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Automatic Human Height Detector - A Review

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Abstract: ***The Health Research Worldwide routinely needed the Anthropometric measurements including the height and length. The human height is the distance which is taken from the bottom of the feet till top of the head of the human body that is standing erect. The measuring of height is very important because it is correlated with other health components. Some people may find challenging in measuring the height from home, which is particularly for those who are trying to measure their own height without the assistance of any others. Since the embedded system constitute the real-time computing systems there are also detectors which are basically designed to tackle the problem of accurate height measurement. This paper provides the survey about the various automatic human height detector***
Keywords: Height detector, Microcontroller, Sensors etc.

I. INTRODUCTION

The height or stature of an individual is an inherent characteristic which constitutes one of the parameters of their personal identification. In the terms of Layman, the stature or height is defined as the measurement of an individual from the foot to head, taking into consideration of the standard landmarks. It has the implications in scenarios of clinical significance for the assessment of nutritional status and ranging from estimating the BMI (body mass index) to diagnosing certain physical growth disorders. The prediction of height may also be important in cases of spine deformities and/or limb, trauma or skeletal dysplasia, surgical procedures, and also in estimating the age related with the loss in stature. The height assessment are applied for different age groups are concerned with different methods. Height estimation is also possible on skeletal that are found at the scene of crime and also in other cases of medicolegal importance.

Clinically, the physical growth records are maintained which is necessary for height. This is significant while monitoring the growth patterns, when they are linked either directly or indirectly the point towards socioeconomic status of an individual. Growth indicators like height of the individual can be used in estimating the important for calculating the body mass index(BMI) which helps in diagnosing conditions such as Marasmus and Kwashiorkor in children, and pulmonary function. In the case of Adolescents the height assessment plays an important role in the selection criteria for some particular sports activities. Professions such as military personnel, lifeguards and firefighters will get more benefit from more height among others. A cutoff height is taken as the basic for selection into sports where the height a takes particular leverage. In these cases the accurate height assessment becomes very crucial.

In earlier days the measurements are carried out using various measuring devices. The most commonly used devices for measuring are the measuring tape and the stadiometer. Measuring the height with these method take too much time and also require more than one person. But now the digitalization is also implemented in measuring the height. Various kinds of sensors are been used to measure the height which are portable and easy to use. The programming and hardware part of the sensors are interfaced with the microcontroller. This height detectors also removes the inaccuracies which are introduced due to the human intervention and also improves the efficiency of the system. In most of the hospitals and military services and in hospitals the automatic height detectors are used.

II. FEATURES OF AUTOMATIC HUMAN HEIGHT DETECTOR

Since the technology has become advanced in every walk of our life, there is an increase with the importance of embedded system. This detector have various advantages when comparing with the other traditional measuring devices. Some of the features are given below.

A. This detector has a great potential on markets, with the other competitors being extremely costly.
B. The measurement of height is carried out accurately.
C. Has less moving parts and its operation will require very less physical efforts.
D. This is created for people to use it on their own with ease without requiring help.

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III. EQUIPMENTS

Some of the equipments which are commonly used for measuring the height are given below.

A. *Measuring Tape*

One of the most commonly used measuring tool is the measuring tape. It is a flexible ruler which is used to measure the size or distance. This is made of plastic, fibre glass or metal strip with linear measurement markings. The design of this measuring tape is small hence it can be easily carried in toolkit or pocket which allow to measure great length. Surveyors use this measuring tapes to measure the length of over 100 m.

B. *Infantometer*

The Infantometer is a combination with pediatric weighting scale which is used to measure the size of an infant. This device is designed generously and the softly rounded sides which are provided in it guides the infant securely from holding into the correct position. This is mounted permanently with the rollers on two guide rails and the foot piece smoothly slides along with the scale. Since the foot piece is been locked then the infant can be removed from the device and the results are noted. The measuring range of this device is from 33 - 100 cm.

