0.527,0.014
00:00:260,Pose14,0,-0.021,-0.521,1.048,-0.527,0.021,0,-0.021,-0.521,1.048,-0.527,0.021
00:00:280,Pose15,0,-0.027,-0.52,1.048,-0.528,0.027,0,-0.027,-0.52,1.048,-0.528,0.027
00:00:300,Pose16,0,-0.034,-0.518,1.047,-0.529,0.034,0,-0.034,-0.518,1.047,-0.529,0.034
00:00:320,Pose17,0,-0.044,-0.516,1.045,-0.53,0.044,0,-0.044,-0.516,1.045,-0.53,0.044
00:00:340,Pose18,0,-0.063,-0.51,1.041,-0.531,0.063,0,-0.063,-0.51,1.041,-0.531,0.063
00:00:360,Pose19,0,-0.08,-0.505,1.036,-0.531,0.08,0,-0.08,-0.505,1.036,-0.531,0.08
00:00:380,Pose20,0,-0.101,-0.498,1.029,-0.531,0.101,0,-0.101,-0.498,1.029,-0.531,0.101
00:00:400,Pose21,0,-0.136,-0.482,1.013,-0.531,0.136,0,-0.136,-0.482,1.013,-0.531,0.136
00:00:420,Pose22,0,-0.157,-0.468,0.999,-0.531,0.157,0,-0.157,-0.468,0.999,-0.531,0.157
00:00:440,Pose23,0,-0.173,-0.454,0.987,-0.533,0.173,0,-0.174,-0.459,0.996,-0.537,0.174
00:00:460,Pose24,0,-0.15,-0.44,0.984,-0.544,0.19,0,-0.197,-0.52,1.119,-0.599,0.197
00:00:480,Pose25,0,-0.144,-0.442,0.999,-0.557,0.196,0,-0.211,-0.605,1.244,-0.639,0.211
00:00:500,Pose26,0,-0.146,-0.452,1.033,-0.582,0.198,0,-0.223,-0.743,1.374,-0.631,0.223
00:00:520,Pose27,0,-0.142,-0.454,1.051,-0.597,0.195,0,-0.219,-0.803,1.378,-0.575,0.219
00:00:540,Pose28,0,-0.134,-0.447,1.056,-0.609,0.187,0,-0.205,-0.815,1.313,-0.498,0.205
00:00:560,Pose29,0,-0.121,-0.427,1.045,-0.618,0.174,0,-0.184,-0.777,1.202,-0.425,0.184
00:00:580,Pose30,0,-0.128,-0.379,1.011,-0.632,0.145,0,-0.147,-0.678,1.037,-0.36,0.147
00:00:600,Pose31,0,-0.119,-0.344,0.99,-0.646,0.119,0,-0.119,-0.634,1,-0.366,0.119
00:00:620,Pose32,0,-0.065,-0.293,0.97,-0.677,0.065,0,-0.065,-0.604,1.022,-0.417,0.065
00:00:640,Pose33,0,-0.019,-0.253,0.948,-0.696,0.019,0,-0.019,-0.579,1.033,-0.453,0.019
00:00:660,Pose34,0,0.029,-0.204,0.913,-0.709,-0.029,0,0.029,-0.547,1.033,-0.486,-0.029
00:00:680,Pose35,0,0.094,-0.124,0.838,-0.714,-0.094,0,0.094,-0.489,1.014,-0.525,-0.094
00:00:700,Pose36,0,0.126,-0.096,0.828,-0.733,-0.126,0,0.12,-0.451,0.993,-0.542,-0.125
00:00:720,Pose37,0,0.153,-0.142,0.934,-0.792,-0.153,0,0.108,-0.424,0.983,-0.559,-0.147
00:00:740,Pose38,0,0.186,-0.337,1.196,-0.859,-0.186,0,0.117,-0.412,0.99,-0.578,-0.169
00:00:760,Pose39,0,0.199,-0.508,1.335,-0.827,-0.199,0,0.124,-0.42,1.008,-0.589,-0.177
00:00:780,Pose40,0,0.201,-0.661,1.384,-0.722,-0.201,0,0.126,-0.432,1.03,-0.599,-0.178
