HEIGHT MEASUREMENT DEVICE

ABSTRACT:

In both the past and present, there has been no advanced solution for accurately determining the height of a person or device. An IoT-based height measurement device offers an automatic solution that requires no manual operation. This device can be easily mounted on a wall and measures height in a simple and precise manner. Installed at a maximum height of 10 feet (304.2 cm) on the wall, the device calculates a person's height by subtracting the distance between the sensor and the individual from the total height at which the device is mounted. The measured height is then displayed on an LCD screen and transmitted to a mobile app for further use.

Field of Invention:

With advancements in modern technology, we are stepping into a smart city era where automation is essential. This innovation aids in automatically measuring the height of a person or any device, along with the necessary apparatus to implement the method.

Description of Prior Art:

Traditionally, height measurements have been conducted using a tape measure or stadiometer, which requires an additional person to adjust the starting and ending points of the instrument. However, with advancements in technology, automated instruments now offer significant advantages over manual methods.

For instance, some existing patents describe conventional methods for measuring height, commonly used in clinics and hospitals. These devices, however, tend to be heavy and cumbersome, making them difficult to transport and challenging to mount on walls.

Another example from patent literature discusses a height measurement device equipped with a voice readout feature. This device requires a complex digital circuit for calibration and proper operation, adding to its complexity.

The proposed device introduces a new approach to digital height measurement. It delivers accurate results directly to portable devices such as mobile phones, with an additional LCD display that allows doctors or other authorities to efficiently view the height of a person from a distance. The device operates on automatic calibration, utilizing a less complex circuit, and can easily measure a maximum height of 8 feet with minimal error. Additionally, when no one is standing beneath the device, it enters power-saving mode, enhancing its efficiency.

PROPOSED SOLUTION:

The block diagram of the low-cost height measurement device is illustrated in Figure 1 below. It consists of several components at the input stage, processing unit, and output stage. The device is mounted on the wall at a height greater than the maximum height of the person to be measured. When the person stands beneath the device, the ultrasonic sensor captures the data and sends it to the processing unit, which is an Arduino. The processed height data is then displayed on both an LCD screen and a mobile app.

