

# KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science Campus, Bengaluru – 560 012

Website: <http://www.kscst.iisc.ernet.in/spp.html> || Email: [spp@kscst.iisc.ernet.in](mailto:spp@kscst.iisc.ernet.in) || Phone: 080-23600978

## 42<sup>nd</sup> Series of Student Project Programme: 2018-19

### List of Projects Sanctioned Under Stream C

#### 105. SAPTHAGIRI COLLEGE OF ENGINEERING, BENGALURU

Sl. No.	PROJECT REFERENCE NO.	PROJECT TITLE	BRANCH	DEGREE	NAME OF THE GUIDE	NAME OF THE TEAM LEADER	TOTAL (in Rs.)
1.	42S_BE_0279	AGROBOT	ELECTRICAL AND ELECTRONICS ENGINEERING	BE	Mr. A.DHAMODARAN	Ms. ANUSHA B	7500.00
2.	42S_BE_1589	DESIGN AND FABRICATION OF ARTICULATED 3D PRINTER	MECHANICAL ENGINEERING	BE	Mr. ULLAS C S	Mr. CHETAN GOWDA H S	8000.00
3.	42S_BE_2339	POWER GENERATION BY ENGINE EXHAUST GAS FOR AIR BRAKE SYSTEM	MECHANICAL ENGINEERING	BE	Mr. PADMANABHA G	Mr. KUSHAL S	7000.00
4.	42S_BE_3333	ANTI-KRAIT VENOM ACTIVITY OF FOLK MEDICINAL PLANTS	BIOTECHNOLOGY	BE	Dr. VEENA S MORE	Ms. SAHANA N M	6500.00

#### Note:

1. The sanctioned amount will be sent by KSCST to the College by crossed Cheque in the name of the Principal.
2. The evaluation of above projects will be conducted in the Nodal Centre in the month of May / June 2019. During nodal centre evaluation projects will be selected for state level Seminar & Exhibition which will be conducted in the month of July / August 2019.
3. After completion of the projects, the hard copy of the report and soft in .pdf format needs to be sent to KSCST without fail.

Sapthagiri College of Engineering  
Chikkasandra, Hesarghatta Road,  
Bangalore-560 057

KSCST : 42<sup>nd</sup> Series of Student Project Programme : Stream C : List of Projects Sanctioned : 2018 - 2019

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**  
JNANA SANGAMA, BELAGAVI -590018



A Project Report On

**“DESIGN AND FABRICATION OF ARTICULATED 3-D PRINTER”**

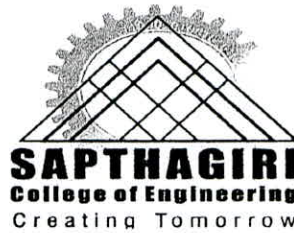
Submitted in partial fulfilment of the requirement for the award of

**BACHELOR OF ENGINEERING**  
In  
**MECHANICAL ENGINEERING**

Submitted By

<b>Mr. CHETAN GOWDA H S</b>	<b>(1SG16ME402)</b>
<b>Mr. MANISH RAO S</b>	<b>(1SG16ME416)</b>
<b>Mr. POORVIK S</b>	<b>(1SG16ME426)</b>
<b>Mr. ROHITH J</b>	<b>(1SG16ME434)</b>

Under the Guidance Of  
**Dr. M ELANGO VAN**  
Professor



**DEPARTMENT OF MECHANICAL ENGINEERING**  
**SAPTHAGIRI COLLEGE OF ENGINEERING**  
14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru-560057  
[AFFILIATED TO VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI]

Principal  
Sapthagiri College of Engineering  
Chikkasandra, Hesaraghatta Road,  
Bangalore-560 057



# SAPTHAGIRI COLLEGE OF ENGINEERING

14/5, Hesaraghatta, Main Road, Chikkasandra, Bengaluru-560057

## DEPARTMENT OF MECHANICAL ENGINEERING




### CERTIFICATE

Certified that the project work entitled "Design and Fabrication of Articulated 3-D Printer" carried out by Chetan Gowda H S (1SG16ME402), Manish Rao S (1SG16ME416), Poorvik S (1SG16ME426), Rohith J (1SG16ME434) Bonafide students of 8<sup>th</sup> semester, Department of Mechanical Engineering at Sapthagiri College of Engineering, Bengaluru in partial fulfilment of the award of Bachelor of Engineering in Mechanical Engineering of the Visvesvaraya Technological University, Belagavi during the year 2018-19. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

