Proposal Details

Title:

Campus **S**mart **R**ecycling **S**ystem to turn Food Organic Wastes and Recyclables into Economic Value Products.

Short Title or Acronym:

CSRS

Keywords:

Animals manure – Compost – Organic fertilizer – Kitchen waste management – Restaurant waste management – Campus waste management – Trash management – Garbage management – Aluminium cans – Plastic tableware – Tableware.

Funding and Duration:

Proposal Type CRP

Proposal period 12 Months.

Total cost:

The estimated total cost of the project is about 500,000.00 EGP.

Research Theme:

Our research theme is **Food, agriculture, fisheries** as pillars of the AASTMT strategy.

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Proposal Summary

The proposed project is about build and implement sustainable self-sufficient recycling system to turn AASTMT campus food organic wastes and recyclables into valuable products that have economical values, which can be used to reduce the campus running expanses.
The proposed system is targeting only 3 types of campus wastes (Organic food remains - Plastic tableware - aluminium cans).
The main objectives of the project are:

- Adding an economic value to the organic food wastes instead of dumping it.
- Reducing the campus running cost by:
  - Producing percentage of the campus disposable plastic tableware using AASTMT owned plastic injection machine reside at ISC.
  - Reducing the campus budget for purchasing:
    - Fertilizers used in campus cultivated areas.
    - Aluminum raw materials for student's graduation projects.

These objectives will be achieved by manufacturing:

- Portable compost unit that produce organic fertilizer from garbage.
- 2 molds for the AASTMT plastic injection machine.
- Plastic washing, drying and disinfection unit to recycle the plastic tableware.
- Aluminum can crusher machine to reduce the storing size of the cans until melting it.
- Electrical furnace to melt aluminum cans into raw bars.

ملخص الاقتراح

يهدف المشروع المقترح الى بناء وتنفيذ نظام إعادة تدوير مستدام مكتفي ذاتيًا لتحويل القمامة العضوية والمواد القابلة لإعادة التدوير داخل الاكاديمية إلى منتجات ذات قيمة اقتصادية والتي يمكن استخدامها لتقليل المصاريف الادارية الدورية.
ويستهدف النظام المقترح 3 أنواع فقط من نفايات الحرم الجامعي (بقايا الاطعمة - أدوات المائدة البلاستيكية - عبوات المشروبات الغازية (الألومنيوم).
وتتلخص الأهداف الرئيسية للمشروع في:

- إضافة قيمة اقتصادية للمخلفات الغذائية العضوية بدلاً من التخلص منها.
- تقليل تكلفة إدارة الحرم الجامعي من خلال:
  - إنتاج نسبة من أدوات المائدة البلاستيكية التي تستخدم لمرة واحدة داخل الحرم الجامعي باستخدام ماكينة حقن البلاستيك المملوكة للأكاديمية والموجودة في مجمع خدمة الصناعة بالاكاديمية.
  - تخفيض ميزانية الاكاديمية لشراء:
    - الأسمدة المستخدمة في تسميد المسطحات الخضراء واشجار النخيل في المقر الرئيسي.
    - خام الألومنيوم المستخدم في تنفيذ مشاريع تخرج الطلاب.

سيتم تحقيق هذه الأهداف من خلال تصنيع:

- وحدة سماد محمولة لانتاج السماد العضوي من القمامة.
- عدد 2 قالب لماكينة حقن البلاستيك بالأكاديمية.
- وحدة غسيل وتجفيف وتطهير البلاستيك لإعادة تدوير أدوات المائدة البلاستيكية.
- آلة سحق عبوات الألومنيوم لتقليل حجم تخزين العبوات لحين صهرها.
- فرن كهربائي لصهر عبوات الألومنيوم وتحويلها إلى قضبان خام.

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Introduction/Background

Dealing with and managing wastes is one of the most serious problem that face the modern civilization all over the globe. Most countries have developed firm strategies to control the trash threats to the community's public heath, while some still straggle from the consequences of the problem. Many countries and local communities either in first or third world countries, have a successful initiatives and projects about converting the trash into valuable resources with economic values.