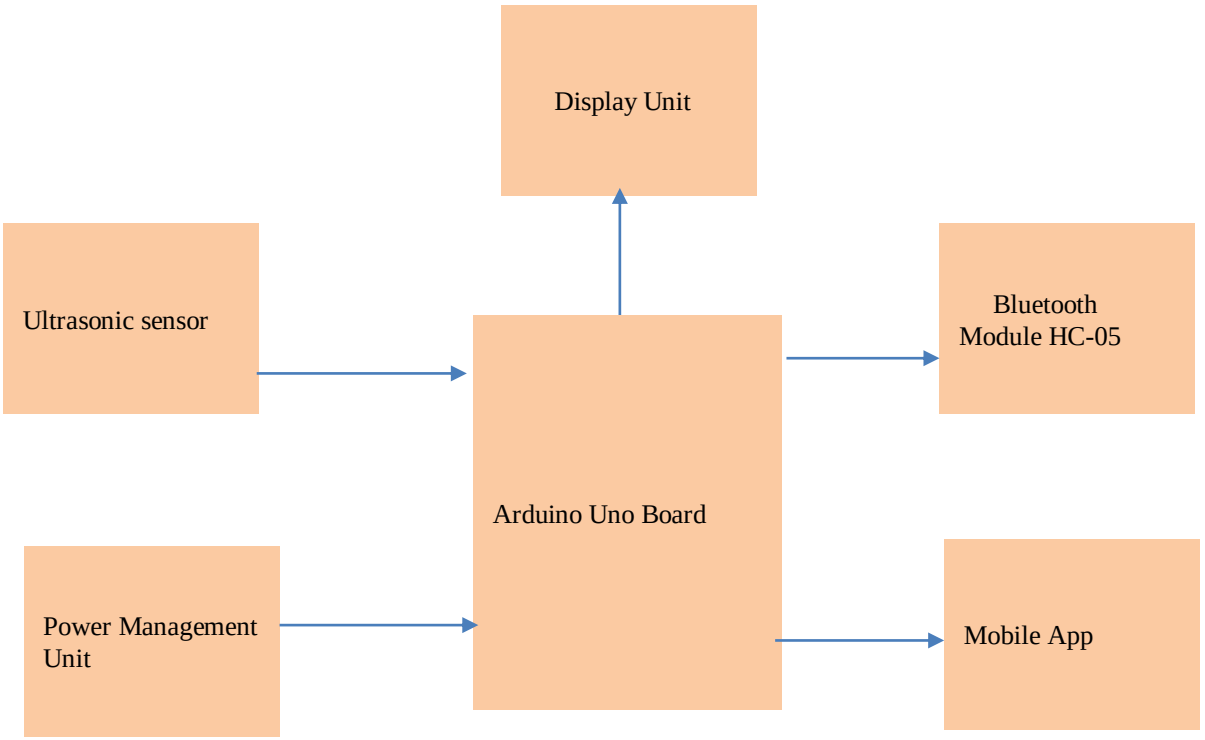

Figure 1: Block diagram of low-cost height measurement device

1. Input device:

The height measurement in this device is accomplished using an ultrasonic sensor. As the name suggests, ultrasonic sensors determine distance by emitting ultrasonic waves. The sensor's head emits an ultrasonic wave, which then reflects back after hitting the target. The sensor calculates the distance to the target by measuring the time taken for the wave to travel to the target and back. The sensor has a minimum detection range of 2 cm and a maximum range of up to 400 cm.

According to surveys, the average height for males is 1.7 meters (170 cm) and for females is 1.6 meters (160 cm), both typically below 6 feet. For reference, a height of 6 feet corresponds to 182 cm, while 8 feet is equivalent to 244 cm. The input device is capable of accurately measuring heights up to 400 cm, or approximately 13.1 feet.

2. Power Management unit:

It is used to power up the processing unit with 9V battery supply.

3. Processing Unit:

The Arduino Uno is an open-source microcontroller board built around the Microchip ATmega328P microcontroller. It features a set of digital and analog input/output pins that can be connected to various expansion boards and circuits. In this device, the Arduino Uno is used to process data from the ultrasonic sensor and calculate the height.

4. Display Unit:

The 16×2 LCD is so named because it has 16 columns and 2 rows. While there are various configurations available, such as 8×1, 8×2, 10×2, and 16×1, the 16×2 LCD is the most commonly used. It operates at a voltage of 4.7V to 5.3V and has a current consumption of 1mA without the backlight. In this device, it is used to display the height in centimeters, which is calculated by the processing unit.

5. Bluetooth Module:

The Arduino will transmit data both to the LCD and the Bluetooth device. The Bluetooth Module is a user-friendly Bluetooth SPP (Serial Port Protocol) module, designed to establish transparent wireless serial connections. It communicates via serial communication, making it easy to interface with a controller or PC. The module supports switching between master and slave modes, allowing it to either receive or transmit data as needed.

6. Mobile app:

A new app will be developed to allow the height data received via Bluetooth to be directly displayed on mobile phones for further processing and use.

The major application is in medical field where doctors can quantify the height accurately while sitting at distance, in army applications during the selection of soldiers, smart city projects, etc. The complete machine is to gauge the tallness of person up to 8 feet i.e. 244 cm and the height of placing the device 10 feet which is fixed.

FLOW DIAGRAM:

Step 1: Turn on the power supply.

Step 2: Ultrasonic sensor first confirms whether the person is standing or not. If condition is not true, then the device will go into power save mode turning off the LCD display.

Step 3: If condition in step 2 is true, then LCD will turn on with display message “Ready”.

Step 4: The sensor will sense the data and transfer to the processing unit Arduino Uno.

Step 5: Data after processing will display on the LCD with message “Height= ….” And in same time period, Bluetooth module will turn on if condition fails then it will again turn on the Bluetooth.

Step 6: If condition in step 5 of Bluetooth is obtained, then the data will be sent on the Mobile phone app for further processing.