  
Dr. M Elangovan

Signature of the Guide

  
Dr. P Mahadevaswamy

Signature of the HOD

  
Dr. K L Shivabasappa

Signature of the Principal

Name of the Reviewer

Examiner

Signature with date

1. Dr. Mahadevaswamy
2. Dr. Kiran T.S.

  
Principal

Sapthagiri College of Engineering  
Chikkasandra, Hesaraghatta Road,  
Bengaluru-560 057

## DECLARATION

We the students of 8<sup>th</sup> semester, Mechanical Engineering do here by declare that project report entitled **"DESIGN AND FABRICATION OF ARTICULATED 3-D PRINTER"** has been compiled by us under the esteemed guidance of **Dr. M Elangovan**, professor, Mechanical engineering, Sapthagiri College of Engineering, Bangalore.

Mr. CHETAN GOWDA H S

*Chetan Gowda H S*

(1SG16ME402)

Mr. MANISH RAO S

*Manish R. S.*

(1SG16ME416)

Mr. POORVIK S

*Poorvik S.*

(1SG16ME426)

Mr. ROHITH J

*Rohith J.*

(1SG16ME434)

*12*  
Principal  
Sapthagiri College of Engineering  
Chikkasandra, Hesaraghatta Road,  
Bangalore-560 057



## ABSTRACT

This project introduces the implementation of a low-cost 3D printing Robotic Arm. Articulated Robotic Arms made up of several joints and actuated by motors are generally used in industrial field for lifting and manufacturing purposes. 3D printers are machines used for converting digital 3D model into physical 3D object. 3D object can be build by using Additive Manufacturing process. In AM process successive layers of material are laid one upon another and the process repeats until the final object is obtained. The additive process used in this project is Fused Filament Fabrication. By using this method, it is able to print object more accurately and smoothly. FFF model uses thermoplastic filament that is wound on a coil and unreel to supply material through cold end of an extrusion nozzle, which turns the flow on and off. The hot end of the extruder melts the material and can be moved in both horizontal and vertical directions. Both the movement of robotic arm and extruder is directed by a numerically controlled mechanism that is directly controlled by a computer-aided manufacturing software package. The model or part is produced by successively layering the thermoplastic material that is extruded from the nozzle. Movement of extruder is controlled by stepper motor. By combining Robotic arm with 3D printing technology, it is capable for increasing range of operation and it is comparatively more flexible than commercially available desktop 3D printers.



Principal  
Sapthagiri College of Engineering  
Chikkasandra, Hesaraghatta Road,  
Bangalore-560 057

SCE-2016-17

## Payment Voucher

No. : 444

Dated : 20-Jun-2019

Particulars	Amount
Account : KSCST( Project Work)	8,000.00
Through : SBI- 30263521464	
On Account of : being towards re imbursement of the KSCST grants to Chetan Gowda ( Grants received towards approval for the project under 42nd series SPP Program 2018-2019)	
Bank Transaction Details: Chetan Gowda.H.S Cheque 727753 20-Jun-2019 8,000.00	
Amount (in words) : INR Eight Thousand Only	
	₹ 8,000.00

Chetan Gowda.H.S [15616ME02]  
Receiver's Signature:

Authorised Signatory

Principal  
Sapthagiri College of Engineering  
14/5, CHIKKASANDRA, Hesaraghatta Main Road  
Bengaluru - 560 057



From,  
**Dr. M Elangovan**  
Professor  
Sapthagiri college of engineering  
Bengaluru

Date: 17/06/2019  
Place: Bengaluru

To,  
**Principal**  
Sapthagiri college of engineering  
Bengaluru

Through,  
**Dr. P Mahadevaswamy**  
Professor & Head  
Sapthagiri college of engineering  
Bengaluru

Respected sir ,

**Sub: Reimbursement of the KSCST grant**

As I mentioned in the above subject, we got the approval for the project under 42<sup>nd</sup> series SPP program 2018-19 (project No: 42S\_BE\_1589) Karnataka State Council for Science and Technology. So we carried out our project on our own expense. Kindly requesting you to reimburse the sanctioned amount **8000/-** (EIGHT THOUSAND RUPEES ONLY). Please do the needful.