00:00:800,Pose41,0,0.184,-0.763,1.278,-0.515,-0.184,0,0.117,-0.435,1.047,-0.612,-0.17
00:00:820,Pose42,0,0.164,-0.739,1.148,-0.409,-0.164,0,0.105,-0.418,1.038,-0.62,-0.157
00:00:840,Pose43,0,0.14,-0.683,1.039,-0.356,-0.14,0,0.122,-0.387,1.017,-0.63,-0.139
00:00:860,Pose44,0,0.099,-0.628,1.006,-0.378,-0.099,0,0.099,-0.334,0.988,-0.654,-0.099
00:00:880,Pose45,0,0.062,-0.608,1.022,-0.414,-0.062,0,0.062,-0.299,0.974,-0.675,-0.062
00:00:900,Pose46,0,-0.007,-0.566,1.034,-0.468,0.007,0,-0.007,-0.233,0.935,-0.702,0.007
00:00:920,Pose47,0,-0.055,-0.53,1.029,-0.499,0.055,0,-0.055,-0.181,0.892,-0.712,0.055
00:00:940,Pose48,0,-0.095,-0.49,1.014,-0.524,0.095,0,-0.095,-0.126,0.839,-0.714,0.095
00:00:960,Pose49,0,-0.121,-0.452,0.993,-0.541,0.126,0,-0.127,-0.097,0.83,-0.732,0.127
00:00:980,Pose50,0,-0.105,-0.417,0.982,-0.565,0.157,0,-0.166,-0.194,1.018,-0.824,0.166
00:01:000,Pose51,0,-0.118,-0.413,0.99,-0.578,0.17,0,-0.187,-0.338,1.197,-0.859,0.187
00:01:020,Pose52,0,-0.125,-0.42,1.008,-0.588,0.177,0,-0.199,-0.509,1.335,-0.826,0.199
00:01:040,Pose53,0,-0.125,-0.436,1.039,-0.603,0.177,0,-0.198,-0.716,1.369,-0.653,0.198
00:01:060,Pose54,0,-0.118,-0.435,1.047,-0.612,0.17,0,-0.184,-0.764,1.278,-0.515,0.184
00:01:080,Pose55,0,-0.105,-0.418,1.038,-0.62,0.157,0,-0.164,-0.739,1.148,-0.409,0.164
00:01:100,Pose56,0,-0.124,-0.37,1.006,-0.636,0.128,0,-0.128,-0.657,1.009,-0.352,0.128
00:01:120,Pose57,0,-0.099,-0.334,0.988,-0.654,0.099,0,-0.099,-0.628,1.006,-0.378,0.099
00:01:140,Pose58,0,-0.04,-0.279,0.964,-0.685,0.04,0,-0.04,-0.596,1.028,-0.432,0.04
00:01:160,Pose59,0,0.007,-0.233,0.935,-0.702,-0.007,0,0.007,-0.566,1.034,-0.468,-0.007
00:01:180,Pose60,0,0.054,-0.181,0.893,-0.712,-0.054,0,0.054,-0.53,1.029,-0.499,-0.054
00:01:200,Pose61,0,0.095,-0.126,0.839,-0.714,-0.095,0,0.095,-0.49,1.014,-0.524,-0.095
00:01:220,Pose62,0,0.141,-0.11,0.869,-0.759,-0.141,0,0.121,-0.437,0.986,-0.55,-0.138
00:01:240,Pose63,0,0.166,-0.194,1.018,-0.824,-0.166,0,0.105,-0.417,0.982,-0.565,-0.157
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00:01:260,Pose64,0,0.194,-0.422,1.275,-0.852,-0.194,0,0.122,-0.415,0.998,-0.583,-0.174
00:01:280,Pose65,0,0.202,-0.591,1.372,-0.781,-0.202,0,0.126,-0.426,1.02,-0.593,-0.179
00:01:300,Pose66,0,0.198,-0.716,1.369,-0.653,-0.198,0,0.125,-0.437,1.04,-0.603,-0.177
