A NOVEL TECHNOLOGY FOR SHOOTING SPORTS

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ABSTRACT:- The motivation of this project is to get the complete database of the Refile Shooter to get the rectify the mistakes done while practicing. There are many unnoticed errors committed by the shooter in practice, this device helps us in finding them and change the practice session according to their mistakes. The process is carried over by noting the deviations done by the shooters while shooting in the range. These deviations are analyzed by the coach and the player(shooter). The major deviations are getting panicked, unwanted muscle stretch and movement, leg movement, stress applied on the gun handle. So, the mentioned deviations are been noted and viewed in either chart form or the raw excel data. After each session all the data is been validated and actions are been taken based on the mistakes happened. The device improves the quality of the shooter and helps clearly in the improvement of the game. It also shows the minute mistakes that human cannot be able to address. It also helps in customizing the gun handle based on the gun handler and can easily able to self-assess their performance. It is very cheap in the cost wise and provides the great improvement in the performance of the refile shooter.

1. INTRODUCTION

The principle target of this project is to get the complete database of the Refile Shooter to get the rectify the mistakes done while practicing. There are many unnoticed errors committed by the shooter in practice, this device helps us in finding them and change the practice session according to their mistakes. The process is carried over by noting the deviations done by the shooters while shooting in the range. These deviations are analyzed by the coach and the player(shooter). The major deviations are getting panicked, unwanted muscle stretch and movement, leg movement, stress applied on the gun handle. So, the mentioned deviations are been noted and viewed in either chart form or the raw excel data. After each session all the data is been validated and actions are been taken based on the mistakes happened. The device improves the quality of the shooter and helps clearly in the improvement of the game. It also shows the minute mistakes that human cannot be able to address. It also helps in customizing the gun handle based on the gun handler and can easily able to self-assess their performance. It is very cheap in the cost wise and provides the great improvement in the performance of the refile shooter.

This project holds the main controller Arduino Nano used for all arithmetic and logic units for all the computation. The sensors used in this project are Gyro Sensor, Sharp sensor, Heartbeat Sensor, Temperature sensor and Muscles Sensors as the input devices. The output system is a telemetry viewer. The sensors are interfaced to read different poster and position of the user to get the mistakes done by them to rectify the error made by them.

Our device is wearable while shooting practice which provides the complete process, shake and movement of the shooter while shooting. The gun holder's Heartbeat is been noted by the heartbeat sensor, the movement and shake are provided by the gyro sensor, the muscle contraction is provided by the muscle sensor and sharp sensor provides the height position of the user from the ground, temperature sensor provides the temperature of the user.

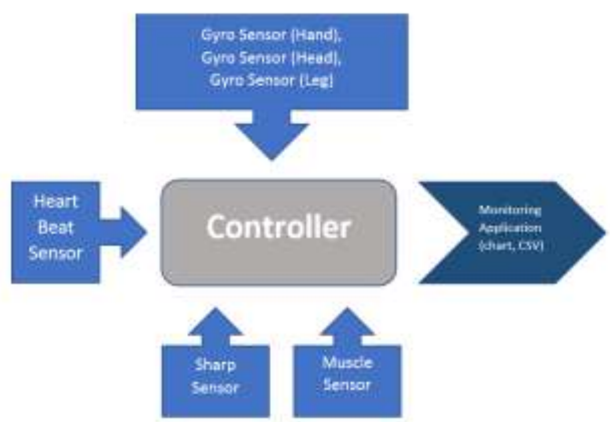

Figure 1: Flow diagram for Gun Handler

The above flow chart illustrates the step by step process of the system. This chart is an activity chart in which consists of initial user node and final destination node.

