Project phase - 1 Report

On

HUMANOID ROBOT

Submitted in the partial fulfillment of the requirements for the award of the degree in bachelor of technology in electronics and communication engineering

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BONAFIDE CERTIFICATE

*This is to certify that this Bonafede report of the project phase 1 entitled "**HUMANOID ROBOT**" is done by **ATHUL H S (LVKE19EC049), HAIFA N (VKE19EC015), H SARATH (VKE19EC018), SANA JAN (VKE19EC031),** student of seventh semester, in partial fulfillment for the award of degree of Bachelor of Technology in Electronics and Communication Engineering by AP J Abdul Kalam Technological University of Kerala, Trivandrum during the academic year 2022-2023*

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CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Robotics is an emerging field of science during which robots are fabricated and programmed to try to varied tasks. In those robots, Humanoid robots are the well sophisticated robots that perform tasks almost like humans and interact with them. It makes human efforts simpler. This project will deals with designing and development of the humanoid robot.

1.1 PROBLEM STATEMENT

Eyra E-Spartans is a robot developed by the robotic development team in VKCET college. The robot is powered by Third generation Intel motherboard. It is programmed by python in Ubantu 18.04 which is a flavor of Linux. It has online speech recognition and a face recognition mechanism. Wheeled motion also done in this robot. The human like structure is provided for better look. Speech and face recognition is possible through a module contain both camera and microphone.

According to this project it contains many problems. In face recognition the robot will identify a few persons.ie only a less number of identifications. When we look in to online speech recognition it require an internet connection. Without data connection it will not work. Basically it has lower operating speed and having a bad design.

1.2 PROPOSED SOLUTION

All our problems have different solutions. After analyzing the robot we found that ituses a motherboard having lower spaces. So we decided to change the platform to new one which support advanced technologies. We build a robot having self learning capabilities.

For this process we give some advancement in the recognition systems. The speech recognition system will work under offline and online modes. So it does not require any internet connection.

In the face recognition system we use haar cascade algorithm to detect or identify the persons or objects. In the face recognition it can identify an unknown person by asking him about its details. Haar cascade algorithm is feature based object detection. With the help of internet of things (IOT) we can control some electronic devices. Then we added humanoid motions. With the use of servos we can move the robots exactly Same as humans. Currently we focus on the head section. So we make human like head movement by using 3D printed design.

CHAPTER 2

REQUIREMENTS

2.1 PRODUCT RESEARCH DEVELOPMENT (PRD)

Humanoid robot are one of the most important growth engine technology in national economy and its application is also expected to be promising industry in the new generation. Humanoid robot design includes action and behavior structure design and human-robot interaction design as well as appearance design. Especially for personal service robot which assists and supports human life in domestic environment it is more important to have emotional exchange with human and personality design for humanoid robot is one of the essential issues.

2.1.2 PROJECT IDENTIFICATION

As a student, we understood the problem of students and teachers of our department. By immense discussion we came to this project. We are able to find more about this problem.

2.1.2 TARGETED CLIENT

As our project mainly solves problems of teachers and staffs, it mainly focuses on educational institutions. Even in this era, teachers and staffs are facing issue on attendance monitoring and other related works. As works are done manually, time is lost, disturabance are caused, over workload has been created. Thus every educational instituitions are our targeted client. These educational instituitions enhance the growth of children.

This project must be a relaxation to teachers and staffs in work, they can concentrate on teaching. Therefore this project improves the technical ability of teachers and staffs.

2.1.3 ALTERNATE SOLUTION

Some jobs are specifically done manually, and there is a belief that it can't be done using technology. But now it can be solved using attendance monitoring system, for taking attendance of the students using face recognition. It consumes the time of teachers. This project gives guidance to the students about their doubts. Thus it helps the teachers to clarify the doubts of students. It also helps the teachers and students to refer on their specific topics and to get study materials. Many students and teachers are facing stresses in the institution, by interaction of this humanoid robot can give fun and relaxation. It improves the communication of human and machine.

