DOI: https://doi.org/10.46632/eae/1/1/8

Electrical and Automation Engineering
Vol: 1(1), 2022
REST Publisher; ISBN: 978-81-956353-5-1
Website: http://restpublisher.com/book-series/electrical-and-automation-engineering/

Exploring Various Applications of Micro Controller

[1]*M. Malathi, [1]P. Muthulakshmi, [1]N. Patchiraja, [2]M. Ramachandran,[2]Chinnasami sivaji
[1]PSN Institute of Technology and science, Tirunelveli, Tamil Nadu, India.
[2]REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.
[*]Corresponding author Email: malathimani873@gmail.com

Abstract. A microcontroller (sometimes called an MCU or microcontroller unit) is an integrated circuit (IC) commonly used for a specific application and designed to perform certain tasks. Products that must be controlled automatically in certain situations, such as devices, power tools, automobile engine control systems, and computers. And devices are excellent examples, but microcontrollers are beyond these applications. Essentially, the microcontroller collects input, processes this information, and publishes a specific action based on the information collected. Microcontrollers typically operate at low speeds of 1 MHz to 200 MHz and must be designed to use less power as they are embedded in other devices with higher power consumption in other areas. The microcontroller is A particular feature inside the embedded system A small included designed to manage Round. A common microcontroller chip processor, Memory and input output (I / O) gadgets Contains. Microcontrollers embedded Controller or microcontroller unit (MCU), Vehicles, robots, every now and then the workplace Machinery, Medical Devices, Mobile Radio Transceivers, vending machines and family Found in consumables. Unnecessarily small A small aspect designed to govern functions of the portable of private computer systems. For a complex pre-very last running system (OS).

1. Introduction

Microcontroller (for microcontroller unit MCU) is a single metal-oxide-semiconductor (MOS) A small computer on an integrated circuit (IC) chip Is. A microcontroller consists of Page memory and programmable input / output One or more CPUs with devices (processor cores). Ferroelectric RAM, NOR Flash or OTP ROM Program memory in the form is often added to the chip, As well as a small quantity of RAM. Microcontrollers embedded Designed for packages, non-public in computer systems or other general purpose projects in contrast to the microprocessors used, many are unique with chips.

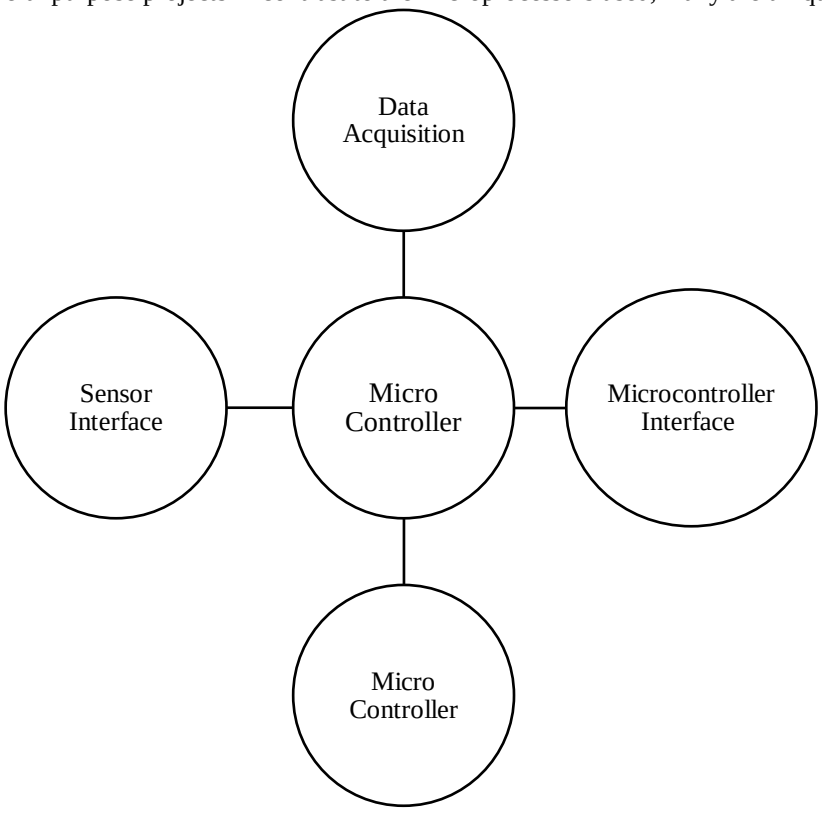

FIGURE 1. Micro Controller

In present day Vocabulary, microcontroller is a chip Vocabulary The microcontroller is much less sophisticated than a machine on a chip (SoC). May be a SoC additionally join the external microcontroller chips as the motherboard additives,