C. *Stadiometer*

This is a piece of medical equipment which is used to measure the human height. It is constructed with ruler an a sliding horizontal headpiece which can be fixed at the top of the head to measure the height. The measurements are both in analog and digital which is designed accurately to measure the height. A typical stadiometer will measure both in inches and in centimeter but there may be variation among the different models. This is commonly used in clinical test and also in experiments.

D. *Anthropometer Rod*

The Anthropometer rod consist of four hallow graduated tubes in which two for horizontal arms, one fixed and one movable for measuring any linear dimension of the human body. It is also referred to a single tool with multiple configurations which is able to make different measurements. The upper two sections of this Anthropometer rod can be used as a sliding beam capiler and the measurements of this rod is ranging from 0 to 950 mm

E. *Osteometric Board*

The osteometric board is a flat rectangular base with short and long vertical wall. Its thickness is about 2.54 cm, length is 65 cm and its breadth is 25 cm. One broader and one longer side of the base will be remained closed by the two vertical wooden pieces of about 10 cm in height. These two vertical walls which is found on the boar meet with each other forming a right angle at one corner of the base. The metric scales graduate the base which run on each side for measuring purpose. A movable cross-piece is also present here to determine the measurements.

IV. TECHNOLOGIES

Before the invention of various technologies the people have used various equipments for measuring the height as given above. Now the detailed survey on method of height measurements and its existing technologies in the market are carried out.

A. *Overall Technology*

1) *Laser Rangefinders:* A laser rangefinder is a rangefinder is an electron optical device which is designed to measure the distance from target to target. The laser beams are emitted by the rangefinders at the push of the button. The distance objects are bounced off by those beams and the high-speed clock of the rangefinders measures total time when the beam left the unit until it gets returned. As we know that how fast the beam will travel the unit can be simply used to measure the time to calculate the distance that it travelled and then the distance will be displayed to the user.

There are many approaches through which the range finders can be programmed and they use to determine which readings should be displayed. Some of the common approaches are given below.

a) *1st Reading:* when the unit gets received the first beam will be reflected back the closest object, then calculates and displays the corresponding distance. In this approach it displays 225 yards.

b) *Closest Spike:* For things like rain or fog, this approach can help with the filter out “false” readings , which are more scattered in pattern and the results don’t come really in peak. Here this would display 230 yards.

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c) *Highest Spike:* The entire set of readings are taken and the readings for the same distance finds the largest peak and then it assumes that what the range can be indented. This is a good approach, but they are especially helpful when ranging reflective targets which are perpendicular to the user. Here it would display 350 yards.

d) *Largest Cluster:* The entire set of readings are analyzed in this approach and looks for the biggest group of readings. This would display 650 yards.

e) *Furthest Spike:* This approach is helpful when trying to range the target which is obscured by the brush and look for the peak which is furthest one. This would display 660 yards.

2) *Time Of Flight:* The principle of time-of-flight is a method used to measure the distance between the sensor and the object, which is based upon the time difference between the emission from the signal and when it is returning to the sensor after they are reflected by the object. The commonly used signals or carriers in the time-of-flight principle are sound and light. TeraRanger is made of Terabee where this is one of the most iconic optic distance sensor. The technology present in this sensor is the time-of-flight which offers the range of 14 meter in light weight and is designed in low cost. Comparing to the ultrasound this sensor will provide more compact than laser-based system, easy to use and provides higher safety for vision-based systems.

3) *SECA 284:* The seca 284 provides a 360 degree wireless technology. This is possible both for weighting and measuring in a single step. It has a solid headpiece with Frankfurt line for precise positioning of patient's head and a heel positioner. It has a high weighting capacity of up to 300 kg and has a large height measuring range from 30 to 220 cm. Moreover, there are two displays for the complete measuring station in which, the direct read-out of height from the headpiece will be shown in one display and the height, weight, automatically calculated BMI will be displayed in the other three-line-multi-function touch display. The seca 284 shows slight weight changes with 50 gram of graduation and all the measurements are been transmitted using seca 360 degree wireless. The fundamental argument of seca 284 is they are used in pediatrics for cardiology and neurology and its versatility. Every human with the maximum weight up to 300 kg can be weighed and measured using this scale. The height range covered by this scale is from 30 cm and 220 cm.