2. LITERATURE REVIEW

S.A. DAUD (ET AL), [2013] describes the use of multiple Infrared sensors to reconstruct a shape by detecting any changes in sensor displacement when there is an obstacle placed in front of the sensor. Meanwhile, the distance between IR sensors and the obstacle was set at 5 cm to minimize the noise contributed by the reflection of the sensor during data collection. A stepper motor was used in the experimental design to control the movement of an obstacle which rotates at 3600 for one complete cycle. Additionally, Arduino Software was used as a micro controller to control the switching mode of the sensor and CoolTerm Software was used to store the sensor output data in the text file format. For analysis, Matlab Software has beenused to plot the graph of sensor value against the collected data. IR sensors are capable in measuring data up to 0.05 cm of resolution in displacement. Experimental results showed that by using IR sensors, it is possible to reconstruct a shape via plotting the graph for cylinder, hemisphere and ellipse shape obstacles.

Vocal-fold paralysis patients treated with stem-cellgrafting

JUN-ICHIRO FURUKAWA (ET AL),[2012] proposes a human movement modelboth for myoelectric assistive robot control and biosignal-sensorfailure detection. Weparticularly consider an application to upper extremity exoskeleton robot control. When using electromyography (EMG)-based assistive robot control, EMG electrodes can be easily disconnected or detached from skin surfaces because the human body is always in contact with the robot. If multiple electrodes are used to estimate multiple joint movements, the probability of sensor electrode misplacement increases due to human error. Tocope with the aforementioned issues, we propose a novel human movement estimation model that takes anomalies into account as uncertain observations. We estimated human joint torques by automatically modulating the contribution of each sensor channel for the movement estimation based on anomaly scores that were computed according to synergistic muscular coordination. We compared our proposed method with conventional approaches during drinking-movement estimation with five healthy subjects in the three aforementioned anomaly situations and showed the effectiveness of our proposed method. We applied it to a four-DOF upper limb assistive exoskeleton robot and showed proper control in sensor failure situations.

TALLURI, (ET AL),[2019] Nearness of specialist is basic for legitimate patient consideration. In any case, they can't be available on every single spot to give drug or treatment. So remote observing of a patient is the correct arrangement. This framework is utilized to screen physical parameter like heart beat and send the deliberate information straightforwardly to a specialist through Web application. This System comprises of an IR base heart beat sensor, Arduino Uno. This estimates heart beat from a baby tosenior individual. The minimal effort of the gadget will give fitting command post successful checking framework." Heart Rate observing framework utilize ing Heart rate Sensor and Arduino". With the advancement of innovation, in this venture we can detect body temperature and pulse carefully utilizing Arduino. Arduino is utilized on the grounds that it can detect the earth by getting contribution from assortment of sensors and can influence its surroundings by controlling lights, engines, and different actuators. The microcontroller on the board is modifiedutilizing C". LM35 is utilized for the sense body temperature Body temperature is a fundamental parameter for checking and diagnosing human wellbeing. Heart beat sensor was utilized for detecting pulse. This gadget will enable one to quantify their mean blood vessel weight (MAP) in around one moment and the precise body temperature will be shown on the Android. The framework can be utilized to gauge physiological parameters, for example, Heart rate, Pulse rate.

KJARTAN HALVORSEN (ET AL),[2016] as discussed in a calibration method for a triaxial accelerometer using a triaxial gyroscope is presented. The method uses a sensor fusion approach, combining the information from the accelerometers and gyroscopes to find an optimal calibration using Maximum likelihood. The method has been tested by using real sensors in smart-phones to perform orientation estimation and verified through Monte Carlo simulations. In both cases, the method is shown to provide a proper calibration, reducing the effect of sensor errors and improving orientation estimates.

ANTOINE FERREIRA (ET AL),[2012] as discussed Research activities on nanorobotics comprise an emerging interdisciplinary technology area raising new scientific challenges and promising revolutionary advancement in applications such as medicine, biology and industrial manufacturing. Nanorobots could be defined as intelligent systems with overall dimensions at or below the micrometer range that are made of assemblies of nanoscale components while exploiting the physics at such a scale, or as larger platforms capable of robotic operations at the nanoscale. The development of nanorobots presents difficult design, fabrication and control challenges, as such devices will operate in microenvironments whose physical properties differ from those encountered by conventional parts. Furthermore, nanorobotics is a field that calls for collaborative efforts between physicists, chemists, biologists, computer scientists, engineers and other specialists to work towards this common objective.