Thanking you sir,

Forwarded to  
the principal  
18/6/19

Your's faithfully

*M Elangovan*

Dr. M. Elangovan

Project Guide.

*RAVISHANKAR* 18/6/19  
COORDINATOR  
KSCST - SPP project

Principal  
Sapthagiri College of Engineering  
14/5, Chikkasandra, Hesaraghatta Main Road  
Bengaluru - 560 057

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3	42S_BE_2339	POWER GENERATION BY ENGINE EXHAUST GAS FOR AIR BRAKE SYSTEM	MECHANICAL ENGINEERING	BE	Mr. PADMANABHA G	Mr. KUSHAL S	7000.00
4	42S_BE_3333	ANTI-KRAIT VENOM ACTIVITY OF FOLK MEDICINAL PLANTS	BIOTECHNOLOGY	BE	Dr. VEENA S MORE	Ms. SAHANA N M	6500.00

29000

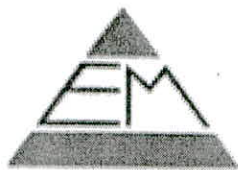
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Principal  
Sapthagiri College of Engineering  
14/5, Chikkasandra, Hesaraghatta Main Road  
Bengaluru - 560 057



## Original



Address: # 114, 6th Cross, 3rd Main BHCS Layout Uttarahalli,  
Subramanyapura Bangalore-560061

**E - Mail:** [emmotionmodules@bsnl.in](mailto:emmotionmodules@bsnl.in)/[emechdrives@gmail.com](mailto:emechdrives@gmail.com)

**Telephone No:** 9686143312/8762388637/080-26395978

PO No	:	Verbal
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PO Date: 23/04/2018

**Place of Supply : Bangalore**

Details of Consignee (Shipped to)	
Company Name	ABC Corporation
Address	123 Main Street, Suite 500, New York, NY 10001
Contact Person	John Doe
Phone	(212) 555-1234
Email	john.doe@abc.com
Notes	Special handling required for fragile items.

Name : Chethan Gowda

Address : 11/24, Jayaramanna Building

Chikkabidarakallu, Bangalore-73

Phone: 9591155877

GSTIN:

S.No	Description of Goods	HSN/SAC Code	Qty	Rate	Total	CGST		SGST	
						Rate	Amount	Rate	Amount
1	Stepper Motor 10 Kg-Cm	8503	3	980.00	2940.00	9%	264.60	9%	264.60

Taxable Value :	2940.00
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Tax Value	:	529.00
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Total Value	:		3469.00
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### For EM Motion Modules

**Authorised Signatory**

Principal  
Sapthagiri College of Engineering  
14/5, Chikkasandra, Hesaraghatta Main Road  
Bengaluru - 560 067

online invoice




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Account Statement for the period 4/5/2019 to 4/5/2019

Account Number	00000030263521464	Description	CA-GEN-PUB OTH-NONRURAL- INR
Name	SAPTHAGIRI COLLEGE OF ENGINEERING	Currency	INR
Corporate Address	no.14/5,chikkasandra, hessaraghatta main road Bangalore, Karnataka - 560057	Branch	HESARGATTA ROAD, BANGALORE (10499)
Rate of Interest (% p.a.)	16.7%	IFS Code	SBIN0010499
Book Balance	13,90,273.28	Available Balance	13,90,273.28
Hold Value	0.00	Uncleared Amount	0.00
Balance as on	9,52,585.23		