V. HARDWARE DESCRIPTON

A. Ultrasonic Sensor

Ultrasonic sensor is a sensor which is used to measure the distance by using the ultrasonic waves. This sensor uses the transducer both for sending and receiving ultrasonic pulses which relay back information about the object's proximity. The sensor work by emitting the sound waves whose frequency is too high that the humans can hear. The transducer present in the sensor acts as the microphone for both sending and receiving the ultrasonic sensors. The measurement of time lapses between the sending and receiving of the ultrasonic pulse determines the distance to the target from the sensor.

The working principle used in this sensor is very simple. The ultrasonic pulse was send out by the sensor at 40 KHz which travels through the air and it will bounce back to the sensor if there is an obstacle or object. By calculating the speed travelled by the sound and the time taken to travel, the distance can be calculated. The ultrasound is reliable hence it can be used in both inside or outside lightning environment. It can also be reliably implemented in many sensing applications, water level sensing, drone applications and also in sensing cars etc. The ultrasonic range finders can be commonly used in devices for detecting the collision.



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B. IR Sensor

The infrared radiation is measured and detected using the infrared sensor in the surrounding environment. This infrared radiation is not visible to the human eye, as its wavelength is longer than the visible light. The IR sensors can be of two types: active and passive. Both the emission and he detection of infrared radiation are carried out in active IR sensor. This active ir sensor has two parts: a receiver and a light emitting diode. When an object comes closer to the sensor, the infrared light which is present in the LED gets reflected to the object and gets detected by the receiver. These sensors are commonly used in obstacle detection system and also act as the proximity sensors.

The passive infrared sensor detect only the infrared radiation and it will not emit from LED. These sensors are commonly used in motion-based detection like security systems used in home. To the embedded computer the electronic signals are send from the sensor, which turn triggers as alarm.



C. DC Motor

The electric motor is the direct current motor that supplies the power to machines as it performs its main function which uses the electrical energy. The principle used in this motor is based on how the magnet gets reacted with each other. We can find the coil of wire and a horseshoe magnet as the basic component in this motor. The electric current run through the coil every time and the electromagnetic field is generated and gets aligned at the center of the coil. When the switch current gets turned on the magnetic field gets turned on also, when the current gets turned off the magnetic field also gets turned off.

The electric current will begin the process that is supplied by the battery and the direct source. A force will be applied on the wire whenever the electric current flows. At the south pole of magnet, an upward force gets generated it will make the wire to move upwards and at the north pole of magnet, an downward force gets generated where it makes the wire move downwards. Through the speed of the DC motor the voltage can be controlled which is applied to armature.



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D. Arduino

An arduino is an microcontroller based kit, owing its open source hardware feature. This is used for controlling or operating many devices and also used for communications. This controller uses the Harvard architecture in which the program data and the program code takes the separate memory. Two memories are provided here, the program memory and the data memory in which the data are stored in the data memory.

The typical example for this controller is the Arduino Uno which consist of ATmega328 that has 28 pin microcontroller. This Arduino Uno consist of 14 digital input/output pins, a USB connection, a power jack, an ICSP header,6 analog inputs, 16 MHz crystal oscillator and a reset button. The most advantage with arduino is without requiring any programmer, the programs can be loaded directly into the device. Only we have to download the arduino software and the code can be written.



E. 16X2 Alphanumeric LCD

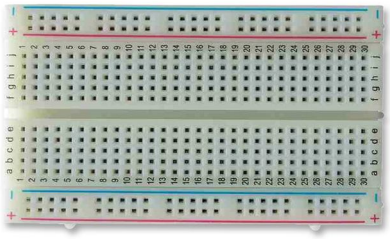
LCD is used in most of the electronic projects in which the status of process can be displayed. The most commonly used module of LCD is the 16X2 alphanumeric LCD. Some of the major reasons for choosing the LCD over the other display component is they are low cost, get programmable easily and able to display large number of characters.