The idea of recycling waste materials is not new, since dawn of history farmers were pioneers in recycling the unwanted biomass into fertilizers. Many ancient civilizations have many methods to produce organic fertilizers from biomass. In ancient agriculture practices farmers mainly were the ones whom responsible for producing the fertilizers to increase the cultivated land fertility.

Egyptian and Arab societies will greatly benefit from this project specially that the nature and traditions of the Egyptian living style produces a huge number of wastes (garbage and trash), unfortunately these wastes represent a crisis to the environment although it can be transformed into a great chance of productivity.

The project aims to make the implementations at AASTMT a case study and a role model to emphasize the return value from converting domestic food wastes and recyclables into valuable products with economic value. So that we can spread the idea to both Egyptian and Arab societies to control waste in places like resorts, sports clubs, restaurants and also urban housing areas.

The major factors that made Abou Qir campus is suitable for our project are:

- Our experience that gained from building our composter machine prototype in 2016.
- AASTMT produces large amounts of wastes due to the highly increasing number of students, restaurants and cafes in each campus especially in Abou Qir campus.
- The large percentage of cultivated area of the campus which need fertilizers. That means there is a great potential for saving if we can produce organic fertilizers, instead buying it.
- The availability of Plastic Injection Machine (Owned by AASTMT since 2018 as a result of a previous ERASMUS+ scholarship) in the projects workshop at the ISC.
- The COVID – 19 pandemic which affects our way of life since the 2020 until now.
- The increased numbers of graduation projects of AASTMT students that commissioned in the projects workshop at the Industry Service Complex, which use aluminum alloy in manufacturing parts of the projects.

We hope that this grant will be an opportunity, develop & enhance our work. And may open future opportunity to extend our system to cover all type of recyclable wastes in the campus.

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Questions and Objectives

The main questions that lead to this project proposal are:

- Can we practically benefit from wastes, instead of dumping it?
- Is there a simple cost-effective solution to help the local societies in the urban areas to decrease the effects of garbage problem?
- What are the best types of recyclable materials in domestic waste we can easily use?
- Can we build a solution that can suit many types of project benefiters?
- Are our project deliverables outcomes, can be used for startup projects, for youth in urban communities?

Figure 1 Bedaia 2020

As an answer to most of those questions, Research and Developments Department at Industry Service Complex in AASTMT Abou Qir campus, build a prototype for a small size composter unit that can be used in recycling the home kitchen wastes into organic fertilizer in 2016. The prototype proved the concept and succeeds in producing organic fertilizers as expected, from the kitchen food wastes.

The prototype was presented in many events at AASTMT like the environmental day in 2019, and many exhibitions like “Bedaia” exhibitor in 2020.

Figure2 Composer 2016

To demonstrate how local communities can benefits from recycling some types of their own wastes, our case study research will be based on a series of experiments to show the applicability of our solution using AASTMT main campus (Abou Qir) in Alexandria.

As mentioned before the proposed system will focus only in this stage on 3 types of campus wastes:

- Organic food waste from the kitchen and restaurant
- Plastic spoons and forks
- Aluminum beverage cans

The project objectives are:

- Managing and controlling the campus waste.
- Adding an economic value to the organic food wastes instead of dumping it.
- Reducing the campus running cost by:
  - Producing percentage of the purchased disposable plastic tableware using AASTMT owned plastic injection machine reside at ISC.
  - Reducing the campus budget for purchasing:
    - Fertilizers used in campus turfs areas.
    - Recyclables restaurant tableware (Spoons and forks).
    - Aluminum raw materials for student’s graduation projects.

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The project practical applications

These objectives will be achieved by manufacturing the following units:

- Portable compost unit that produce organic fertilizer from food organic wastes.
- 2 molds for the AASTMT plastic injection machine.
- Plastics washing, drying unit and UV disinfection unit to recycle the plastic tableware.
- Aluminum can crusher unit to reduce the storing size of the cans until melting it.
- Electrical furnace to melt aluminum cans into raw bars.