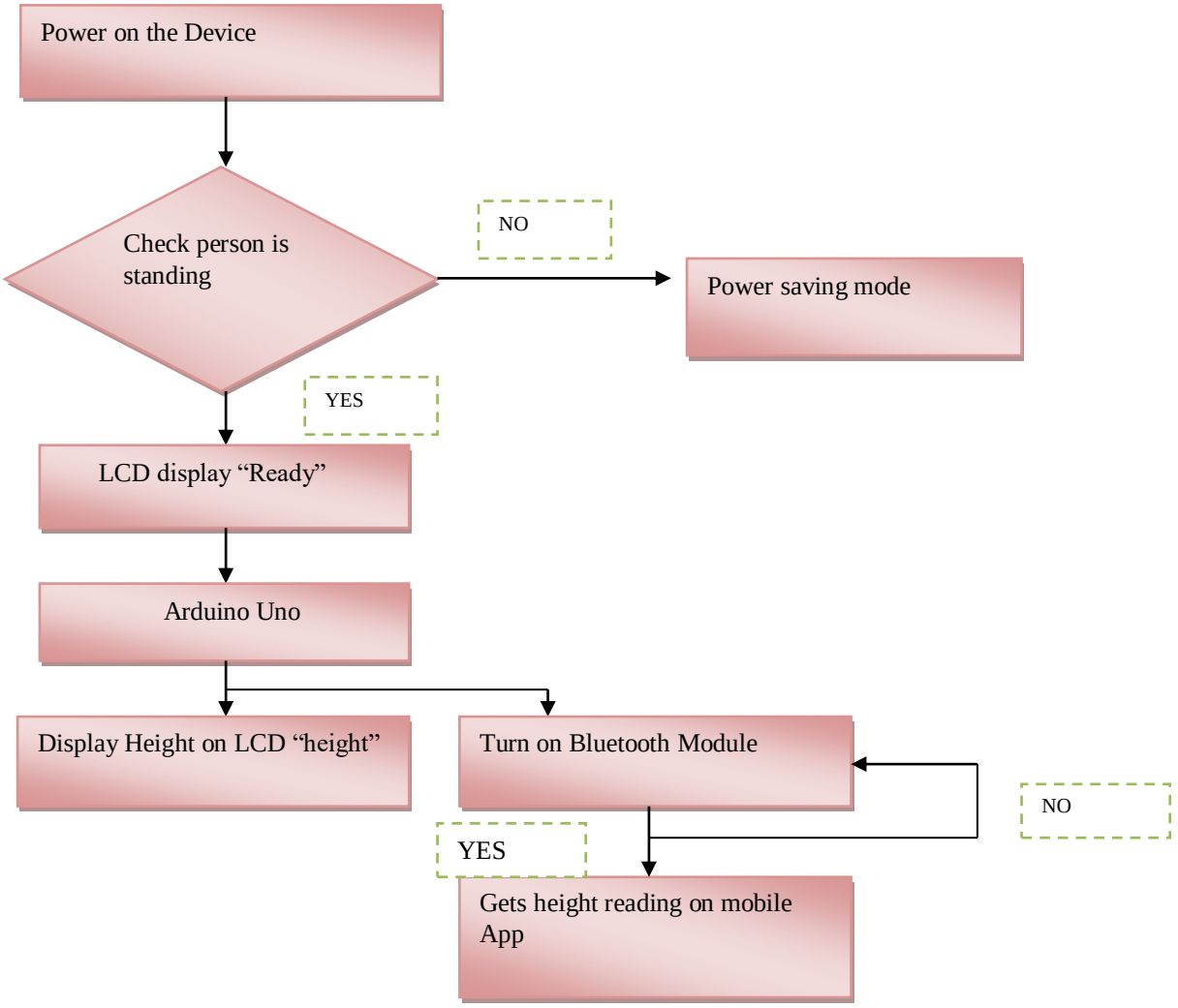

Figure 2: Flow diagram of IOT based low-cost height device

References:

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