2.2 MARKETING RESEARCH DEVELOPMENT (MRD)

The developers in the Humanoid Robots Market are working on solving issues such as dexterous manipulation, targeted application, bipedal locomotion, etc. to work in the same environment as humans. The market has various benefits such as dealing with the distribution process and customer care. They are also durable. It allows the target market to get feedback from customers on the interests in the product. It depends on,

1. How to define the market of the product.
2. How to address the client.
3. Quantityof production.
4. Scope of the project.
5. Cost of production in market.
6. Margin of the product.

Our targeted marketing areas are educational instituitions. As the teachers and

staffs are facing many issues in the these instituitions. It may be easy to convince them, because they're facing these issues and it is familiar to them. They may be wandering for the solution to their problem. Thus it increases the market value.

We mainly focuses on technical educational instituitions because it enhances the practical knowledge of technical students. It will increase our profit. If our customer needs any enhancement we can improvise it in future. For one product, the cost of production must be approximately 50,000 rupees since it include many technical aspect

CHAPTER 3

FEASIBILITY ANALYSIS

3.1 DESIGNABLE

It can be designed effectively. For designing we use feasible components. 3D printing is used for the physical appearances. It is designed by considering its purposes or functions, interest of customers, economics, aesthetics. It is designed in the way of a human. i.e human behaviour, actions , motion etc.. Product design is eco-friendly and easy to maintain.

3.2 MANUFACTURABLE

For manufacturing, we use specific coding and IOT using arduino. Specific components are used for its functions. Manufacturing can be done effectively with an approximated estimate. Feasible components are used. Manufacturing cost is approximately 40,000. Manufacturing can be done ourself with some outsource.

3.4 TESTABLE AND SERVICEABLE

It can be easily tested and find its problem as it can be operated using a system. The components can be easily tested and replace it if needed. It is also serviceable. Service is available only for 1 year. The electronic components are repaired and replaced if needed.

CHAPTER 4

ENGINEERING SPECIFICATIONS

4.1 COMPONENTS IDENTIFICATION

4.1.1 Mother Board

The motherboard is the central component of a computer system that connects all other parts of the computer together. This report aims to provide a comprehensive study of the motherboard, its components, specifications, and their functions.

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The motherboard consists of various components, including the CPU socket, memory slots, expansion slots, power connectors, and input/output ports. The CPU socket is the slot on the motherboard where the processor is mounted, and it determines the type of processor that can be installed. Memory slots are used to install RAM, and they determine the amount and type of memory that can be installed. Expansion slots are used to install additional components such as graphics cards, sound cards, and network cards. Power connectors supply power to the motherboard and other components, while input/output ports allow the connection of external devices such as USB drives, keyboards, and monitors. The specifications of the motherboard determine the performance and capabilities of the computer system. The form factor of the motherboard determines its size and shape, and it determines the case that can be used.

The chipset is responsible for controlling the communication between the CPU, memory, and other components. The number of RAM slots and the type of memory supported determine the maximum amount of memory that can be installed. Other specifications such as the number of SATA and M.2 slots, the number of USB and LAN ports, and the audio and video connectors also determine the capabilities of the motherboard.

Figure 4.1 Mother Board

4.1.2 Arduino UNO

Arduino Uno is a popular open-source microcontroller board based on the ATmega328P microcontroller. It is widely used in the maker and electronics community for various projects due to its flexibility, ease of use, and low cost. This report aims to provide an overview of the Arduino Uno, its specifications, and applications.

The Arduino Uno board consists of a microcontroller, a voltage regulator, and input/output connectors. The microcontroller is the brain of the board, and it is responsible for processing the code and controlling the input/output pins. The voltage regulator provides a stable voltage supply to the board, while the input/output connectors allow the connection of sensors, actuators, and other devices.