Figure6 Composter Unit

Figure4 UV Disinfection Unit

Figure3 Cans crusher

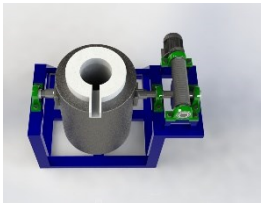

Figure 5 Electrical Furnace

The project social impact

To maximize the social impact, we must first identify the possible benefiters entities to focus on reaching most of them. Those entities should be kept up to date with the project results and recommendation through our society educational campaign.

Our initially analysis of the possible benefiters entities, predict that all of the urban entities can invest in recycling food wastes into fertilizers, this is logical because:

- it's the easiest type of recycling since the availability of the food wastes in every kitchen, almost every day
- Composter unit cost will be affordable, because of its simple operation.
- The running costs will be very low comparing to the plastic injection machine and aluminum furnace.

That means if we want to produce a commercial system, we should focus more on recycling the food waste by producing a working affordable cost smart composter unit.

Possible entity	Type	Food waste	Plastics	cans
Work Camps	Medium	✓		
Corporates	Large	✓	✓	✓
Factories	Large	✓	✓	✓
Homes	Small	✓		
Hotels	Medium	✓		
Orphanage	Small	✓		
Resorts	Medium	✓		
Restaurants	Medium	✓		
Universities	Medium	✓	✓	✓

Also, we predict that many of the benefiters of the project will be home owners in the residential areas; home residents will be the major numbers to respond to the project because of many reasons, but the most important one, is space and cost, not anyone can afford to buy a plastic injection machine, only large entities can afford that.

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Project Description

Since we focusing on recycling 3 types of campus wastes in this project, our work will be divided into 3 directions to build:

- Smart composter system unit. To recycle food wastes
- Smart plastics (washer, drier & disinfector) system. To recycle plastics
- Smart electrical furnace system unit. To recycle aluminum cans

All the units that will be produced by the end of the project will have the following smart features[1] except the electrical furnace:

- Wireless communications.
- Remote user alerting.
- Online remote monitoring.

Those features will be one of the first steps towards AASMT smart campus vision.

Recycling food organic wastes

As we said before we already build a working prototype since 2016. The composter unit is a simple machine that use steering and heat to accelerate the processes of composing the organic materials to produce compost. The capacity of 2016 prototype is 5 kg and it takes 21 days to produce the first batch of compost, then with daily adding of food organic wastes. It can produce 1 - 4 kg per day[i] (after the first 21 days) depending on the quantity of the organic waste that been added daily. In this project we want to build an upgraded version, with higher capacity and new features. We predict that those upgrades will defiantly add more value to the unit. Producing the compost takes 2 steps

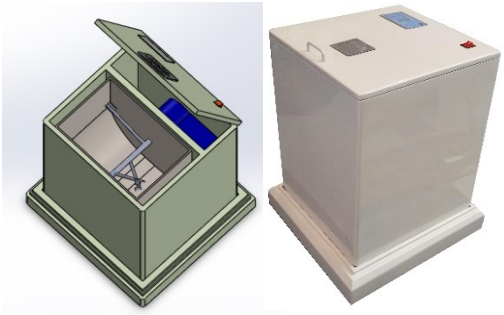
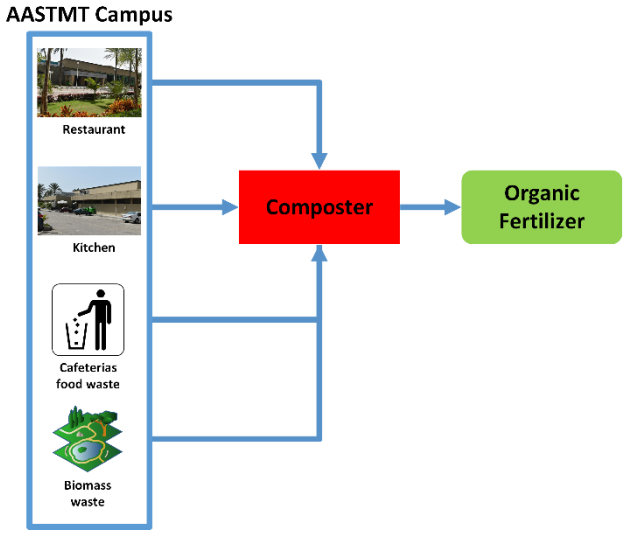


