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| **Title:** | Design and Development of a Microcontroller-Based Automatic Blood Flow Monitoring and Controlling System | | |
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| **Published Journal Name:** | Proceedings of the National Conference on Electronics and ICT | | |
| **Type of Publication:** | Conference Proceedings | | |
| **Volume:** | - | Issue | - |
| **Publisher:** | Bangladesh Electronics Society | | |
| **Publication Date:** | 20 April 2017 | | |
| **ISSN:** |  | | |
| **DOI:** | - | | |
| **URL:** | https://www.researchgate.net/publication/316349735\_Design\_and\_Development\_of\_a\_Microcontroller\_Based\_Automatic\_Blood\_Flow\_Monitoring\_and\_Controlling\_System | | |
| **Other Related Info.:** | Place: organized by the Bangladesh Electronics Society, held at Bangladesh Atomic Energy Center (BAEC), Dhaka, Bangladesh, 20 April 2017, p. 25. | | |
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| **Abstract:** |  |
| Abstract— This paper reports the design and development of an automatic blood flow monitoring and controlling system using a microcontroller. It also aims to develop a low-cost system that is capable of assisting doctors or nurses to monitor and control the blood flow rate accurately to the patients. The microcontroller is used as the controlling unit to provide the necessary control and coordination with the flow sensors, matrix keypad, stepper motor as well as the Bluetooth module that can help the user to control the blood drops per minute using his/ her smartphone. The developed flow sensor is attached to the neck of the blood bottle to get the exact number of drops of blood to determine an accurate rate of blood flow. The flow sensor is an infrared-based obstacle sensor that is built with a face-to-face infrared LED and infrared photodetector and acts as the drop detector without physical attachment to the blood being passed in between the LED and photodetector. So, there is no chance of chemical decomposition of blood. A high-precision blood flow controller is designed to control the flow rate precisely. It is built with a stepper motor, gear, and a few mechanical parts. The output signal obtained from the flow sensor is amplified with an op-amp-based amplifier and then is fed to the microcontroller's external interrupt pin to continuously check whether the flow rate is equal to the given set-point or not. If any mismatch is detected, then the microcontroller rotates the stepper motor to change the flow rate to match the flow rate with the set point. To reduce the settling time, the motor speed varies exponentially with the difference between the instantaneous flow rate and the set-point. There is a battery backup system to provide uninterrupted service in case of power failure. The designed system is tested to evaluate its performance. From the test data, the experimental accuracy of the system is found over 99%. | |