

# MPX4115VC6U as Pressure Regulation on Automatic Cupping Therapy

Agoes Santika Hyperastuty,  
Yanuar Mukhammad, Samik  
Munawar, I'im Nandang

Medical Electrical  
Engineering Kadiri  
University, Indonesia

**Email:**  
[ag,santikabks@gmail.com](mailto:ag,santikabks@gmail.com)

## ABSTRACT

Mpx4115VC6U sensor is one of the pressure sensors. Mpxv4115VC6U sensor is a pressure sensor with temperature compensation, signal conditioning, and has been calibrated. This sensor has good suction power. One example of the use of the MPX4115VC6U sensor is the cupping tool. Mpx4115VC6U sensor is one of the pressure sensors. This sensor has good suction power. One example of the use of the MPX4115VC6U sensor is the cupping tool. Cupping tools are a method of treatment by removing dirty blood from the surface of skin rashes, then sucked with cupping shovels and cuffs, used for various diseases such as hypertension and other diseases. The cupping device equipped with the MPX4115VC6U sensor is capable of sucking at a pressure of -200 mmHg-400 mmHg. The cupping device equipped with the MPX4115VC6U sensor is capable of sucking at a pressure of -200 mmHg-400 mmHg. From the test results of the tool, it was obtained that the percentage value of error ranged from 0.2-0.5%, with the error percentage above the tool can be used properly.

**Keywords:** Mpx4115VC6U sensor, Cupping tools, The pressure sensors

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## INTRODUCTION

Cupping is one of the treatment therapies by removing dirty blood on the body through the surface of the skin, with a needle method that has been sterile pierced on the surface of the skin, in Arabic called Al Hijamah which means dirty blood expenditure and in Europe called cupping therapeutic method and in Indonesia called cupping therapy and in Indonesia called cupping therapy. Cupping therapy can also treat various diseases by using a small needle that is inserted on the surface of the skin then the header and cuff as a negative textured puller for the surface of the skin, and there are also those who use a glass glass tube that is heated so that there is a withdrawal on the skin.

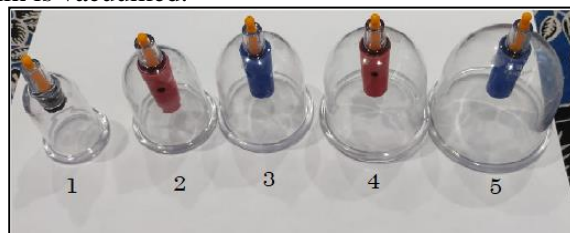
The method of cupping treatment is an Islamic treatment recommended by rasullallah SAW, explained in the Hadith Bukhori / Muslim, that the Prophet said: cupping is done by sucking the skin that has been slashed so that blood will come out (Thamrin, 2015). This cupping method can cure various diseases, one of which is high blood pressure. High blood pressure is a disease characterized by an increase in blood in the body, This disease commonly known as hypertension is usually experienced by people aged 35 years to 65 years with different causes and backgrounds ranging from heredity and unhealthy lifestyle, because when people who experience a slow or sudden increase in blood will trigger a heart attack and result in death (Andria, 2011) In preventing the occurrence of hypertension, skin infections, muscle pain and blood clots and others. Caused by dirty blood in the skin, treatment is done farmagologically, non farmagologically or complementarily. Lately many people choose complementary medicine for several reasons, including, it can suppress cost,

affordable, not using chemicals and of course the advice from Rasulullah SAW is with cupping therapy. Hijamah or cupping is a coronation therapy by removing dirty blood from the surface of the skin rash, cupping is a classic method of treatment using a small glass tube that is then heated with fire so that it can squeeze the surface of the skin and then slowly remove dirty blood from the skin, In general, the process of sharpening in pulling cupping headers for vacuuming is still done by hand, so it can be said that the vacuuming process is inefficient, while in certain parts such as thick skin requires greater pressure then with this tool cannot be done the vacuum process manually. Based on this experience, it is necessary to innovate electronic automatic cupping tools with negative pressure motors or vacuum motors. Identifying problems in the background, therefore the author will design a cupping tool that uses a vacuum motor to replace the piston, so that it can be Determine the areas and points on the patient's back that require appropriate pressure, if these areas require more and greater pressure so that they can be accumulated (Mahmoud, 2013). Based on the description above, this study used the MPX4115VC6U sensor to control the pressure on the cupping vacuum displayed on the LCD.

## MATERIALS AND METHODS

### Design and Samples

This research applies applied research methods. Cupping is one of the treatment therapies by removing dirty blood on the body through the surface of the skin, with a needle method that has been sterile pierced on the surface of the skin, then the scope and cuff as a pressurized puller so that the surface of the skin is vacuumed.