Since 2 horizontal lines are comprised to display the 16 characters, this display is called the 16X2 LCD. Two types of registers are inbuilt with it, the command register and the data register. The command can be used in the insertion of special command into the LCD, in which the data register is used in the insertion of data into the LCD. Here a special set of data, the command is used to provide the internal command like clear screen, setting up the cursor and others to the LCD.



F. Breadboard

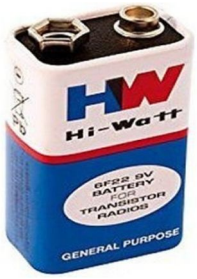
This is a solderless construction base, used for wiring the projects with microcontroller boards and developing an electronic circuit. It is small in size, portable white plastic and with pluggable design. To complete central processing units from small analog and digital circuits, a variety of electronic systems can be prototyped using this breadboards. The layout of this is made up of two types of areas called strips in which these strips gets interconnected with the electrical terminals. They have holes which are organized with five rows and holes in each row are electrically connected. The holes are isolated electrically when they are in different rows.



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G. Battery

The battery is used to give the power supply smoother and more predictable .The energy stores in the battery can be used when more electricity is required. They are much reliable, affordable and provide sufficient energy to the application. This can be ideally used in circuits that need lower power consumption hence it can work for longer durations.



VI. LITERATURE SURVEY

SL NO	TITLE	JOURNAL	OVERVIEW OF PAPER	METHODS USED	ABSTRACT THEME	ACCURACY RESULT OBTAINED	FUTURE WORK
1	Portable automatic height detector	International Journal of Science, Engineering and Technology Research (IJSETR)	This height detector is used to measure the distance, depth, proximity of the object. Here the IR sensor is used to calculate the distance, microcontroller is programmed and the height gets displayed in the LCD.	The obstacle detection and signal processing.	This paper address the design, implementation and testing of a portable automatic height detector, which uses IR sensor, an application of embedded system to determine the height of an object.	The obstacle detection and signal processing stages are also more crucial and have carried out successfully.	Future work includes liquid level measurement, height detection of huge vehicles etc.
2	Component measurement using ultrasonic sensor	International Research Journal of Engineering and Technology (IRJET)	The instrument consist of two modules, the main working module, which consist of ultrasonic sensor, arduino board and LCD with set of wires and the measuring module, with two passage to measure diameter, width and length of the component.	Integrated development Environment (IDE) based on processing Language Project.	The objective of this project is to design and manufacture the instrument which can measure the geometrical parameters such as length, height and width of the component with less moving parts and requires less physical effort to operate it.	It is observed that the original values and the measured values are approximately same.	In Future we can improve the accuracy by using more accurate ultrasonics ensor.

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3	Object detection using ultrasonic Sensor	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	The ultrasonic sensor, Arduino UNO, UART, DC motor, motor driver and a PC system are used here. The sensor is connected to the arduino to sense the object and gets attached to the DC motor to control the speed of angle of the sensor. The UART is connected to arduino to transfer the data and finally the result will be displayed on RADAR screen.	RADAR is the detection system used.	The main intent of this project is to help the fishermen who are caught by the neighboring country's navy. This project helps the fishermen to escape from them by raising an alert note, they can get alert and move away from the place immediately.	When the object is detected, the screen will display the presence of the object and the angle and distance of the object will also be displayed.	For future work, this can be used as the base material and also be technologically advanced or reformed affording to the increasing necessities and future demands.
4	Maximizing range using ultrasonic sensor and arduino	International journal of engineering Research and application	To explain this process, an ultrasonic sensor uses the pulse of about 10microseconds to trigger the module. This device uses light, vibrations, and other methods that detect the changes in environment in various form of movement and light obstacles.	Arduino is used for detection purposes.	This paper explain straight forward and less costly way for visual feedback to optimize the ultrasonic sensor's work in detecting and measuring the distance an obstacle characteristics underwater using microcontroller.	The result shows the relative proximity of the obstacles against the ROV (remotely operated vehicles) when all testing requirements were met.	In Future more accuracy will be provided for liquid level detection and obstacle detection.
5	Obstacle detection and object size measurement for autonomous mobile robot using sensor	International journal of computer applications	This system uses range of data collected by the sensor with the image captured by the camera for object detection and object size measurement. The object is placed between the two different images to	Sensor fusion is applied here in mobile robots for object detection and navigation.	A new technique is proposed which can detect an obstacle, to judge its distance and measure the size of the obstacle using the ultrasonic sensor and with one camera. This technique is cheap in sensor cost and in terms of	The key factor used here is the error in calculating the distance and also the distortion of the lens plays a key role in determining	The future prospect of the project includes improvement in the accuracy of the system.

