IoT based Gesture Control Gaming

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Abstract - *The video gaming industry has been ever-increasing since its inception. The early video gaming platforms for commercial purposes became to be successful in the 1970s. With the improvements on the computer industry, especially the rise of desktop computers led to humongous improvements in the gaming industry. Today there are various platforms on which video games are developed such as the PC, mobile, arcade, web browser, virtual reality, blockchain, etc. In the year 2015, the estimated video gaming industry net worth was around $91 billion. Nowadays we have lots of game controllers that are improving the gaming experience over the years. Gaming experience can be improved to a good extent with the help of controllers but these controllers are quite expensive. Through this project we design our own gaming controller using Arduino. The game controller will be designed for the game Angry Birds. The domains of Internet of Things (IoT) and Gesture Control will be employed in this project. Everyone is a fan of video games but over time we find it uninteresting if we are less involved into it. Today the advanced gaming consoles enables virtual gaming experience and helps us to feel the game a lot better than a keyboard or a mouse do. Thus, we intend on making a virtual gaming controller than can give the user an enhanced gaming experience. Through this project we intend to make a virtual controller than can give us an enhanced experienced to play angry birds.*

Key Words: - **Video gaming, game controller, Internet of Things (IoT), gesture control**

1. INTRODUCTION

The gaming industry has seen a significant growth over the years. The development of the cathode ray tube in the 1940s had paved the way for the inception of the gaming industry. The early games developed were the arcade games. These arcade gaming platforms began to grow in the late 1960s and 1970s. The 1980s saw a huge growth in 8-bit computer games. The 1990s saw a widespread growth in CD-based games, interactive hardware such as mobile devices and the rise of the internet, which led to competitive gaming environment. Development of dedicated graphics card developed mainly by Intel and Nvidia led to a huge increase in 3D graphics based gaming platforms and the inception of sports in the 2000s. The 2010s have provided the way for development of games through virtual reality, augmented reality and blockchain.

The Internet of Things (IoT) is a network of physical devices and other real world entities such as vehicles, industrial appliances, etc. embedded with software, sensors, actuators, etc. connected to the Internet. The information collected through these mediums could be analyzed for further improvement in services. The increased speed of the Internet and the lowering cost of computing devices has enabled the IoT to be integrated in the video game industry. As the number of devices joining the Internet network increases, the number of free video games launched has also increased. There has been a massive overhaul in the game development and the gaming hardware. This has led to mushrooming of the gaming communities all over the world.

Gesture control is the method to control and interact with a computer without direct physical contact. It could be implemented in the gaming systems through gaming gloves, visual recognition and 3D cameras. For example, the Kinect is a gesture control based game controller which uses depth camera and motion sensor. The depth camera detects a skeleton image of the player and the motion sensor tracks their movements.

Game controllers are the input devices for controlling the game play. These controllers include keyboard, mouse, joystick, touchscreen, etc. The project aims to design a cost-effective gaming controller for the game Angry Birds. Angry Birds is a video game developed by a Finnish company Rovio Entertainment. The game has been developed for various plat-forms such as video game consoles, PC and mobile platform in operating systems such as iOS, Android, Symbian and Windows Phone.

2. EXISTING SYSTEM

The existing system [1] discusses the work done in the topic of hand gesture recognition for mouse control for various applications like sign language detection, robot control, etc. The work has been implemented through various methods like Hidden Markov model and MEMS accelerometer. The main output of this paper is the detection of hand gestures and recognition the meaning of those gestures. In the Hidden Markov model the motion detector initially tracks the moving object by differentiating it with the background through gray-level changes. Then the moving hand skin color is detected through R, G and B pixels of the moving region. The edges of the moving object (in this case the human arm) are determined. In that arm, the palm is differentiated with the forearm since palm has the maximum number of skin edges on the arm as compared to the forearm. Thus, the palm becomes the gesture region which movements are needed to be tracked.

The other method proposed in the existing system is the MEMS accelerometer based gesture detection. It measures the acceleration movements from the human hand signals. Initially, the microcontroller acceleration signals of the hand movements which are tracked by the accelerometer. The un-wanted noise signals are filtered out to provide the accurate output. After this, the process of Feature Generation and Feature Selection are applied wherein the extracted feature

of the preprocessed signals provide the characteristics of different hand movement signals. These features are used for model constructions and useless features are weeded out. Lastly, the reduced feature vectors are provided to the PNN classifier where the output of the gesture is predicted and the necessary actions are taken in the system.

The existing system could be used for building hand gloves as a game controller. The hand gloves could be used for gaming is a gesture based gaming controller that provides a unique experience. It will connect to devices using Bluetooth. The gloves are cross-platform controllers that can be used on any operating system. It uses natural hand movements as control gestures and is interpreted on the screen. However, there would be certain drawbacks in the existing system:

1. The default system would not meet the virtual gaming experience of the user.

2. The gloves that would be used can be uncomfortable since they cannot be worn for a longer duration.

3. The user cannot experience a 3-dimensional game play.

4. The gloves would be expensive to design and manufacture.

3. PROPOSED SYSTEM

In the proposed system, we will try to construct a game controller using flex sensor and potentiometer for controlling the mouse on the computer screen. In this way, the game play could be controlled without the need of mouse and keyboard or the idea proposed in the existing system. The flex sensor is a variable resistor. The resistance of the sensor increases as the sensor body bends. We can implement usage of this sensor in the Angry Birds game in the following way- when the sensor body is pulled, the mouse pointer gets controlled and the catapult/ slingshot in which the bird is placed is moved in the X direction depending on the extent to which the sensor body is pulled.