00:01:320,Pose67,0,0.184,-0.764,1.278,-0.515,-0.184,0,0.118,-0.436,1.047,-0.612,-0.17
00:01:340,Pose68,0,0.152,-0.712,1.087,-0.375,-0.152,0,0.109,-0.404,1.029,-0.625,-0.149
00:01:360,Pose69,0,0.128,-0.657,1.009,-0.352,-0.128,0,0.123,-0.37,1.006,-0.636,-0.128
00:01:380,Pose70,0,0.099,-0.629,1.006,-0.378,-0.099,0,0.099,-0.334,0.988,-0.654,-0.099
00:01:400,Pose71,0,0.04,-0.596,1.028,-0.432,-0.04,0,0.04,-0.279,0.964,-0.685,-0.04
00:01:420,Pose72,0,-0.007,-0.566,1.034,-0.468,0.007,0,-0.007,-0.233,0.935,-0.702,0.007
00:01:440,Pose73,0,-0.055,-0.53,1.029,-0.499,0.055,0,-0.055,-0.181,0.893,-0.712,0.055
00:01:460,Pose74,0,-0.111,-0.471,1.002,-0.531,0.111,0,-0.112,-0.104,0.821,-0.716,0.112
00:01:480,Pose75,0,-0.121,-0.437,0.986,-0.549,0.138,0,-0.141,-0.11,0.869,-0.759,0.141
00:01:500,Pose76,0,-0.116,-0.420,0.986,-0.560,0.140,0,-0.140,-0.200,0.970,-0.780,0.140
00:01:520,Pose77,0,-0.122,-0.415,0.998,-0.583,0.174,0,-0.194,-0.422,1.275,-0.852,0.194
00:01:540,Pose78,0,-0.126,-0.426,1.019,-0.593,0.179,0,-0.202,-0.591,1.372,-0.781,0.202
00:01:560,Pose79,0,-0.122,-0.438,1.046,-0.608,0.174,0,-0.192,-0.751,1.332,-0.582,0.192
00:01:580,Pose80,0,-0.112,-0.429,1.045,-0.616,0.164,0,-0.174,-0.759,1.214,-0.456,0.174
00:01:600,Pose81,0,-0.109,-0.404,1.029,-0.624,0.149,0,-0.153,-0.712,1.087,-0.375,0.153
00:01:620,Pose82,0,-0.114,-0.352,0.996,-0.644,0.115,0,-0.115,-0.64,1,-0.361,0.115
00:01:640,Pose83,0,-0.081,-0.317,0.981,-0.665,0.081,0,-0.081,-0.619,1.014,-0.395,0.081
00:01:660,Pose84,0,-0.04,-0.279,0.965,-0.685,0.04,0,0.04,-0.596,1.028,-0.432,0.04
00:01:680,Pose85,0,0.007,-0.234,0.936,-0.702,-0.007,0,0.007,-0.566,1.034,-0.468,-0.007
00:01:700,Pose86,0,0.076,-0.154,0.867,-0.713,-0.076,0,0.076,-0.51,1.022,-0.512,-0.076
00:01:720,Pose87,0,0.111,-0.105,0.821,-0.716,-0.111,0,0.111,-0.471,1.002,-0.531,-0.111
00:01:740,Pose88,0,0.154,-0.143,0.935,-0.792,-0.154,0,0.109,-0.425,0.983,-0.558,-0.148
00:01:760,Pose89,0,0.177,-0.261,1.108,-0.848,-0.177,0,0.112,-0.413,0.985,-0.571,-0.164
00:01:780,Pose90,0,0.194,-0.423,1.275,-0.852,-0.194,0,0.122,-0.415,0.998,-0.583,-0.174
00:01:800,Pose91,0,0.201,-0.662,1.384,-0.721,-0.201,0,0.126,-0.432,1.03,-0.598,-0.179
00:01:820,Pose92,0,0.192,-0.751,1.332,-0.582,-0.192,0,0.122,-0.438,1.046,-0.608,-0.174
00:01:840,Pose93,0,0.174,-0.759,1.214,-0.456,-0.174,0,0.112,-0.429,1.045,-0.616,-0.164
