ESE519 Project Proposal

**1. Project Title:** Content reactive humanoid toy figures.

**2. Team:**

A. Stuart (Lead for Hardware (component selection, designing circuitry, mechanical design))

B. Sarath Vadakkepat (Lead for Communication)

C. Zairah Mustahsan (Lead for Media processing)

**3. Motivation**:

Content reactive toys enable kids to have a much more immersible experience while watching their favourite action anime/cartoon/movies. Content reactive humanoid toys provide a new dimension to toys which can be commonly christened “Smart Toys”. Content reactive toys react and enact out their virtual self in an anime/cartoon/movies. It would be desirable to design such toys that successfully enact a sequence or a set of actions in sync with a media program with a very low latency.

**4. Goal:**

The outcome of the project would be create a prototype of an action humanoid toy figure which can imitate few of the motions synchronized with a media file. Various motions could include movement of hands and legs, vibration and sound sensors and speakers and limited toy figure movement.

**5. Methodology:**

1. Design the complete blueprint of the system on paper. Identify the key components required.
2. Divide into hardware and software components and identify the features to be implemented.
3. Set up a communication medium between the hardware and software.
4. Make the hardware components respond to different inputs.
5. Process a media file to accumulate content reactive data. Test the system till this step on a raw scale
6. Design and build a body enclosure for the hardware in the form of humanoid toy figure.
7. Embed the hardware into the built body to form a prototype of the humanoid
8. Test the complete system with media file and hardware components on the humanoid.

**6. Project Components:**

Hardware :

Raspberry Pi as the microcontroller

Stepper/Servo/DC motors/Solenoids/Speaker

Vibration Motors/Led lights/Capacitors/Resistors/Inductors/Voltage Regulator etc

Software :

Python based TCP/IP communication protocol

Data file containing content reaction data required.

Timing program to sync the media file and the content reactive data sent over communication network.

**7. Testing and Evaluation:**

1. Testing of software communication between a laptop and raspberry pi
2. Testing of activating hardware components via the hardware connections to raspberry pi
3. Testing of hardware components to perform specific tasks using standalone inputs
4. Generating content reactive data from 1 or 2 media files and developing the syncing program to ensure that the correct data is chosen from a video frame.
5. Testing by sending content reactive data to raspberry pi and then finally to hardware.
6. Ensuring the hardware actions are visible for a given media file with responses to the media file in minimal delay. (Reach Goal)

**8. Deliverables:**

**Baseline 1**: Design the complete blueprint of the system on paper. Identify the key components required. Divide the system into hardware and software components and identify the features to be implemented

**Baseline 2**: Set up a communication medium between the hardware and software. Process a media file to accumulate content reactive data. Make the hardware components respond to different inputs.

**Baseline 3:** Test the system till this step on a raw scale

**Reach Goals** –

**Reach 1:** Design and build a body enclosure for the hardware in the form of humanoid toy figure.

**Reach 2:** Embed the hardware into the built body to form a prototype of the humanoid

**Reach 3:** Visual experience of complete system with media file and hardware on the humanoid.

Baseline goals are to develop a system consisting of software and hardware at a breadboard /crude level. Reach goals are to make the system as explained in **motivation** and **goal** sections of this document which is the significant step in bringing out a complete product.

**9. Overall Timeline**:

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| **Duration** | **Task** |
| Oct 17- 20 | Literature survey of the domain and current progress in the field of smart toys |
| Oct 21 - 24 | Design the complete blueprint of the system on paper |
| Oct 25 - 28 | Identify the key components required. |
| Oct 29 - Nov 1 | Divide the system into hardware/software components and identify the features to be implemented |
| Nov 2 - 5 | Set up a communication medium between the hardware and software. |
| Nov 6 - 9 | Process a media file to accumulate content reactive data. |
| Nov 10 - 13 | Integrate hardware and software till this step |
| Nov 14 - 17 | Complete Baseline goals and demo |
| Nov 18 - 21 | Design a body enclosure for the hardware in the form of humanoid toy figure. |
| Nov 22 - 25 | Build the above designed humanoid figure |
| Nov 26 - 29 | Embed the hardware into the built body to form a prototype of the humanoid |
| Nov 30 - Dec 3 | Full Integration and basic tests |
| Dec 4 - 7 | Complete Tests using a fully integration hardware and software components |
| Dec 8 - 12 | Final Testing and Demo |