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			find whether the distance between the object and the camera is less and larger. The geometric similarity is used to find the size of object.		computational cost.	the size of the object.	
6	Distance measurement of an object or obstacle by ultrasound sensors using P89C51RD2	International Journal of computer Theory and Engineering	Microcontroller development kit and sensor are used for testing the system. When the pulse waves arrive at receiver, the signals received then it gets amplified and processed by the receiver module. The microcontroller calculates the time period for measuring the distance travelled by the waves.	The microcontroller P89C51RD2 is used.	In this paper the distance measurement of the obstacle is done by using the transmitter, receiver and a microcontroller. Measurement using ultrasonic sensors is one of the cheapest among the various options.	The results show that the results for measured distance is satisfying for use in the sewer inspection system being developed	This system can also be implementable for sewer blockage detection system.
7	Human Position/Height Detection using Analog Type pyroelectric sensors	International journal of science, engineering and technology Research	The relation between the height and detected frequency is considered first. Detection range becomes large when the sensor passes through the distance place. The tall wave will have high frequency than the low cases. The distance between center of the detection range of height of the head is shown by Distance=inter*(max-L)/Max[m]. spectrum of frequency.	The pyroelectric sensors are used here to detect the feeble far-infrared rays emitted by the human body.	This proposed method employs the Fast Fourier Transform(FFT) to calculate human position and analyzes the spectrum distribution to discriminate between adults or children. This method can calculate the human position even if two persons are in the same room.	Since this sensor does not have such a quick response speed, the method that discriminates between the adults and children is only 90% accurate.	The future targets are improvements in accuracy and the development of any application system using these sensors.

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8	Distance Measurement using ultrasonic sensor and arduino	International Journal of Engineering Science and Computing	This is efficient way to measure small distances. The sound waves are used to measure the various units such as distance and speed. Time taken for the sound wave to propagate from transmitter to receiver is proportional to the distance of the object. Here we use ultrasonic sensor HC-SR04 interfaced with Arduino UnoR3.	This technique of distance measurement is done using ultrasonic sensor .	This project is designed to develop the distance measurement system using ultrasonic waves and interfaced with arduino. Here the frequency range waves can be utilized through the ultrasonic sensor HC-SR04. .	The distance from any object is calculated from Distance=speed*time.	New prototyping hardware, Height measurement, agriculture velide, collision/protection can be other application.
9	Ultrasonic Sensor Height Detector	International Journal for Research in Applied Science and Engineering Technology	This system is mainly designed to detect or measure the height. The ultrasonic sensor measures the distance from the reference level,. Arduino controller takes the input from the sensor. Then the output is shown in LCD display through the microcontroller. In this Arduino IDE is used for the programming.	The ultrasonic sensor acts as the brain	This paper presents a portable embedded system which is used to measure the height using ultrasonic sensor. This device is created for people to use it on the own with ease without requiring any help.	The results are compiled over various instances and have successfully measures and displayed the heights of various objects.	The instant display without added delay further adds to its benefits and the automatic measurements to remove human intervention and to improve efficiently.
10	An ultrasonic sensor based portable height measuring device	Annual North East Bioengineering Conference	The ultrasound technology is used to measure the distance to the floor from the top of person's head. This includes a PICI8F4525 microprocessor, 4 MHz resonator and	The ultrasonic sensor is used here for measuring the height.	This paper is to design a portable device which utilizes the ultrasonic sensors to measure the height. The main intention of this prototype is to make the device much efficient and	The device achieves the maximum standard deviation of 0.06 inches, and a less than 0.84% relative error.	Bluetooth technology , which will link the height measurement to a mobile app and a bluetooth