00:01:860,Pose94,0,0.141,-0.683,1.039,-0.356,-0.141,0,0.122,-0.388,1.017,-0.63,-0.139
00:01:880,Pose95,0,0.114,-0.64,1,-0.361,-0.114,0,0.114,-0.352,0.996,-0.644,-0.114
00:01:900,Pose96,0,0.081,-0.619,1.014,-0.395,-0.081,0,0.081,-0.317,0.982,-0.664,-0.081
00:01:920,Pose97,0,0.017,-0.582,1.033,-0.45,-0.017,0,0.017,-0.257,0.952,-0.694,-0.017
00:01:940,Pose98,0,-0.031,-0.549,1.033,-0.484,0.031,0,-0.031,-0.208,0.916,-0.708,0.031
00:01:960,Pose99,0,-0.076,-0.51,1.022,-0.512,0.076,0,-0.076,-0.154,0.867,-0.713,0.076
00:01:980,Pose100,0,-0.121,-0.453,0.993,-0.541,0.126,0,-0.127,-0.098,0.83,-0.732,0.127
00:02:000,Pose101,0,-0.109,-0.425,0.983,-0.557,0.148,0,-0.154,-0.143,0.935,-0.792,0.154
00:02:020,Pose102,0,-0.118,-0.413,0.99,-0.577,0.17,0,-0.187,-0.338,1.197,-0.859,0.187
00:02:040,Pose103,0,-0.125,-0.42,1.008,-0.588,0.177,0,-0.199,-0.509,1.335,-0.826,0.199
00:02:060,Pose104,0,-0.126,-0.432,1.03,-0.598,0.179,0,-0.201,-0.662,1.384,-0.721,0.201
00:02:080,Pose105,0,-0.122,-0.438,1.046,-0.607,0.174,0,-0.192,-0.751,1.332,-0.582,0.192
00:02:100,Pose106,0,-0.105,-0.418,1.038,-0.62,0.157,0,-0.164,-0.74,1.148,-0.408,0.164
00:02:120,Pose107,0,-0.122,-0.388,1.017,-0.63,0.139,0,-0.141,-0.683,1.039,-0.356,0.141
00:02:140,Pose108,0,-0.099,-0.334,0.988,-0.654,0.099,0,-0.099,-0.629,1.006,-0.377,0.099
00:02:160,Pose109,0,-0.062,-0.299,0.974,-0.675,0.062,0,-0.062,-0.608,1.022,-0.414,0.062
00:02:180,Pose110,0,-0.017,-0.258,0.952,-0.694,0.017,0,-0.017,-0.582,1.033,-0.45,0.017
00:02:200,Pose111,0,0.031,-0.208,0.916,-0.708,-0.031,0,0.031,-0.549,1.033,-0.484,-0.031
00:02:220,Pose112,0,0.095,-0.126,0.84,-0.714,-0.095,0,0.095,-0.491,1.014,-0.524,-0.095
00:02:240,Pose113,0,0.127,-0.098,0.83,-0.732,-0.127,0,0.121,-0.453,0.993,-0.54,-0.125
00:02:260,Pose114,0,0.154,-0.143,0.935,-0.792,-0.154,0,0.109,-0.425,0.983,-0.557,-0.148
00:02:280,Pose115,0,0.187,-0.338,1.197,-0.859,-0.187,0,0.118,-0.413,0.99,-0.577,-0.17
00:02:300,Pose116,0,0.199,-0.509,1.335,-0.826,-0.199,0,0.125,-0.42,1.009,-0.588,-0.177
00:02:320,Pose117,0,0.201,-0.662,1.384,-0.721,-0.201,0,0.126,-0.432,1.031,-0.598,-0.179
00:02:340,Pose118,0,0.184,-0.764,1.278,-0.514,-0.184,0,0.118,-0.436,1.048,-0.612,-0.17
00:02:360,Pose119,0,0.164,-0.74,1.148,-0.408,-0.164,0,0.105,-0.418,1.038,-0.62,-0.157
00:02:380,Pose120,0,0.141,-0.683,1.039,-0.356,-0.141,0,0.122,-0.388,1.018,-0.63,-0.139
