APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

**CENTRE FOR ENGINEERING RESEARCH AND DEVELOPMENT**

**College of Engineering Trivandrum Campus**

**Thiruvananthapuram. Pin 695 016**

**STUDENT PROJECT**

|  |  |  |
| --- | --- | --- |
| Name of the Principal Investigator  (Faculty who is guiding the project) | : | Dr. Mathew K |
| Phone no | : | 9495428095 |
| Email id | : | kmathewmace@gmail.com |
| Name of the Co-Investigator  (Faculty who is co-guiding the project) | : | Prof. Babu P Kuriakose |
| Phone no | : | 9447457933 |
| Email id | : | babupkuriakose@gmail.com |
| Address of the Institution | : | Mar Athanasius College of Engineering  Kothamangalam, Ernakulam, Kerala,  Pin:686666. |
| Title of the project proposal | : | IOT and PLC based smart home system with PV inverter and blockchain based energy trading |
| Name(s) of Student investigators | : | 1. Mathew Varghese 2. Ameer Fayiz Kaithakath |
| Semester | : | Seven |
| Branch | : | Electronics and communication Engineering |
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## Terms and Conditions

1. The scheme is constituted for the purpose of providing assistance in the form of grants to students for scientific research work with particular relevance to the State of Kerala in the economic and industrial development.
2. Grant will be released to the principal investigator after the completion of the project through the Head of the institution.
3. The maximum duration of the project will be one year from the date of start of the project.
4. This date of start of the project should be intimated by the Institution authorities/Principal Investigator to CERD. It will, in no case be later than one month after the receipt of the information letter.
5. On completion of the project, 3 copies of the final project report on the work done should be sent to the Council along with the utilization certificate (UC) and statement of expenditure (SE). The Utilization Certificate and Statement of Expenditure should be countersigned by the HOI in the case of Government Institution and should be audited by a chartered accountant in the case of private colleges. The copy of the relevant pages of the Bank pass book should also attached along with the documents for settlement.
6. The institute will maintain separate audited accounts for the project.
7. The institute will not entrust the implementation of the work for which the grant is being sanctioned to another institution nor will it divert the grant receipts to other institute as assistance.
8. The CERD reserves the right to terminate the project at any stage if it is convinced that the grant has not been properly utilized or appropriate progress is not being made. In addition, the Council may designate Scientist/Specialist or an Expert Panel to review the work done.
9. If the PI to whom the project has been sanctioned wishes to leave the Institution where the project is based, the Institute/PI will inform the same to the Council and in consultation with Council, evolve steps to ensure successful completion of the project, before relieving the PI.
10. Investigators must acknowledge the Council in reports and technical/scientific papers publishing based on the research work done under the project. Investigators are requested to publish some of the research papers emerging out of the project work in leading Indian Journals.
11. If the results of research are to be legally protected by way of patent/copy rights etc. the results should not be published without action being taken to secure legal protection for the research results.
12. The knowledge generated from the project will be the property of CERD and should be properly acknowledged. Transfer to technology generated shall be done in consultation with the CERD.
13. The CERD may enforce additional guidelines for the operation of the student project from time to time and the Institution/Investigators are required to observe such directions in the conduct of the research work.
14. Equipment head will not be allowed in research funding to private self financing colleges. In special situations, based on recommendations of expert committee, 50% of equipment cost will be reimbursed if and only if the other 50% is shared by the College

We agree to the terms and conditions stated above.

Name & Signature of Name & Signature of Name & Signature of

Principal Investigator Prof-in-charge, Head of Institution

Satellite Centre

(Office Seal)

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APPLICATION FOR GRANT FOR STUDENT PROJECT

|  |  |  |  |
| --- | --- | --- | --- |
| 1. |  |  |  |
| (a) | Title of the Research Proposal | : | IOT and PLC based smart home system with PV inverter and blockchain based energy trading |
| (b) | Broad area/field of classification | : | Consumer Electronics |
| (c) | Project Type(s) (Basic Research/Applied Research/Developmental/Demonstration/Others) | : | Developmental and Demonstration. |
| 2. |  |  |  |
| (a) | Broad objectives of the project | : | Design and implement an IOT based smart home system with a PV inverter which communicates using PLC and implement blockchain based energy trading |
| (b) | Precise objectives of the project | : | Develop an ecosystem for implementing PLC on IOT systems and enable energy trading in a secure way using blockchain technology. Also we aim to encourage the use of solar cells by integrating a solar inverter along with the PLC control system |
| 3. | Applications/Socioeconomic importance  (The relevance, if any, to the utilization  and management of the natural resources  of the State) | : | 1. Decentralised energy production and secure energy trading using blockchain encourages the use of green energy 2. Less dependency on centralized power generation using thermal power plants by enabling load shedding by energy transfer between the houses employing the proposed scheme 3. Optimise power usage by predictive analysis and automation 4. Control and know the status of devices via internet or mobile application |
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4. Abstract:

Typical smart home or an institution requires wifi coverage for the whole area. Our system pro

Each device will be assigned with a unique identification number which corresponds to a particular patient.With the help of API (Application program interface) developed for doctors and pharmacy software, digital copy of prescription will be shared with the device during consultation or purchase from pharmacy. The purchased medicines are fed into the device one after other by selecting the correct medicine. Thereafter the device will automatically allot each medicine to specific cartridges which are stacked inside the device. The stack design is in such a manner that the sorting mechanism can pick desired medicine from each cartridge. From the digital prescription, medicine to be dispensed is identified and packed into a single package on which general instructions regarding medication are printed using a thermal printer.