however an SoC typically integrates the superior Image processing unit (GPU) and Wi-Fi interface Devices like controller with its internal The microcontroller unit is circuits. Microcontrollers are usually controlled Used in materials and devices, Vehicle engine handling structures, Medical devices, remote controls, compatible Workplace machinery, equipment, strength tools, With toys and other embedded systems. Separate microprocessor, memory and input / output Compared to the layout used for gadgets by reducing the amount and fee, Microcontrollers are additional gadgets and less managing attitudes digitally Do at cost. Mixed signal microcontrollers not uncommon, non-virtual electronics Analog combinations required to handle structures Integrates. In the context of the Internet of Things. Microcontrollers are cheap and are a famous statistics collection technique.

2. Micro Controller

A microcontroller is embedded in a computer to control the operation of a device. It's I / O using its central processor. It does this by interpreting the data received from the devices. This device is so called because it has small (micrometer) transistors. The microcontroller (μC/ or uC) is a separate chip microcomputer created from the VLSI myth. Also known as a microcontroller embedded controller. Different types of microcontrollers on the market are 4 bit, 8 bit, and 64 bit and 128 bit microcontrollers. Robots, home appliances, motor vehicles and many gadgets. Many gadgets have different word lengths. A microcontroller consists of components such as memory, devices and most importantly a processor. Microcontrollers basically require a certain amount of control. Used by the user of the device used in the device [1]. QDI Asynchronous 8-bit microcontroller is a CISC system based on a completely unique "luxurious" micro-architecture. We decided to restrict memory access and integrate two different log files: "C") to facilitate the formatting of the compiler. It performs simultaneous calculations of data and addresses [2]. The microcontroller center is designed using semi-latency Sensitivity (QDI) common sense. The four-phase protocol is used along with n-rail encryption. Named MICA, this microcontroller is a fashionable cellular-based totally QDI within the layout of asynchronous circuits. A vector for growing new capabilities. MICA Devices like controllers with its internal microcontroller unit are circuits. Microcontrollers are usually controlled Used in materials and devices Vehicle engine handling structures, Medical devices, remote controls, compatible Workplace machinery, equipment, strength tools, With toys and other embedded systems. Separate microprocessor, memory and input / output Compared to the layout used for gadgets by reducing the amount and fee, Microcontrollers are additional gadgets and less managing attitudes digitally do at cost. Mixed signal microcontrollers Not uncommon, non-virtual electronics Integrates. In the context of the Internet of Things, microcontrollers are an economical and popular data collection technique. [6]. An important objective in programming the microcontroller output is 1000 and 2000 Hz. Is to use multiple harmonics in between Creating, in addition, harmonics are usually 5-10% higher in signal between beginning and end, So this signal characteristic is embedded in mimicry.