Farrell Farahbod (et al), [2019] he x-axis of Time Domain Charts can now display elapsed time. Timestamps are recorded. Exported CSV files contain the UNIX timestamp for each sample. CSV files can be imported (replayed.) New and existing charts are configured with a non-modal side panel instead of a pop-up window. Layout files and CSV files can be imported via drag-n-drop. Charts can be maximized (full-screened.) The Time Domain Chart now renders properly even when the sample number is very large. Samples are automatically swapped to disk if there's not enough space in RAM. Binary mode supports uint8 values. Binary mode supports bitfields (for showing boolean and enum values.) Various small bug fixes. See the git commit log for more details.

3. EXISITING SYSTEM

Smart Detector which would be able to detect the shale above knee level and more importantly, help navigate around large targets alone with the help of RFID (radio frequency identification system). RFID technology is much more affordable and accurate and is coupled with Braille blocks," he said. The detector has a microcontroller and RFID reader at the bottom that can scan the strip of RFID cards on the floor and help the user navigate. It gives only shake processes. This could only give the vibration of the user which is not adequate for the error compilation.

4. PROPOSED SYSTEM

Our project holds the main controller Arduino Nano used for all arithmetic and logic units for all the computation. The sensors used in this project are Gyro Sensor, Sharp sensor, Heartbeat Sensor, Temperature sensor and Muscles Sensors as the input devices. The output system is a telemetry viewer. The sensors are interfaced to read different poster and position of the user to get the mistakes done by them to rectify the error made by them.Our device is wearable while shooting practice which provides the complete process, shake and movement of the shooter while shooting. The gun holder's Heartbeat is been noted by the heartbeat sensor, the movement and shake are provided by the gyro sensor, the muscle contraction is provided by the muscle sensor and sharp sensor provides the height position of the user from the ground, temperature sensor provides the temperature of the user.

5. HARDWARE REQUIREMENTS

Arduino Nano

Arduino is open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone, or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP). Arduino received an Honory Mention in the Digital Communities section of the 2006 Ars Electronica Prix.The Arduino Nano can be powered via the mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.

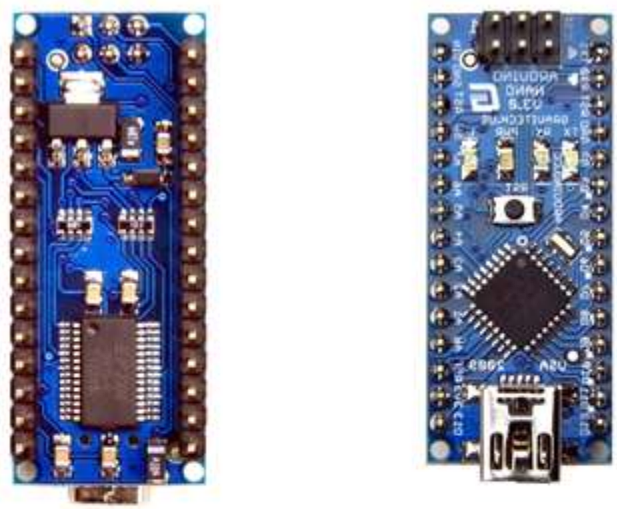

Figure 3: Arduino Nano

PIN DESCRIPTION

Arduino Nano is a surface mount breadboard embedded version with integrated USB. It is a smallest, complete, and breadboard friendly. It has everything that Diecimila/Duemilanove has (electrically) with more analog input pins and onboard +5V AREF jumper. Physically, it is missing power jack. The Nano is automatically sense and switch to the higher potential source of power, there is no need for the power select jumper. Nano's got the breadboard-ability of the Boarduino and the Mini+USB with smaller footprint than either, so users have more breadboard space. It's got a pin layout that works well with the Mini or the Basic Stamp (TX, RX, ATN, GND on one top, power and ground on the other). This new version 3.0 comes with ATMEGA328 which offer more programming and data memory space. It is two layers. That make it easier to hack and more affordable.