The potentiometer is a 3-terminal variable resistor. In the motion control application, potentiometers can be used as position feedback devices in order to create "closed loop" control, such as in a servomechanism. This method of motion control used in the DC Motor is the simplest method of measuring the angle, speed and displacement. The potentiometer could be used to control the mouse pointer in the Y-direction. Thus, it will help in adjusting of the slingshot/catapult for effective throw on the target.

The components will be setup in an Arduino Uno microcontroller. The program is initialized to work with 9600 baud rate and start reading the values from Flex sensor and Potentiometer. The serial write () function in the Arduino IDE can send only one byte of data at a time. 1 byte is 8 bits and 2^8 = 256. We will be able to send values only from 0 to 256. So we have to compress the values of Flex sensor output and Potentiometer Output into 0 to 256. To do that we use the map () function in Arduino IDE. All the values from the flex sensor are converted from 5 to 100, so when we bend the sensor it will increment from 5 and when released it will go back to 5. To mention the mouse clicks the value 1 and 0 is used. When 1 is sent the mouse is pressed and when 0 is sent the mouse is released. The values form the potentiometer is converted from 101 to 200 sing the map () function and is send to the systems COM port suing the Serial write () function.

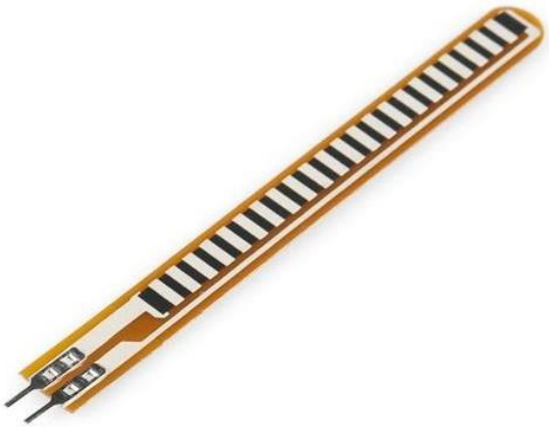

Fig. 1. Flex Sensor

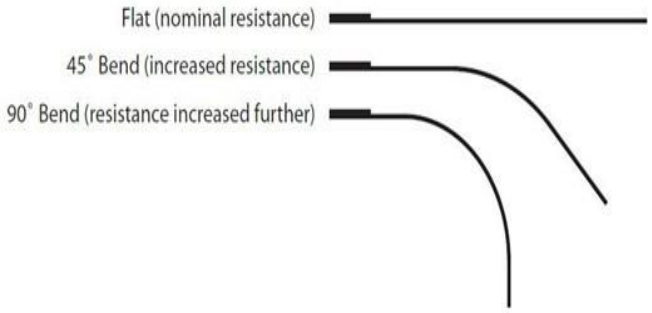

Fig. 2. Change of resistance according to the bend of the flex sensor

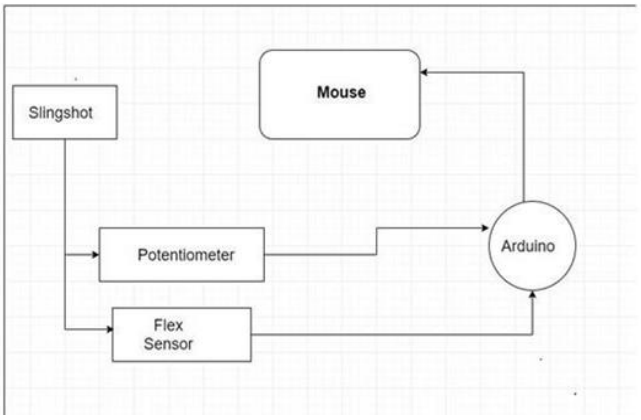

Fig. 3. Architecture

The project also requires the usage of Processing IDE. Its is an open-sourced graphical library built for electronic arts and visual design applications. Processing uses the Java language, with additional simplifications such as additional classes and aliased mathematical functions and operations. As well as this, it also has a graphical user interface for simplifying the compilation and execution stage. In this project, the processing IDE is used to read the COM port values and control the mouse pointer based on the values received via the COM port.

4. CONCLUSION

Thus, the project aims to build a cheap and usable gaming control. There are many future scope for this project. Firstly, Instead of connecting the Arduino serially to the PC, we can Use a Bluetooth module to have a wireless control over the Mouse. This can enable us to maintain the contact with the Mouse for at the most 10m. Secondly, we can implement the Game controller for other games as well. Depending on the Demands of that particular game, we can make an effective Controller with the required sensor.

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