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			9v to 5v converter, 9v battery, two ultrasonic sensor, resistor and the LCD to display the height.		how economically the materials are and also how easy it is to assemble, manufacture and how consumer friendly it is.		scale. The app would be configure to determine BMI calculations at same time.

VII. ADVANTAGES AND DISADVANTAGES

A. *Advantages*

1) The materials used to create this is both cheap and lightweight.
2) This improves the versatility of the device.
3) Instant display without added delay adds to its benefits.
4) Removes human intervention and improves efficiency.
5) No requirement of skilled labor.
6) Time saving operation.
7) Equipment is portable.
8) Easy to use.

B. *Disadvantages*

1) The accuracy of the sensor can be affected by the temperature and the humidity of the air.
2) This is not water resistant.

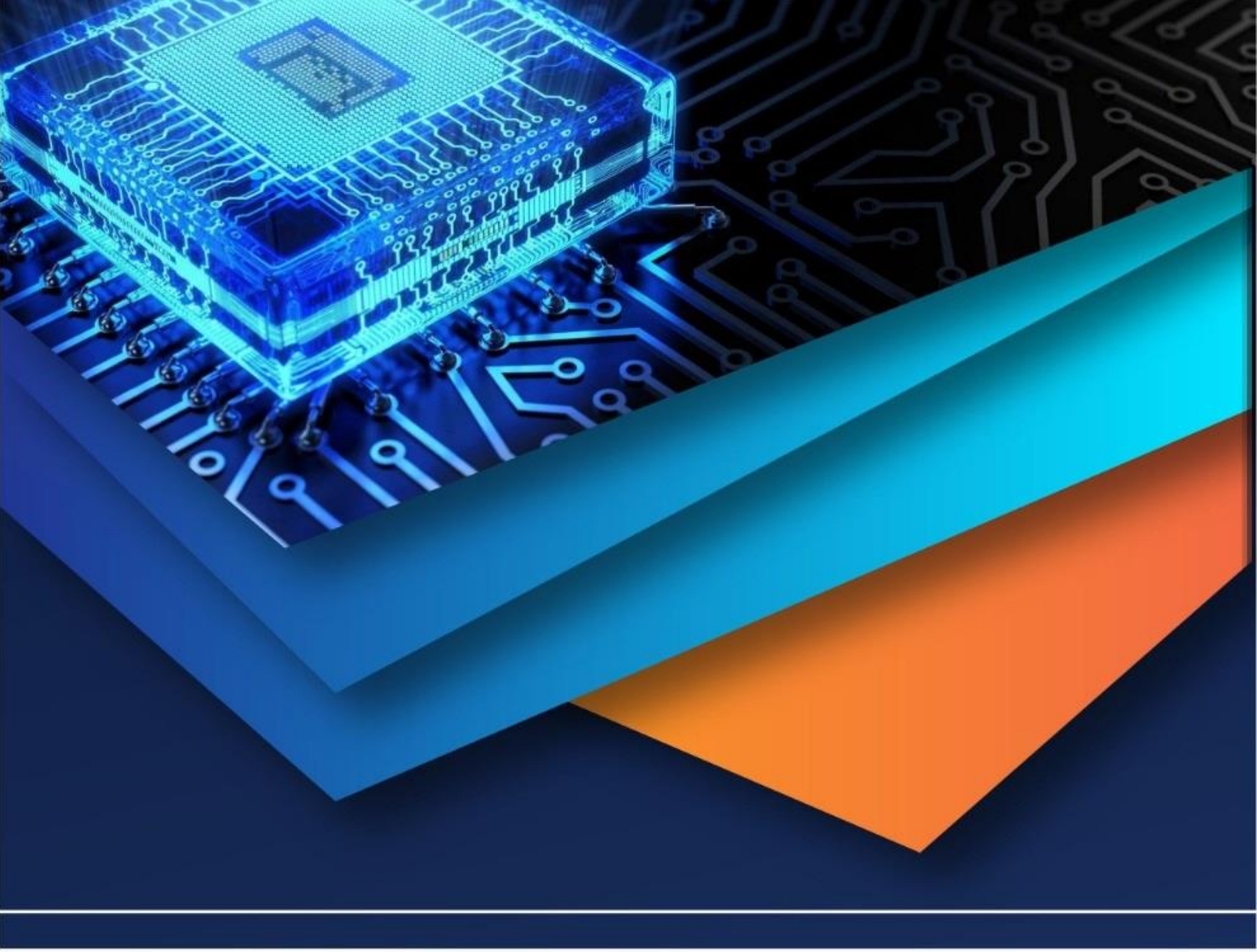
VIII. CONCLUSION

Various manual methods have been used till date to measure the height. The typical method is to stand in front of height measuring scale and manually checking the height. However the number of errors may be introduced due to human errors. The human eye cannot accurately calculate and hence it is not an efficient method. Hence there is a need of automatic human height detector. Hence the benefits of this detector removes the human intervention all together and improves the accuracy by using more accurate sensors. The overall smartness will be focused towards the better future.

REFERENCES

[1] RhutaMarathe, AmrutaKulkarni, UtkarshaDevkar, “Portable Automatic Height Detector”, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 10,October 2014.
[2] Karan Sangaj, Sudarshan Shinde, Aditya Suryawanshi, Rameez Shanediwan, Apurva Potdar, “Component Measurement Using Ultrasonic Sensor”, International Research Journal of Engineering and Technology (IRJET), Volume:05 Issue: 05 | May-2018.