3. Data acquisition

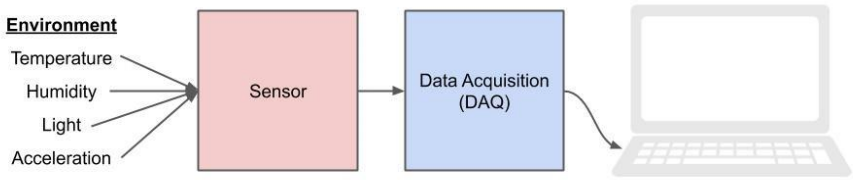

FIGURE 2. Data acquisition

Data acquisition is a virtual wide variety that comes from actual-global physical conditions and the result can be used by computer to measure pattern signals. The system of converting values. Data acquisition systems, initially compressed by DAS, DAQ or DAU, typically convert analog waveforms to virtual values for processing. Data Acquisition Applications Generally Assembly, Basic, C, C ++, Fortran, are managed by means of software program applications evolved the usage of diverse popular purpose programming languages consisting of Java, Lab view, Lisp and Pascal. Woods. There are also open supply software program applications that provide all the equipment needed to get better statistics from specific, normally unique, hardware gadgets. There also are open supply software packages that offer all of the equipment. These gears come from the medical network, wherein the rate of complex trying out, Requires bendy and adaptable software program. Those programs are usually customizable but the most incorporated information is the acquisition of commonplace DAQ programs. The structure may be easily designed and used in many physics experiments [7]. Control program written in ST62 own family meeting language, interrupt Oversees the operation of the entire system beneath control. This measurement method makes use of two microcontroller interferences. Timer interruption is used for records series and storage, At the same time PC interference is used to trigger the statistics switch method. Between the center and the system. These interruptions have been not decided earlier, However PC interference is a excessive precedence [8]. The human-gadget interface, the speech popularity machine has to offer conversation functions. To provide. It is expected that it will be able to "talk" with certain stimuli, which will make the authentication process easier for the public to use. And can provide information related to this. Recognition; Communicate

with other devices. Weight, all of these are affordable. Push-pull inverter low voltage DC. The high frequency AC generates voltage from the battery. The high frequency AC generates voltage from the battery [9]. The brain of the provided emergency system is the microcontroller. Power electronics techniques are used to operate the rest of the system. Objectives of Power Electronics Design Performance and reliability are minimal [10]. Designed for the embedded marketplace Microprocessors. Different than desktop microprocessors Restrictions. Installed Video game consoles, modems, sets- in applications Top packing containers, digital cameras, mobile phones, Includes printers and plenty of extra. Access controllers, Resources like watches, restricted Applications pens, smart cards and smart Rings. Is considered embedded. Applications. [11]. to calculate the reference voltage used to generate the PWM control signal, the energy change is detected by comparing the current and previous voltage levels. The dc / dc converter is powered by a DSP-based controller for faster response Adding a PI controller also improves the overall system stability, which is also used to match the sequence and reference voltage level [12] Flexibility and extension indicators to the controller occurs in natural progress The user selects the hand gesture via sending. For instance, in case you need greater accuracy Whilst the entire device is in pose, you can use the accurate Pl or Precision P2, Store. As nicely as. As facts obtained from it Hand sensor to choose the nice posture is used. For instance, by using function sensor statistics If you contact a small object this is constant, For instance, if you touch a small item decided by way of position sensor information, , [13]. Small sufficient to get speedy charging time. Thus C is charged to VDD. High impedance enter capacitor after secondary 1- The sensor interface is highest with precision and stability (with ST buffer),2 is set to the output that gives the digital '0', and the embedded timer time will start. Process sensors, motors, switches, keyboards, displays, Memory and other micro-controllers are useful to the extent that they interact with other devices.

4. Microcontroller interface

Developed over many Years to clear up the complicated hassle of equilibrium. Round functions inclusive of fee, amount, weight, electricity intake, reliability, availability productivity Design standards. Many microcontroller designs usually integrate numerous interface modes. In its best shape, the micro-controller gadget is seen as a gadget for reading (video display units). Processes, and writing (controls) publications [14]. Direct interface Sensors with microcontrollers are simple, Compact and coffee fee design answers Form, essentially, two size strategies Interfaces based on discharge time, Resistors and capacitive sensors and (B) may be used to degree interfaces based totally on rate transfer, which only applies to each Methods, controlling the microcontroller operation collection, sensor cause and measuring the salt time c programming language (time-digital transition), It incorporates statistics about wherein they are measured. Overall the measured sensor is a semi-digital sensor due to the fact it's miles a time-based output signal. [15]. in this article, we gift Leroy, a microcontroller optimized for low cost FPGAs. Lios is an FPGA-based totally machine-on-chip (so) layout designed for software functions. Is a small sixteen-bit processor. Logic cells and chip memories have an amazing stability among affordable overall performance and maximum clock frequency. The final point is critical for use as a utility processor inside the So C so that the frequency of the whole layout isn't interrupted. These layout dreams include a pipeline cache with extra direct addresses in the on-chip memory for neighborhood variables. Achievable by way of structure. On-chip records memory is shared with those records and popular statistics. Instructions require only reminiscence modules with extra on-chip reminiscence and the pipeline can run a preparation in a single clock cycle. For short applications, by good judgment cells (LCs) Instruction can create memory.