Date (Value Date)	Narration	Ref / Cheque No.	Branch Code	Debit	Credit	Balance
04-May-19 (04-May-2019)	TO CLEARING CAB AISHWARAYAS 727363	727363	40743	17,170.00		9,35,415.23
04-May-19 (04-May-2019)	BY TRANSFER NEFT*CNRB0000683*P19050409544439*KARNATAKA STATE C	TRANSFER FROM 3199678044303 /	4430		8,000.00	9,43,415.23
04-May-19 (04-May-2019)	BY TRANSFER NEFT*CNRB0000683*P19050409544528*KARNATAKA STATE C	TRANSFER FROM 3199675044306 /	4430		29,000.00	9,72,415.23
04-May-19 (04-May-2019)	CASH DEPOSIT CASH DEPOSIT SELF		10499		8,880.00	9,81,295.23
04-May-19 (04-May-2019)	CHEQUE WDL WITHDRAWAL TRANSFER BY CHEQUE 727728	TRANSFER FROM 54003362309 / 727728	10499	4,240.00		9,77,055.23

\*\*This is a computer generated statement and does not require a signature.

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EE - 7500  
 NE - 8000 ✓  
 NE - 7000  
 BT - 6500  
 29000

  
 Principal  
 Sapthagiri College of Engineering  
 14/5, Chikkasandra, Hesaraghatta Main Road  
 Bengaluru - 560 057



**KSCST PROJECTS**

**UTILIZATION CERTIFICATE**

**KSCST Student project program 42<sup>nd</sup> series- 2018-19**

Sl No	Title of the project	Amount	<p>Certified that KSCST has provided partial financial support of RS42500/- towards Biofuel and SPP student project program 42<sup>nd</sup> series</p> <p>Sum of Rs42500/- only has been utilize for the purpose Biofuel and SPP student project program for which it was sanction</p>
1	AGROBOT	7500/-	
2	Development of Energy Management System (EMS) for Solar Photovoltaic Power Plants to Supply Power for Cottage Industries without using Battery Bank	8000/-	
3	Design and Fabrication of Articulated 3D Printer	8000/-	
4	Power generation by engine exhaust gas for air brake	7000/-	
5	Anti-Krait venom activity of folk medical plants.	6500/-	
6	Bio plastic Extraction from waste grease produce in industries using as Glycerol as a substrate.	5500/-	

Certified that I have satisfied myself that condition on which the grant in aid sanctioned has been duly/are be fulfilled and that I have excise the following check to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of check exercised

1. Cash book
2. Vouchers

*[Signature]*  
Principal  
Sapthagiri College of Engineering  
14/5, Chikkasandra, Hesaraghatta Main Road  
Bangalore - 560 057

*[Signature]*  
Principal  
Sapthagiri College of Engineering  
14/5, Chikkasandra, Hesaraghatta Main Road  
Bangalore - 560 057

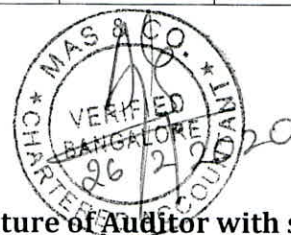


Sl. No	Project proposal ref no	Title of the project	Dept./Guide	Amount Sanction by KSCST	Amount utilized by the college	Balance if any to be refunded to KSCST
1	42S_BE_0279	AGROBOT	EEE/ Mr.Dhamodaran	7500/-	7500/-	0
2	42S_BE_1473	Development of Energy Management System (EMS) for Solar Photovoltaic Power Plants to Supply Power for Cottage Industries without using Battery Bank	EEE/ Mrs. Rekha S N	8000/-	8000/-	0
3	42S_BE_1589	Design and Fabrication of Articulated 3D Printer	ME/ Mr. Ullas CS	8000/-	8000/-	0
4	42S_BE_2339	Power generation by engine exhaust gas for air brake	ME/ Mr. Padmanabha	7000/-	7000/-	0
5	42S_BE_3333	Anti-Krait venom activity of flok medical plants.	BT/ Dr. Veena S More	6500/-	6500/-	0
6	42S_B_BE_003	Bio plastic Extraction from waste grease produce in industries using as Glycerol as a substrate.	BT /Mr.prashanth kumar HP/ Ms. Shobha G	5500/-	5500/-	0

Signature of the Principal with seal

Signature of Auditor with seal

Sapthagiri College of Engineering  
Chikkasandra, Hesaraghatta Road  
Bangalore-560 057



Date:

Principal  
Sapthagiri College of Engineering  
Chikkasandra, Hesaraghatta Road  
Bangalore-560 057