[3] Arun Francis G, Arulselvan M, ElangKumaran P, Keerthivarman S, Vijaya Kumar J, “Object Detection Using Ultrasonic Sensor”, International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN 2278-3075, Volume-8 Issue-6S, April 2 019.
[4] Hamdy Youssef Hussein Aly, Saud Salem Almusallam, “Maximizing Range Using Ultrasonic Sensor and Arduino”, International Journal of Engineering Research and Application (IJERA), ISSN:2248-9622 Vol.9, Issue:3 (Series-III) March 2019.
[5] Fayaz Shahdib, Md. Wali Ullah, Md. Kamrul Hasan, Hasan Mahmud, “Obstacle Detection and Object Size Measurement for Autonomous Mobile Robot using Sensor”, International Journal of Computer Applications (0975-8887) Volume 66-No.9, March 2013.
[6] Shinya Okuda, Shigeo Kaneda and Hirohide Haga, “Human Position/Height Detection using Analog Type Pyroelectric Sensors”
[7] A.K. Shrivastava, A. Verma, S.P. Singh, “Distance Measurement of an Object or Obstacle by Ultrasound Sensors using P89C51RD2”, International Journal of Computer Theory and Engineering, Vol. 2, No.1 February, 2010.
[8] CH. Neeraja Soni, CH. Sarita, Shrikant Maheshwari, Basant Kumar Sahu, Bhavishya Jain, Garima Shrivastava, “Distance Measurement using Ultrasonic Sensor and Arduino”, International Journal of Engineering Science and Computing (IJESC), Volume 7 Issue No.3, March 2017.
[9] Alexander Nguyen, Michael Health, Anthony Messina, Jiang Wu *, Ying Sun, “An Ultrasonic Sensor Based Portable Height Measuring Device”, 43rd Annual Northeast Bioengineering Conference, NJIT, Newark, NJ, March 31-April 2, 2017.
[10] O.Sreeja, Vineesha, Pallavi, “Ultrasonic Sensor Height Detector”, International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN:2321-9653, Volume 6 Issue II, February 2018.

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