00:02:400,Pose121,0,0.099,-0.629,1.006,-0.377,-0.099,0,0.099,-0.334,0.988,-0.654,-0.099
00:02:420,Pose122,0,0.062,-0.608,1.022,-0.413,-0.062,0,0.062,-0.299,0.974,-0.675,-0.062
00:02:440,Pose123,0,0.017,-0.582,1.033,-0.45,-0.017,0,0.017,-0.258,0.952,-0.694,-0.017
00:02:460,Pose124,0,-0.055,-0.53,1.029,-0.499,0.055,0,-0.055,-0.181,0.893,-0.711,0.055
00:02:480,Pose125,0,-0.095,-0.491,1.014,-0.523,0.095,0,-0.095,-0.126,0.84,-0.714,0.095
00:02:500,Pose126,0,-0.121,-0.437,0.987,-0.549,0.138,0,-0.141,-0.111,0.87,-0.759,0.141
00:02:520,Pose127,0,-0.105,-0.418,0.982,-0.565,0.157,0,-0.166,-0.195,1.018,-0.823,0.166
00:02:540,Pose128,0,-0.118,-0.413,0.99,-0.577,0.17,0,-0.187,-0.338,1.197,-0.859,0.187
00:02:560,Pose129,0,-0.125,-0.421,1.009,-0.588,0.177,0,-0.199,-0.509,1.335,-0.826,0.199
00:02:580,Pose130,0,-0.125,-0.437,1.04,-0.603,0.177,0,-0.198,-0.717,1.369,-0.652,0.198
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00:02:600,Pose131,0,-0.118,-0.436,1.048,-0.612,0.17,0,-0.184,-0.764,1.278,-0.514,0.184
00:02:620,Pose132,0,-0.109,-0.404,1.029,-0.624,0.149,0,-0.153,-0.712,1.087,-0.375,0.153
00:02:640,Pose133,0,-0.124,-0.37,1.006,-0.636,0.128,0,-0.128,-0.657,1.008,-0.351,0.128
00:02:660,Pose134,0,-0.099,-0.334,0.988,-0.654,0.099,0,-0.099,-0.629,1.006,-0.377,0.099
00:02:680,Pose135,0,-0.04,-0.28,0.965,-0.685,0.04,0,-0.04,-0.597,1.028,-0.432,0.04
00:02:700,Pose136,0,0.007,-0.234,0.936,-0.702,-0.007,0,0.007,-0.567,1.034,-0.467,-0.007
00:02:720,Pose137,0,0.054,-0.182,0.893,-0.711,-0.054,0,0.054,-0.53,1.029,-0.498,-0.054
00:02:740,Pose138,0,0.111,-0.105,0.822,-0.716,-0.111,0,0.11,-0.471,1.003,-0.531,-0.111
00:02:760,Pose139,0,0.141,-0.111,0.87,-0.759,-0.141,0,0.12,-0.438,0.987,-0.549,-0.137
00:02:780,Pose140,0,0.166,-0.196,1.019,-0.823,-0.166,0,0.104,-0.418,0.983,-0.565,-0.156
00:02:800,Pose141,0,0.193,-0.424,1.276,-0.852,-0.193,0,0.121,-0.417,0.999,-0.583,-0.174
00:02:820,Pose142,0,0.201,-0.592,1.373,-0.781,-0.201,0,0.125,-0.428,1.021,-0.593,-0.178
00:02:840,Pose143,0,0.196,-0.718,1.37,-0.652,-0.196,0,0.124,-0.439,1.041,-0.602,-0.176
00:02:860,Pose144,0,0.173,-0.761,1.215,-0.454,-0.173,0,0.11,-0.431,1.047,-0.615,-0.163
00:02:880,Pose145,0,0.15,-0.714,1.088,-0.373,-0.15,0,0.107,-0.407,1.031,-0.624,-0.147
00:02:900,Pose146,0,0.125,-0.66,1.009,-0.349,-0.125,0,0.121,-0.374,1.009,-0.635,-0.125