The Arduino Uno has a variety of specifications that make it a versatile and powerful tool for electronics projects. It has 14 digital input/output pins, six analog input pins, and a 16 MHz quartz crystal. It can be powered through a USB connection or an external power supply. It is also compatible with various shields, which are add-on boards that provide additional functionality such as wireless communication, motor control, and sensor integration. Arduino Uno has a wide range of applications in various fields such as robotics, automation, and IoT. It can be used to control motors, read sensor data, and communicate wirelessly. It can also be programmed to perform complex tasks such as image processing and machine learning. Its open-source nature makes it easy to learn and share projects and ideas with the community

Figure 4.2 Arduino UNO

4.1.3 NodeMCU

NodeMCU is an open-source firmware and development board based on the ESP8266 Wi-Fi module. It provides an easy-to-use platform for IoT (Internet of Things) development, allowing developers to quickly and easily build connected devices. This report aims to provide an overview of the NodeMCU, its specifications, and applications.

The NodeMCU development board consists of an ESP8266 Wi-Fi module, a USB-to-serial converter, and input/output pins. The ESP8266 Wi-Fi module is a low-cost, low-power Wi-Fi module that provides connectivity to the Internet. The USB-to-serial converter allows the board to be programmed and debugged using a computer, while the input/output pins provide connectivity to sensors, actuators, and other devices. The NodeMCU has a variety of specifications that make it a powerful and flexible platform for IoT development. It has 11 digital input/output pins, one analog input pin, and a 80 MHz microcontroller. It also has 4MB of flash memory for storing code and data. It can be programmed using Lua, a simple and easy-to-learn scripting language, or using the Arduino IDE (Integrated Development Environment).

NodeMCU has a wide range of applications in various fields such as home automation, robotics, and environmental monitoring. It can be used to control lights, appliances, and other devices in a smart home setup. It can also be used to monitor

environmental parameters such as temperature, humidity, and air quality. Its Wi-Fi connectivity makes it easy to connect to the Internet and control devices remotely.

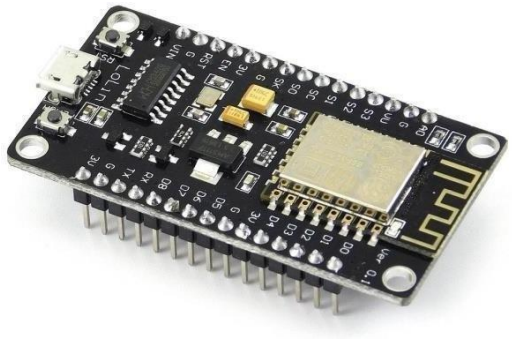

Figure 4.3 NodeMCU

4.1.4 Webcam

Webcams with microphones are essential tools for remote communication, video conferencing, online teaching, and many other applications. They provide high-quality video and audio transmission over the Internet, allowing people to communicate and collaborate in real-time. This report aims to provide an overview of webcams with microphones, their specifications, and applications.

Webcams with microphones come in a variety of shapes and sizes, with different specifications and features. The most common type is the USB webcam, which connects to a computer or other device through a USB port. Most webcams with microphones have a resolution of at least 720p or 1080p, which provides high-quality video transmission. The microphones are usually built-in and can capture clear audio within a certain range. Webcams with microphones have a variety of applications in various fields such as education, business, healthcare, and entertainment. They are commonly used for video conferencing, online teaching, remote healthcare, and virtual events. They can also be used for live streaming, video recording, and content creation. When choosing a webcam with microphone, some important factors to consider include resolution, frame rate, field of view, microphone quality, and compatibility with the software and hardware being used.

There are many different brands and models of webcams with microphones available, with varying specifications and prices.