5. Sensor interface

FIGURE 3. Sensor interface

The sensor interface enables a system to read information from the input signal generated by the ICs complex sensors, It provides a suitable output signal that is easy for the host system to visualize or process. Amps sensor interfaces offer high

accuracy, precision and sensitivity. Operates in harsh environments. The sensor interface is an aggregate of amplification, filtration and different sign alignment and analog-to-digital conversion Analog-to-digital conversion. Analog-to-virtual converter Analog-to-digital conversion. Analog-to-virtual converter (ADC) can be in your microcontroller, but you need to have a sensor compatible with ADC enter. [16]. Direct interface sensors with microcontrollers are simple, compact and cheaper Provides layout solutions. Basically, two measurement strategies are proposed: (a) based at the charging or discharging time of the RC circuit. Can be used to degree interfaces, resistance and capacitance sensors and(b) Charge transfer primarily based interfaces relevant most effective to capacitor sensors. In each mode, the microcontroller controls the working series and activates the sensor and scaling the time c programming language (time-digital conversion), which includes records about erasure [17]. Photo of test system Snap-shot of recorded waveforms is shown in Figure 5The time periods T1 and T2 have been measured at the oscilloscope and the N1 and N2 values had been as compared from the microcontroller. These values were determined to match the theoretical values calculated the use of the SPICE tools. L1 and L2, ie the use of the microcontroller's counter while varying in step with the inverse characteristic. Shows a hard and fast of measured N1 and N2 values. Overall, the measured sensor results in a semi-digital sensor as it affords a time-primarily based output sign. It additionally shows the ratio metric output calculated the use of the output and blunders in every reading. The worst errors in the output for the tested range become found to be much less than 0.3%. The outcomes display that the proposed mission is a promising, simple and occasional value, technique of obtaining live digital output from one of a kind reluctance / inductive sensors. Sources of errors consist of incompatibility among RL1 and RL2, RP1 and RP2, and noise [18]. Mechanical creation and very excessive decision (Capacity sensors are almost silent) Many in programs, rated capacitance below 1 pF having a small sensor that controls miles Essential. At the identical time, the pc to make sure most performance, low quantity Time, needs greater precision. Calibration is generally costly and time eating sample is in a tightly controlled environment for walking sensors, the energy of interface electronics scattering can be difficult. For this cause, very low Use the adjacent interface with force preferably or as an alternative, longer to the sensor (s) it is suitable to use an interface that supports cables. [19]. to boom the readability, the cost of the 12-B counter is 16 times (Fast mode) or for the duration of enter tracking is sixty 4 times. (Normal Mode) Samples are taken, and all samples are the identical Summary from the rate in the output take a look at in /are deducted. Both instructions of voltage change. The stimulus used are in cycles Measured. In this way, the input is offset Voltages are canceled. Input applicator and the low frequency noise of the coordinator significantly reduced. Trigger voltage Generator and reference fee. [20] Wireless Sensor Networks (WSNs) Multi-sensor in one region to wirelessly monitor real-world data wirelessly has nodes. Ongoing improvements in wireless communications, Round design integrating a mechanical system with a micro electrode A small, unmeasured node relies on its limited local resources and has minimal capabilities. However, many of these small, unobstructed nodes are sprayed in one region When, automatically from one end to the other before reaching the distant target Their capabilities can be extended by advanced networking protocols to move data. Overall, these nodes have considerable processing efficiency. WSNs are increasingly versatile due to the miniaturization of sensor nodes Capable and can be used for a huge range of packages.