### Data Collection

The initial stage of this study is study literature, which collects data on information on the use of MPX4115VC6U sensors as pressure sensors. Cupping tools from various sources, such as journals, websites related to traditional cupping. Perform the collection of components to be used in the tool to be designed on this final task. In the process of designing the tool consists of 2 parts, namely hardware and software. In hardware design, this research uses mpx4115VC6U sensor as a pressure sensor for after hardware and software design is completed then continue on the manufacture of tools. Then when it is finished then proceed to testing the tool whether the tool works well or not, if it does not work should do a recheck on the design of hardware and software. When the circuit works well then the tool will work properly. Next, take the data and analyze the data. Next make a conclusion.

## RESULTS

After measuring using 5 cupping using pressure settings ranging from 200 mmHg-400 mmHg. For a pressure of 200 mmHg, the value as below is obtained :

**Table 1 Cupping Data**

Pressure	
Setting	LCD
-200	-209
-200	-205
-200	-202
-200	-204
-200	-203

The table above shows that an error value of 0.5 percent ( 0.5%)

For testing with a pressure of 250 mmHg obtained data :

**Table 2 Cupping Data**

Pressure	
Setting	Setting
-250	-255
-250	-257
-250	-253
-250	-251
-250	-252

The table above shows that an error value of 0.5 percent ( 0.5%)

**Table 3 Cupping Data**

For testing with a pressure of 300 mmHg obtained data :

Pressure	
Setting	Setting
-300	-302
-300	-303
-300	-302
-300	-302
-300	-302
-300	-302

The table above shows that an error value of 0.2 percent ( 0.2%)

**Table 4 Cupping Data**

For testing with a pressure of 400 mmHg obtained data

Pressure	
Setting	Setting
-400	-373
-400	-372
-400	-370
-400	-368
-400	-252

The table above shows that an error value of 0.2 percent ( 0.2%)

## DISCUSSION

First we turn on by pressing power (ON / OFF), the system will initialize the LCD, then choose the pressure to be used (-200 mmhg, - 450 mmhg maximum) then by pressing the start button then the motor will work to suck. The pressure sensor begins to work to read the pressure on the suction tube according to the desired pressure.

The table above shows there is a shift between the setting and the data displayed on this LCD due to the delay shift that occurs when the pump runs which causes the pressure detected by the sensor to offset but this usually occurs because when the sensor sensing and the time of stopping the pump occurs delay, for example, when the cupping setting 250 turns out to be a shift so that it becomes 255 which means it shifts 5 mmhg due to delay. To overcome this delay can be done by minimizing the delay but the pump has time to off so there will be a shift as well. The right method to overcome the friction is to use PID control so that at the time the pump will go to the point point he will slow down and this can be done. Actually, to overcome this delay, it can be done by reducing the delay but the pump has time to be off so that there will be a shift as well. The right method to overcome pergesarn is to use PID control so that when the pump will go to the point point he will slow down and this can be done.

For the measurement results, a negative value occurs because the characteristics used are negative values, this shows that the pressure generated by the air on the cupping makes the sensor expand the negative voltage. In order not to be negative, there are actually various ways, one of which

is to use \* -1 in the formula to get the mmhg value, but in this tool data processing is carried out according to the data obtained by the sensor. The measurement error in this tool is about 2 mmhg the smallest and the largest, which can reach more than 5 mmhg. However, jikia seen from the measurement results, namely 1 mmhg is a small pressure that can be tolerated by the tool, the most important of which is no more than 50 mmhg which will result in the onset of effects on patients as well as too high a pressure drawn so that it is dangerous for the patient.

The smallest error, which is 0.6%, indicates the accuracy of the tool that is already good but sometimes the measurement has more errors than that. Measurements are made from a pressure setting of 200 to 400 mmhg and the cupping used is medium size. The data obtained by the sensor is in the form of voltage which is converted into mmhg using a formula that is first converted into the form of an ADC value. After the ADC value is obtained by arduino, it will be converted into mmhg form.

In this tool, the setting used to select the pressure to use the potential is not to facilitate the use of the tool, for the tool setting menu, which is from 0-1000 mmhg, for the human body to have a standard pressure according to the level of the fat, therefore pressure adjustments must be made before cupping. So this tool has a system, for example, there are 4 cupping points, then each cupping point can be set differently. If one cupping point has been completed, it will move to another cupping point. So it can be adjusted to the need for deepening. When the sensor has reached the expected pressure, it will turn off the pump and will make the cupping suck up air and then remove it and place it to another cupping point. After cupping the tool can be reset according to pressure needs, namely by rotating the potentiometer contained in the tool and selecting the desired value range of 0-1000 mmhg. After setting the desired pressure, there will be a button that can be pressed to start activating the pump. The voltage range generated by the sensor is below 5volt dc with a small current so that this sensor is very easy to apply to the tool.