Figure7 Composter Prototype 2016



Step one collecting[2] the food organic wastes from its main sources:

- Campus main restaurant
- Campus main kitchen
- Campus cafeterias

Also, there are the biomass that came from he cultivated campus areas after the gardening and landscaping operations like cutting lawns and hedges. The main key here is that collecting food wastes should be on daily routine based on the composter capacity. Because there is no way to store the food wastes

[1] For the electrical furnace, depending on the control type will be used.
[2] This is the task of the campus cleaning service department.

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Step two start the composting process, as mentioned above collecting food wastes will be based on the composter capacity, also when operation the composter for the first time it will take about 21 to produce the first batch of compost

Cultivated areas survey in AASTMT main campus which need fertilizers which creates a unique opportunity to invest in composter units

The total area of AASTMT campus is approximately 50 Egyptian Fadan 214277 m^2 Cultivated areas = 59505 m^2 = =14 Egyptian Fadan	
The cultivated areas of AASTMT campus is approximately 14 Egyptian Fadan 59505 m^2 36652 m^2 turf Each m^2 needs 5 kg/year of compost Total needs 183260 kg = 183.260 ton	
Approximately 150 Date Palm trees[ii] *Phoenix dactylifera* L. Each tree needs 100 kg/year of compost Total needs 15000 kg = 15 ton	

The design of the new composter will focus on increasing the capacity of the unit and increasing the performance and controlling the decomposition process to decrease the duration of the first period to produce the first batch.

We plan to build 4 composters with capacity of 25 Kg for each one, we can build more composters based on request due to storage avilability.

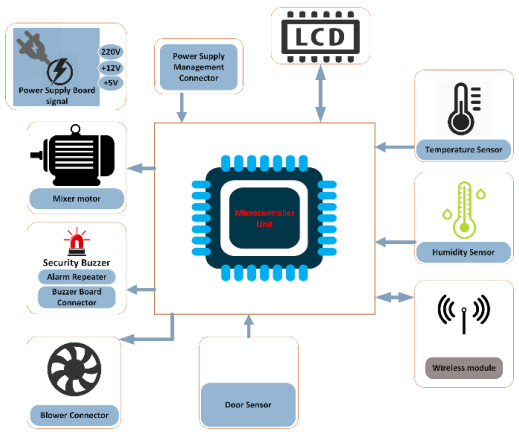

Figure8 Composter control block diagram

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Recycling recyclables: Plastic

Figure9 Plastic Injection Machine

Since 2018 AASTMT owned (as part of ERASMUS+ scholarship) a Plastic Injection Molding Machine[iii]. It comes with a single mold to make bottle cups. We want to make use of it by manufacturing 2 new molds, both of them will produce a useful product that can be benefit AASTMT by using it at the campus.

As a result of the current COVID-19 pandemic effects on or life style, using disposable plastic tableware (spoons – forks – knives) are more preferable to prevent viral and bacterial diseases spread in general.

Since 2018 AASTMT owned the injection machine, why not make use of it to produce disposable plastic tableware that could be used in AASTMT campuses restaurants and cafeterias. It will not be used in commercial production or for making profits, but will be used to make a self-sufficient campus, because the Injection machine is already there.

So, we plan to use the injection machine to produce AASTMT plastics needs, then after disposing this plastic we can collect it and clean, disinfect it, and then recycle[iv] it into another plastic product (not used in catering services)

How we plan to do that?

Step one is to manufacture a mold for plastic tableware to enable the injection machine to produce AASTMT needs from disposable tableware buy melting the plastic raw materials and injected into the mold to produce the plastic products[v]. Also, we will build the cleaning & draying and the disinfection machine using UV[vi] bulbs.