6. Conclusion

The microcontroller is embedded in a computer to govern a function at the Lard device. It does this with the aid of deciphering the records it gets from its I / O gadgets the usage of its central processor. This tool is referred to as it has small (micro-meter) transistors. Data acquisition is the method of modeling indicators that degree actual-international bodily situation. The result is the manner of changing samples into pc-manipulated virtual numeric values. Data acquisition structures, abbreviated DAS, DAQ or DAU initials, normally convert analog waveforms into digital values for processing. Data acquisition packages are typically controlled by means of software programs. Data acquisition systems for sensors, automobiles, switches, keyboards, displays, reminiscence and other micro-controllers, in quick DAS, DAQ or DAU initials are beneficial to the quantity that they have interaction with other devices along with micro-controllers. Many interface structures were developed through the years. Generators use a commonplace voltage reference. Many interface strategies had been developed over time to clear up the complicated hassle of balancing circuit layout standards consisting of capabilities, value, size, weight, energy intake, reliability, availability, productiveness. Features, value, size, weight, strength consumption, reliability, availability, productiveness.

Reference

[1]. Garcia-Guerrero, E. E., E. Inzunza-González, O. R. López-Bonilla, J. R. Cárdenas-Valdez, and E. Tlelo-Cuautle. "Randomness improvement of chaotic maps for image encryption in a wireless communication scheme using PIC-microcontroller via Zigbee channels." *Chaos, Solitons & Fractals* 133 (2020): 109646.

[2]. Bhuvaneswari, G., and G. Manikandan. "A novel machine learning framework for diagnosing the type 2 diabetics using temporal fuzzy ant miner decision tree classifier with temporal weighted genetic algorithm." Computing 100, no. 8 (2018): 759-772.

[3]. P. K. Chidambaram, Amol Lokhande, M. Ramachandran, Vimala Saravanan, Vidhya Prasanth, "A Review on Biodiesel Properties and Fatty acid composites", REST Journal on Emerging trends in Modelling and Manufacturing, 7(3), 2021:87-93.

[4]. Abrial, André, Jacky Bouvier, Marc Renaudin, Patrice Senn, and Pascal Vivet. "A new contactless smart card IC using an on-chip antenna and an asynchronous microcontroller." *IEEE Journal of Solid-state circuits* 36, no. 7 (2001): 1101-1107.

[5]. Prakash, B., S. Jayashri, and T. S. Karthik. "A hybrid genetic artificial neural network (G-ANN) algorithm for optimization of energy component in a wireless mesh network toward green computing." Soft Computing 23, no. 8 (2019): 2789-2798.

[6]. Suhasini, S., J. M. SheelaLavanya, M. Parameswari, G. Manikandan, and S. Gracia Nissi. "Input Based Resource Allocation in Motion Estimation using Re-configurable Architecture." In 2021 Fifth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC), pp. 1091-1095. IEEE, 2021.

[7]. Amol Lokhande, C. Venkateswaran, M. Ramachandran, C. Vidhya, R. Kurinjimalar. " A Study on Various Implications on Reusing in Manufacturing", REST Journal on Emerging trends in Modelling and Manufacturing, 7(2), (2021): 63-69.

[8]. Kuhn, Markus G. "Cipher instruction search attack on the bus-encryption security microcontroller DS5002FP." *IEEE Transactions on Computers* 47, no. 10 (1998): 1153-1157.

[9]. Khan, Mudassir, and Aadarsh Malviya. "Big data approach for sentiment analysis of twitter data using Hadoop framework and deep learning." In 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE), pp. 1-5. IEEE, 2020.

[10]. Bonert, Richard. "Design of a high performance digital tachometer with a microcontroller." *IEEE Transactions on Instrumentation and Measurement* 38, no. 6 (1989): 1104-1108.

[11]. Amol Lokhande, C. Venkateswaran, M. Ramachandran, S. Chinnasami, T. Vennila."A Review on Various Implications on Re engineering in Manufacturing", REST Journal on Emerging trends in Modelling and Manufacturing, 7(3), 2021:70-75.

[12]. Anandaram, Harishchander, and Daniel Alex Anand. "Computational analysis of micro RNAs compatibility in pharmacogenomic based regulatory networks of psoriatic arthritis: an initiation towards identifying a potential miRNA to treat psoriatic arthritis." Biocatalysis and agricultural biotechnology 16 (2018): 545-547.