The upper part of the device will be having the rotating stack arrangement of medicine cartridges along with a single inlet to feed medicines. An attractive touch screen interface will be provided for effortless interaction with the device, also smartphone connected to same network can also act as an interface. Below every cartridge there will be outlet through which medicine picker mechanism will pick required number of tablets from the required cartridge. Instructions regarding selected medicines are printed on paper sachets using thermal printing. The picked medicines are collected into a paper sachet which have printed instructions for medicine intake. Power supply, battery and control unit will be in the bottom layer of the device. An ARM based controller along with the wife module, drives for different actuators and ports for other input output modules will be incorporated on the mother board.

|  |  |  |  |
| --- | --- | --- | --- |
| 5. | Name(s) of investigator (s) |  |  |
| (a) | Principal Investigator | : | Dr. Siny Paul |
| (b) | Co-investigator(s) | : | Prof. Benny Cherian |
| (c) | Student Investigator(s) | : | 1. Abhijith E M 2. Arjun RamuAmbat 3. Muhammed Risvan V 4. Nidhun K Madhu |
| (d) | Branch & Semester | : | Electrical and electronics Engineering, Semester 7 |
| (e) | [**Biodata of (a) (b) & (c) to be attached]** |  |  |
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|  |  |  |  |
| 6. | Particulars of equipment required | : | * Mechanical assembly of cartridges and external cover. * Single tablet picker mechanism. * Stepper motors * Servo motors for precise cartridge positioning. * Motor Driver boards. * Air tight containers for medicine storing. * Rollers * Pulleys * Microcontroller development board. * A laser barcode scanner * Thermal printer * Add on boards- sensor and driver boards. * Paper folder (paper cover making mechanism) * User friendly touch screen display. * Speakers(for notifications) * Tablet moving mechanism |
| 7. | Particulars of any other facilities required | : | 3-D printer, laser Cutter (Available at College Fab Lab) |
| 8. | Particulars of the facilities that will be  provided by the institution where this  project will be implemented. | : | Digital Storage Oscilloscope,  Power supplies, Signal generators, Computer, Working tools |
| 9. | Whether the scheme was submitted to any other organization for financial support, If so, the names of the institutions and their decisions may be indicated. | : | No |
| 10. | Whether at present receiving support  from any other organisation other  than your present department. If so,  full particulars of these may be  given. | : | No. |
| 11. | Budget Details: |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Si No | Item | Description | Quantity | Amount |
| 1. | **Consumables** |  |  |  |
|  | PLA | For 3D printing | 2 | 6000.00 |
|  | Acrylic sheet | 6X1250X1250mm | 4 |  |
|  |  |  |  |  |
| 2. | **Equipments** | | | |
|  | Mechanical structure | Fabricated using 3D printed and mechanical parts | 1 | 38,000.00 |
| Motors | Stepper,servo | 7 |
| Motor Driver board |  | 7 |
| Controller | Microcontroller based | 1 |
| PCB fabrication | Add-on boards | 1 |
| Rollers | Metallic | 8 |
| Rollers | rubber | 4 |
| Metallic track |  | 1 |
| Suction nozzles | Rubber nozzles | 6 |
| Pulleys | Plastic pulleys | 2 |
| Solenoid valve | 1’ solenoid valve | 3 |
| Touch screen display |  | 1 |
| Thermal Printer |  | 1 |
| Wifi module |  | 1 |
| Power supply |  | 1 |
| Barcode scanner | Laser | 1 |
| Conveyer belt | Rubber belt | 2 |
| 3. | **Travel** | Purchase |  | 2000.00 |
| 4. | **Research Literature** |  |  | 500.00 |
| 5. | **Others** | Miscellaneous |  | 2000.00 |
| 6. | **Contingency** |  |  | 2000.00 |
|  |  |  | **Total** | **50500.00** |

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| --- | --- |
| Signature of Principal Investigator:  Name, Address & Telephone No :  Place: Kothamangalam  Date: 19/09/2018 | Dr .Siny Paul  AssociateProfessor, EC Department  Mar Athanasius College of Engineering  Kothamangalam  PIN: 686 666  Ph: 9447815715  Office Seal |
|  |  |

Address:

Director Research,

Centre for Engineering Research and Development,

**APJ Abdul Kalam Technological University,**

College of Engineering Trivandrum Campus,

Thiruvananthapuram.

Pin 695 016.