00:02:920,Pose147,0,0.078,-0.622,1.014,-0.392,-0.078,0,0.078,-0.322,0.985,-0.663,-0.078
00:02:940,Pose148,0,0.035,-0.601,1.028,-0.428,-0.035,0,0.035,-0.286,0.969,-0.683,-0.035
00:02:960,Pose149,0,-0.038,-0.555,1.032,-0.478,0.038,0,-0.038,-0.217,0.922,-0.705,0.038
00:02:980,Pose150,0,-0.085,-0.517,1.021,-0.504,0.085,0,-0.085,-0.164,0.874,-0.71,0.085
00:03:000,Pose151,0,-0.121,-0.479,1,-0.521,0.122,0,-0.122,-0.118,0.83,-0.712,0.122
00:03:020,Pose152,0,-0.124,-0.436,0.979,-0.543,0.163,0,-0.17,-0.138,0.926,-0.788,0.17
00:03:040,Pose153,0,-0.131,-0.421,0.977,-0.556,0.183,0,-0.198,-0.21,1.065,-0.855,0.198
00:03:060,Pose154,0,-0.152,-0.414,0.985,-0.571,0.205,0,-0.23,-0.348,1.242,-0.894,0.23
00:03:080,Pose155,0,-0.161,-0.412,0.989,-0.577,0.214,0,-0.24,-0.425,1.284,-0.86,0.24
00:03:100,Pose156,0,-0.167,-0.401,0.98,-0.579,0.22,0,-0.237,-0.464,1.21,-0.746,0.237
00:03:120,Pose157,0,-0.168,-0.385,0.962,-0.577,0.22,0,-0.229,-0.434,1.097,-0.662,0.229
00:03:140,Pose158,0,-0.201,-0.365,0.939,-0.575,0.218,0,-0.221,-0.383,0.983,-0.599,0.221
00:03:160,Pose159,0,-0.213,-0.344,0.92,-0.576,0.213,0,-0.213,-0.344,0.92,-0.576,0.213
00:03:180,Pose160,0,-0.207,-0.343,0.922,-0.579,0.207,0,-0.207,-0.343,0.922,-0.579,0.207
00:03:200,Pose161,0,-0.194,-0.352,0.933,-0.582,0.194,0,-0.194,-0.352,0.933,-0.582,0.194
00:03:220,Pose162,0,-0.182,-0.362,0.945,-0.582,0.182,0,-0.182,-0.362,0.944,-0.582,0.182
00:03:240,Pose163,0,-0.161,-0.383,0.964,-0.581,0.161,0,-0.161,-0.383,0.964,-0.581,0.161
00:03:260,Pose164,0,-0.138,-0.407,0.985,-0.578,0.138,0,-0.138,-0.407,0.985,-0.577,0.138
00:03:280,Pose165,0,-0.121,-0.424,0.998,-0.574,0.121,0,-0.121,-0.424,0.998,-0.574,0.121
00:03:300,Pose166,0,-0.096,-0.448,1.014,-0.567,0.096,0,-0.096,-0.448,1.014,-0.566,0.096
00:03:320,Pose167,0,-0.08,-0.462,1.023,-0.561,0.08,0,-0.08,-0.462,1.023,-0.561,0.08
00:03:340,Pose168,0,-0.058,-0.481,1.034,-0.552,0.058,0,-0.058,-0.481,1.033,-0.552,0.058
00:03:360,Pose169,0,-0.046,-0.491,1.038,-0.547,0.046,0,-0.046,-0.491,1.038,-0.547,0.046
00:03:380,Pose170,0,-0.031,-0.503,1.043,-0.54,0.031,0,-0.031,-0.503,1.043,-0.54,0.031
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Google Forms used for Data Collection:
https://docs.google.com/forms/d/1etc5oXlms0a49LIbDwfaiT0vvdQhK4q-8x3jimh68sA/
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