[13]. Atman and, M. A., V. Jagadeesh Kumar, and Vempati GK Murti. "A microcontroller-based quasi-balanced bridge for the measurement of L, C and R." *IEEE transactions on instrumentation and measurement* 45, no. 3 (1996): 757-761.

[14]. Bhuvaneswari, G., and G. Manikandan. "An intelligent intrusion detection system for secure wireless communication using IPSO and negative selection classifier." Cluster Computing 22, no. 5 (2019): 12429-12441.

[15]. Kurinjimalar Ramu; M. Ramachandran; M. Nathiya; M. Manjula " Green Supply Chain Management; with Dematel MCDM Analysis", Recent trends in Management and Commerce, 2(3),(2021): 8-15.

[16]. Mukaro, Raphael, and Xavier Francis Carelse. "A microcontroller-based data acquisition system for solar radiation and environmental monitoring." *IEEE transactions on instrumentation and measurement* 48, no. 6 (1999): 1232-1238.

[17]. Loganathan, K., Nazek Alessa, Ngawang Namgyel, and T. S. Karthik. "MHD flow of thermally radiative Maxwell fluid past a heated stretching sheet with Cattaneo–Christov dual diffusion." Journal of Mathematics 2021 (2021).

[18]. Reverter, Ferran, and Ramon Pallàs-Areny. "Effective number of resolution bits in direct sensor-to-microcontroller interfaces." *Measurement Science and Technology* 15, no. 10 (2004): 2157.

[19]. Khan, Mudassir, and Mohd Dilshad Ansari. "Multi-criteria software quality model selection based on divergence measure and score function." Journal of Intelligent & Fuzzy Systems 38, no. 3 (2020): 3179-3188.

[20]. Ramadoss, Nandagopal, and Boby George. "A simple microcontroller based digitizer for differential inductive sensors." In *2015 IEEE International Instrumentation and Measurement Technology Conference (I2MTC) Proceedings*, pp. 148-153. IEEE, 2015.

[21]. D R. Pallavi, M. Ramachandran, Sathiyaraj Chinnasamy, "An Empirical Study On Effectiveness of E-Learning Over Conventional Class Room Learning – A Case Study with Respect to Online Degree Programmes in Higher Education", Recent trends in Management and Commerce, 3(1), (2022):25-33.

[22]. Mohankumar, Madhan, A. N. Shankar, T. S. Karthik, R. Saravanakumar, Hemakesavulu Oruganti, S. Venkatesa Prabhu, and N. Rakesh. "A Comparative Study on Crack-Healing Ability of Al2O3/SiC Structural Ceramic Composites Synthesized by Microwave Sintering and Conventional Electrical Sintering." Advances in Materials Science and Engineering 2021 (2021).

[23]. Anandaram, H. "A review on application of biomarkers in the field of bioinformatics & nanotechnology for individualized cancer treatment." MOJ Proteom Bioinform 5, no. 6 (2017): 179-184.

[24]. Alessa, Nazek, B. Venkateswarlu, K. Loganathan, T. S. Karthik, P. Thirupathi Reddy, and G. Sujatha. "Certain Class of Analytic Functions Connected with-Analogue of the Bessel Function." Journal of Mathematics 2021 (2021).

[25]. Ramadoss, Nandagopal, and Boby George. "A simple microcontroller based digitizer for differential inductive sensors." In *2015 IEEE International Instrumentation and Measurement Technology Conference (I2MTC) Proceedings*, pp. 148-153. IEEE, 2015.

[26]. C. Venkateswaran, D R Pallavi, M. Ramachandran, Sathiyaraj Chinnasamy, Chinnasami Sivaji, "A Study on Weighted Aggregated Sum Product Assessment (WASPAS) w.r.t Multiple Criteria Decision Making", Data Analytics and Artificial Intelligence, 2(1), (2022):26-33

[27]. Manikandan, G., and S. Srinivasan. "Traffic control by bluetooth enabled mobile phone." International Journal of Computer and Communication Engineering 1, no. 1 (2012): 66.

[28]. Nojdelov, Roumen, and Stoyan Nihtianov. "Capacitive-sensor interface with high accuracy and stability." *IEEE Transactions on Instrumentation and Measurement* 58, no. 5 (2009): 1633-1639.