Sharp Sensor

The Sharp distance sensors are a popular choice for many projects that require accurate distance measurements. This IR sensor is more economical than sonar rangefinders, yet it provides much better performance than other IR alternatives. Interfacing to most microcontrollers is straightforward: the single analog output can be connected to an analog-to-digital converter for taking distance measurements, or the output can be connected to a comparator for threshold detection. The detection range of this version is approximately 10 cm to 80 cm (4″ to 32″).

Figure 4: Sharp Sensor

Heart rate sensor

Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e. speed of the heartbeat. Monitoring body temperature, heart rate and blood pressure are the basic things that we do in order to keep us healthy. In order to measure the body temperature, we use thermometers and sphygmomanometer to monitor the Arterial Pressure or Blood Pressure. Heart Rate can be monitored in two ways: one way is to manually check the pulse either at wrists or neck and the other way is to use a Heartbeat Sensor. In this project, we have designed a Heart Rate Monitor System using Arduino and Heartbeat Sensor. You can find the Principle of Heartbeat Sensor, working of the Heartbeat Sensor and Arduino based Heart Rate Monitoring System using a practical heartbeat Sensor.

Figure 5: Heartbeat Sensor

Temperature sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 has an advantage over linear temperature sensors calibrated in ˚ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1/4˚C at room temperature and ±3/4˚C over a full −55 to +150˚C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low selfheating, less than 0.1˚C in still air. The LM35 is rated to operate over a −55˚ to +150˚C temperature range, while the LM35C is rated for a −40˚ to +110˚C range (−10˚ with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package. Features n Calibrated directly in ˚ Celsius (Centigrade) n Linear + 10.0 mV/˚C scale factor n 0.5˚C accuracy guaranteeable (at +25˚C) n Rated for full −55˚ to +150˚C range n Suitable for remote applications n Low cost due to wafer-level trimming n Operates from 4 to 30 volts n Less than 60 µA current drain n Low self-heating, 0.08˚C in still air n Nonlinearity only ±1/4˚C typical n Low impedance output,

0.1 Ω for 1 mA load

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 oC temperature rise in still air.

Muscle Sensors

The muscle sensor measures a muscle's activity by monitoring the electric potential generated by muscle cells and produces an analog output signal that can be read by a microcontroller. This measuring of muscle activity by detecting its electric potential, referred to as electromyography (EMG), has traditionally been used for medical research. As the target muscle group flexes, the sensor's output voltage increases. The relationship between the output voltage and the muscle activity can be fine-tuned using an on-board gain potentiometer.

Figure 6: Muscle Sensor

Gyro Sensor

Microelectromechanical systems, popularly known as MEMS, is the technology of very small electromechanical and mechanical devices. Advance in MEMS technology has helped us to develop versatile products. Many of the mechanical devices such as Accelerometer, Gyroscope, etc… can now be used with consumer electronics. This was possible with MEMS technology. These sensors are packaged similarly to another IC's. Accelerometers and Gyroscopes complement each other so, they are usually used together. An accelerometer measures the linear acceleration or directional movement of an object, whereas Gyroscope Sensor measures the angular velocity or tilt or lateral orientation of the object. Gyroscope sensors for multiple axes are also available. Gyroscope sensors are also called as Angular Rate Sensor or Angular Velocity Sensors. These sensors are installed in the applications where the orientation of the object is difficult to sense by humans. Measured in degrees per second, angular velocity is the change in the rotational angle of the object per unit of time.