Figure 4.4 Webcam

4.1.5 Metal Servo motor

The MG995 Metal Servo Motor is a powerful and versatile servo motor used in various fields such as robotics, automation, and hobby projects. It provides precise and accurate movement control, making it a popular choice for controlling moving parts and mechanisms. This report aims to provide an overview of the MG995 Metal Servo Motor, its specifications, and applications.

The MG995 Metal Servo Motor is a high-torque servo motor with metal gears and a robust construction. It has a torque of up to 12kg/cm and a speed of up to 0.17 seconds per 60 degrees of rotation. It operates at a voltage of 4.8 to 7.2 volts and consumes a maximum of 2.5A of current. It can be controlled using a variety of microcontrollers and motor drivers. The MG995 Metal Servo Motor has a wide range of applications in various fields such as robotics, automation, and hobby projects. It can be used to control the movement of robotic arms, legs, and other moving parts. It can also be used to control the movement of mechanisms such as doors, gates, and drawers. Its precise movement control and high torque make it a popular choice for projects that require accurate movement and

positioning. When using the MG995 Metal Servo Motor, it is important to consider factors

such as the power supply voltage, control signals, and load capacity. It is also important to ensure that the motor is properly mounted and secured to prevent damage to the motor or other components.

Figure 4.5 Metal servo

4.1 Servo motor

The SG90 Servo Motor is a small and lightweight servo motor commonly used in various fields such as robotics, automation, and hobby projects. It provides precise and accurate movement control, making it a popular choice for controlling small moving parts and mechanisms. This report aims to provide an overview of the SG90 Servo Motor, its specifications, and applications. The research for this report was conducted through a combination of online research, literature reviews, and interviews with experts in the field of robotics and automation. Information was gathered from reputable sources such as technical manuals, user reviews, and academic journals.

The SG90 Servo Motor is a small and lightweight servo motor with plastic gears and a compact construction. It has a torque of up to 1.5kg/cm and a speed of up to 0.12 seconds per 60 degrees of rotation. It operates at a voltage of 4.8 to 6 volts and consumes a maximum of 0.5A of current. It can be controlled using a variety of microcontrollers and motor drivers.

The SG90 Servo Motor has a wide range of applications in various fields such as robotics, automation, and hobby projects. It can be used to control the movement of small

robotic arms, legs, and other moving parts. It can also be used to control the movement of

small mechanisms such as doors, gates, and drawers. Its precise movement control and small size make it a popular choice for projects that require accurate movement and positioning in small spaces. When using the SG90 Servo Motor, it is important to consider factors such as the power supply voltage, control signals, and load capacity. It is also important to ensure that the motor is properly mounted and secured to prevent damage to the motor or other components.

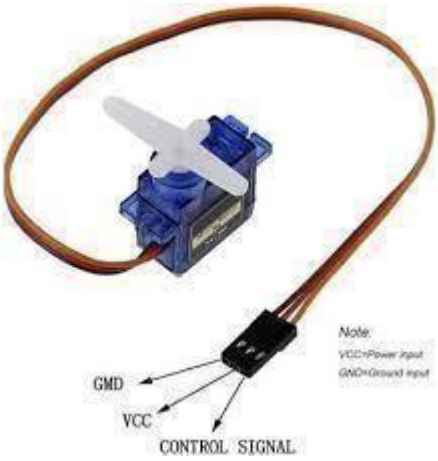

Figure 4.6 Servo motor

CHAPTER 6

CONCLUSION

Humanoid robots introduce new and attractive pedagogical topics and apply PBL (Project-Based Learning) approaches. They help students develop problem solving and analytical skills, required to succeed in a knowledge-based and highly technological society. Robots are becoming useful parts of the education ecosystem with their various capabilities ranging from the ability to perceive people and their environment to the ability to reason and rationalize situations and emotions of people. These robots are also equipped with multimodal interaction capabilities and, equally important, have a physical presence. Humanoid robots, with their humanlike appearance, add another dimension of humanlike body language and social signaling capabilities: keys for more natural and intuitive human-robot interaction

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