[29]. Chitra, P., T. S. Karthik, S. Nithya, J. Jacinth Poornima, J. Srinivas Rao, Makarand Upadhyaya, K. Jayaram Kumar, R. Geethamani, and T. C. Manjunath. "Sentiment analysis of product feedback using natural language processing." Materials Today: Proceedings (2021).

[30]. Anandaram, Harishchander. "Role of Bioinformatics in Nanotechnology: An Initiation towards Personalized Medicine." In Data Analytics in Medicine: Concepts, Methodologies, Tools, and Applications, pp. 1875-1894. IGI Global, 2020.

[31]. Reverter, Ferran, and Ramon Pallàs-Areny. "Effective number of resolution bits in direct sensor-to-microcontroller interfaces." *Measurement Science and Technology* 15, no. 10 (2004): 2157.

[32]. Rashid, Ekbal, Mohd Dilshad Ansari, Vinit Kumar Gunjan, and Mudassir Khan. "Enhancement in teaching quality methodology by predicting attendance using machine learning technique." In Modern approaches in machine learning and cognitive science: a walkthrough, pp. 227-235. Springer, Cham, 2020.

[33]. Ito, Sérgio Akira, Luigi Carro, and Ricardo Pezzuol Jacobi. "Making Java work for microcontroller applications." *IEEE Design & Test of Computers* 18, no. 5 (2001): 100-110.

[34]. Pon Bharathi, D.R. Pallavi, M. Ramachandran, Kurinjimalar Ramu, Vidhya Prasanth, "A Study on Preference Selection Index Multi-Criteria Decision Making Techniques", Data Analytics and Artificial Intelligence, 2(1), (2022): 20-25

[35]. Anand, D. A., and H. Anandaram. "A review on global prevalence and recent advancements in the genetics of psoriasis." MOJ Proteomics Bioinform 6, no. 2 (2017): 243-248.

[36]. Shahdad, Syed Yasmeen, Mudassir Khan, Habeeba Sultana, Mohammad Ashfaq Hussain, and Syeda Meraj Bilfaqih. "Routing Protocols for Constraint Devices Internet of Things Network." In 2019 International Conference on Communication and Signal Processing (ICCSP), pp. 0114-0117. IEEE, 2019.

[37]. Custodio, Angel, Ramon Pallàs-Areny, and Ramon Bragós. "Error analysis and reduction for a simple sensor-microcontroller interface." *IEEE Transactions on Instrumentation and Measurement* 50, no. 6 (2001): 1644-1647.

[38]. Manikandan, G., and S. Srinivasan. "An efficient algorithm for mining spatially co-located moving objects." American Journal of Applied Sciences 10, no. 3 (2013): 195-208.

[39]. Depari, Alessandro, Alessandra Flammini, Emiliano Sisinni, Andrea De Marcellis, Giuseppe Ferri, and Paolo Mantenuto. "Fast, versatile, and low-cost interface circuit for electrochemical and resistive gas sensor." *IEEE Sensors Journal* 14, no. 2 (2013): 315-323.

[40]. C. Venkateswaran, D R Pallavi, M. Ramachandran, Vimala Saravanan, Vidhya Prasanth, "A Review on Promethee and Analytic Hierarchy Process with Its Application", Data Analytics and Artificial Intelligence, 2(1), (2022):34-39

[41]. Geethamani, R., T. S. Karthik, M. Deivakani, Vishal Jain, Anand Mohan, Meenu Chopra, Cosmena Mahapatra, and T. C. Manjunath. "Implementation of wireless home-based automation and safety arrangement using power electronic switches." Materials Today: Proceedings (2021).

[42]. Mankin, R. W., B. B. Rohde, S. A. McNeill, T. M. Paris, N. I. Zagvazdina, and S. Greenfeder. "Diaphorina citri (Hemiptera: Liviidae) responses to microcontroller-buzzer 1546-1555.

[43]. Khan, Mudassir, and Shakila Basheer. "Using Web Log Files the Comparative Study of Big Data with Map Reduce Technique." In 2020 International Conference on Intelligent Engineering and Management (ICIEM), pp. 97-103. IEEE, 2020.