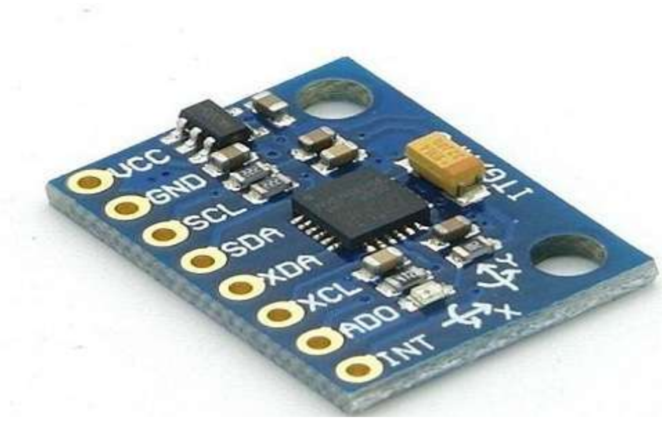

Figure 7: Gyro Sensor

Depending on the direction there are three types of angular rate measurements. Yaw- the horizontal rotation on a flat surface when seen the object from above, Pitch- Vertical rotation as seen the object from front, Roll- the horizontal rotation when seen the object from front. The concept of Coriolis force is used in Gyroscope sensors. In this sensor to measure the angular rate, the rotation rate of the sensor is converted into an electrical signal. Working principle of Gyroscope sensor can be understood by observing the working of Vibration Gyroscope sensor. This sensor consists of an internal vibrating element made up of crystal material in the shape of a double – T- structure. This structure comprises a stationary part in the center with 'Sensing Arm' attached to it and 'Drive Arm' on both sides. This double-T-structure is symmetrical. When an alternating vibration electrical field is applied to the drive arms, continuous lateral vibrations are produced. As Drive arms are symmetrical, when one arm moves to leave the other moves to the right, thus canceling out the leaking vibrations. This keeps the stationary part at the center and sensing arm remains static. When the external rotational force is applied to the sensor vertical vibrations are caused on Drive arms. This leads to the vibration of the Drive arms in the upward and downward directions due to which a rotational force acts on the stationary part in the center. Rotation of the stationary part leads to the vertical vibrations in sensing arms. These vibrations caused in the sensing arm are measured as a change in electrical charge. This change is used to measure the external rotational force applied to the sensor as Angular rotation.

TelemetryViewer

Charts display the value of a quantity plotted over distance, or time, depending on the settings. The unit of the quantity is often affected by the Unit selection in the main Second Monitor application (both metric and imperial units are supported). There is no hard limit on how many laps can be loaded into charts at once, just note that too many charts, with high datapoint density, will degrade performance of chart operations. Lap positions are shown by a vertical line.The Java platform benefits from a massive community of developers and supporters that actively work on delivering Java technology-based products and services as well as evolving the platform through an open, community-based, standards organization known as the Java Community Process program. The API is a large collection of ready-made software components that provide many useful capabilities. It is grouped into libraries of related classes and interfaces. These libraries are known as packages.Charts display the value of a quantity plotted over distance, or time, depending on the settings. The unit of the quantity is often affected by the Unit selection in the main Second Monitor application (both metric and imperial units are supported). There is no hard limit on how many laps can be loaded into charts at once, just note that too many charts, with high datapoint density, will degrade performance of chart operations. Lap positions are shown by a vertical line.

SOFTWARE REQUIREMENTS

- Arduino IDE
- My SQL
- JDBC
- Telemetry Viewer

5. CONCLUSION

The proposed system reduces the external dependency on a central database, which would involve some tedious work in putting together a lot of information on mapping the desired locations. Since, each tag is separately programmed to relay-time information; this system is more advantageous and requires lesser implementation of time. For the welfare of the visually impaired people in mind, the system could still be used by all people, making the system economically feasible. For example, it could be implemented in huge unfamiliar places like museums, people tend to get lost, for guidance. Thus this could be applied to the majority of the population, enhancing the system usage.

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