## CONCLUSION

Based on the research above, the MPXV4115VC6U sensor used as an electric cupping pressure detector can work properly. Mpxv4115VC6U Sensor test results on the Electric Cupping Vacuum tool, the smallest percentage of error is 0.2% and the largest percentage of error is 0.5%. With this percentage of errors the tool can be used by humans decently. Referring to the work method of the Ministry of Health of the Republic of Indonesia in 2018 the tolerance limit +/- is 10%. The measurement results indicated by the measurement error are caused by the value of the component used

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## CONFLICTS OF INTEREST

The author raised the theme of innovation of traditional medicine methods

## REFERENCES

R Sharaf, (2012), Penyakit dan terapi bekamnya.

Sulistyo, dkk, (2015), "Makalah Motor DC," Univ. Sriwijaya, (id.scribd.com).

Kasmui, M. Si, and K. T. Nabawi, (2021), "Komunitas thibbun nabawi," pp. 1–52.

El Sayed SM, Abou – Taleb A, Mahmoud HS, Baghdadi H, Maria RA, Ahmed NS, Nabo MM, Percutaneous excretion of iron and ferritin (through Al – hijamah) as a novel treatment for iron overload in beta – thalassemia major, hemochromatosis and sideroblastic anemia. Med Hypotheses.2014 Dec 19;23:6162-6167.

- Evania Zuhriyah Aulfah Arozi, (2018) “ Pengaruh Terapi Bekam Terhadap Kadar Kolesterol Total pada Pasien Hiperkolesterolemia di Klinik Pengobatan Islami Refleksi dan Bekam”.
- Fatimah Rahmawati, (2020),” 5 Manfaat Bekam Bagi Kesehatan dan Efek Samping,”<http://m.merdeka.com/jabar/5-manfaat-bekam-bagi-kesehatan-dan-efek-sampingnya-kln>.
- Gustomo, (2015). *Pengenalan arduino dan pemrogramannya*. bandung: informatika bandung. bandung. (<http://eprints.polsri.ac.id> , Diakses tanggal 13 Januari 2021).
- Hani Fauziah, dkk, (2020), “ Bekam efektif menurunkan tekanan darah pada pertengahan Bulan Hijriyah”.
- H. Thamrin, (2015) “Perbedaan Tekanan Darah Sebelum dan Sesudah Terapi Bekam di Rumah Sehat Afiat Cinere Tahun”.
- K.M. Andria, (2011), “dan pola makan dengan tingkat hipertensi putih kecamatan sukolilo kota surabaya,” pp. 111–117. Repository.uinjkt.ac.id.
- SM.A. Rahman et al., (2016), “Pengaruh terapi bekam terhadap tekanan darah pada pasien hipertensi di klinik bekam abu zaky mubarak,”.
- Mahmoud, dkk, (2013), “Anatomical Sites for Practicing Wet Cupping Therapy (Al-Hijamah): In Light of Modern Medicine and Prophetic Medicine,” *Altern. Integr. Med.*, vol. 02, no. 08.
- P. Soepomo, (2014), “Bekam Dengan Metode Case Base Reasoning,” *Sarj. Tek. Inform.*, vol. 2, pp. 1186–1195.
- R. Gumilar, N. Teguh, S. Erwin, J. Vol, and N. September, (2015), “ISSN 2338-137X Rancang Bangun Aplikasi Pendukung Penentuan Titik Bekam Berbasis Android,” vol. 4, no. 2, pp. 1–7.
- Sibuea Maickel Osean, (2018), Pengukuran Suhu Dengan Sensor Suhu Inframerah MLX90614 Bebasis Arduino Uno, di Fakultas Sains dan Teknologi: Universitas Sanata Dharma Yogyakarta.
- Siti Nur Hasina, dkk, (2021) “ Terapi Bekam Berpengaruh Terhadap Penurunan Kadar Kolesterol Darah Total”.
- Siti Fatonah, dkk, (2015), “ pengaruh Terapi Bekam Terhadap Tekanan Darah Penderita Hipertensi”.
- Yoga Rahmanda Seto, dkk, (2016), “ Gambaran Kadar Kolesterol Total pada Pasien Terapi Bekam di tempat Pelayanan Kesehatan Tradisional Bekam Herbal Center (BHC) Kedaton Kota Bandar Lampung”.