[44]. Ataur rahman farooqi, D R pallavi, M. Ramachandran, S. Sowmiya, Manjula Selvam, "A Brief Study On Recent Trends in Financial Literacy", Recent trends in Management and Commerce, 3(1), (2022):40-45.

[45]. Yuanyuan, Shi, Liu Jia, and Liu Ranching. "Single-chip speech recognition system based on 8051 microcontroller core." *IEEE Transactions on Consumer Electronics* 47, no. 1 (2001): 149-153.

[46]. Anandaram, H. "Computational Analysis of Pharmacogenomic Based Regulatory Network in Psoriasis: An Approach of Systems Biology to Initiate the Discovery of Systemic Biomarkers to Treat Psoriasis." Syst Comput Biol J 1, no. 1 (2018): 101-101.

[47]. Custodio, Angel, Ramon Pallàs-Areny, and Ramon Bragós. "Error analysis and reduction for a simple sensor-microcontroller interface." *IEEE Transactions on Instrumentation and Measurement* 50, no. 6 (2001): 1644-1647.

[48]. C. Venkateswaran; M. Ramachandran; Vimala saravanan; T. Vennila " A Study on Artificial intelligence with Machine learning and Deep Learning Techniques", Data Analytics and Artificial Intelligence, 1(1), (2021):32-37.

[49]. Sathish, E., G. Manikandan, and G. Bhuvaneswari. "Design and development of multi controlled smart bike." Materials Today: Proceedings (2021).

[50]. Khan, Mudassir, Aadarsh Malviya, and Surya Kant Yadav. "Big Data Approach Of Sentiment Analysis Of Twitter Data Using K-Mean Clustering Approach." International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) 10, no. 3 (2020): 6127-6134.

[51]. Chappell, P. H., and Peter J. Kyberd. "Prehensile control of a hand prosthesis by a microcontroller." *Journal of biomedical engineering* 13, no. 5 (1991): 363-369.

[52]. Alessa, Nazek, K. Tamilvanan, K. Loganathan, T. S. Karthik, and John Michael Rassias. "Orthogonal stability and nonstability of a generalized quartic functional equation in quasi--normed spaces." Journal of Function Spaces 2021 (2021).

[53]. Rebeschiess, Sven. "MIRCOS-microcontroller-based real time control system toolbox for use with Matlab/Simulink." In *Proceedings of the 1999 IEEE International Symposium on Computer Aided Control System Design (Cat. No. 99TH8404)*, pp. 267-272. IEEE, 1999.

[54]. Vimala Saravanan; M. Ramachandran; T. Vennila; G. Mathivanan "A Study on Multi-Objective Optimization on the basis of Ratio Analysis", Recent trends in Management and Commerce, 2(3), (2021):16-22

[55]. Khan, Mudassir, Aadarsh Malviya, and Mahtab Alam. "Map Reduce clustering in Incremental Big Data processing." International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN (2019): 2278-3075.

[56]. Agung, IGAP Raka, S. Huda, and IW Arta Wijaya. "Speed control for DC motor with pulse width modulation (PWM) method using infrared remote control based on ATmega16 microcontroller." In *2014 International Conference on Smart Green Technology in Electrical and Information Systems (ICSGTEIS)*, pp. 108-112. IEEE, 2014.

[57]. Anandaram, Harishchander. "Modeling of Cascade Regulation in Psoriasis: A Comprehensive Approach." ECS Transactions 107, no. 1 (2022): 2627.

[58]. C. Venkateswaran, D R Pallavi, M. Ramachandran, Sathiyaraj Chinnasamy, Chinnasami Sivaji, "A Study on Weighted Aggregated Sum Product Assessment (WASPAS) w.r.t Multiple Criteria Decision Making", Data Analytics and Artificial Intelligence, 2(1), (2022):26-33

[59]. Geetha, D., V. Kavitha, G. Manikandan, and D. Karunkuzhali. "Enhancement and Development of Next Generation Data Mining Photolithographic Mechanism." In Journal of Physics: Conference Series, vol. 1964, no. 4, p. 042092. IOP Publishing, 2021.