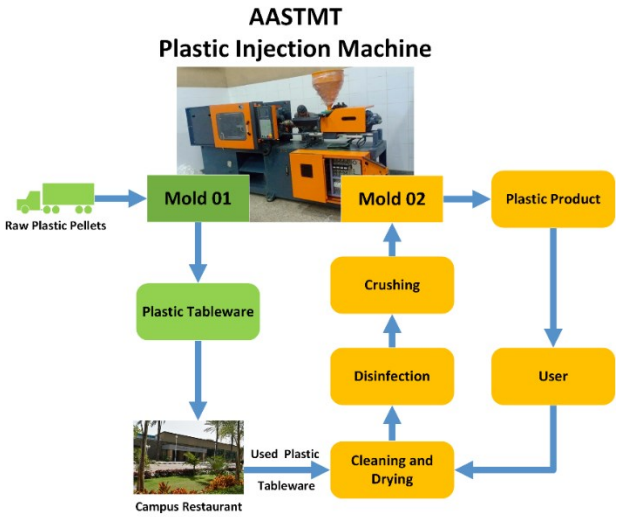

Figure 10 Recycling Plastic process

Step two we will be purchasing[3] Plastic Raw materials in form of plastic pellets, from local suppliers.

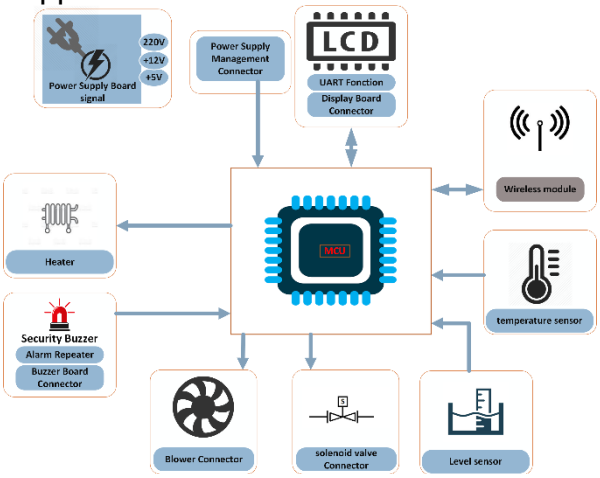

Figure 11 Washing drying machine control diagram

Step three we will produce a sufficient amount of the tableware to be used in the testing of the recycling process. As those products will be used in catering services we don't recommend using recycled materials for safety concerns.

Step four will be collecting (disposed plastic tableware produced from step three) from the restaurant and clean it using washing and drying machine then disinfection using UV to ensure safety, although the plastic product

[3] After completing the project AASTMT officials will handle the purchasing process, we will purchase only during the project period for testing purposes only.

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produced from the recycled plastic tableware will not be used in a catering service. After that it will be crushed to little pieces using the injection machine crusher.

Step five as in step one to produce a different product we will need another mold so, we will manufacture a mold for a chosen product to be produced using the crushed plastic from step four, that product could be for example drink coaster, planter or any useful product we can find.

Recycling recyclables: Aluminium cans

Recycling cans will be by melting[vii] it by electrical furnace. We will start by building the Electrical furnace then we build the smart cans crusher.

Step one collecting[4] the cans from trash pins.

Step two crushing the cans o save space required for storage until melting it. Because cans volume is larger than its weight. Cans sizes available:

Size	Weight	1 KG
330 ml	13 g	77 can
250 ml	11 g	91 can

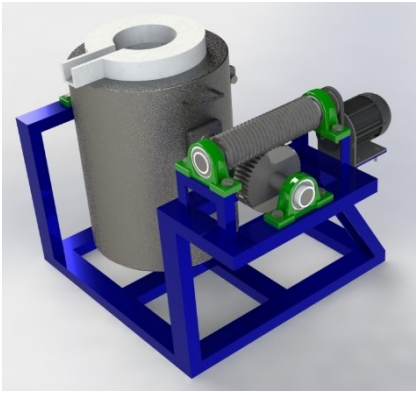

Figure 12 Electrical furnace concept design

Step three melting the cans using the high temperature produced by the electrical furnace. The melting process will not be a daily job, it will be necessary only when there is enough weight of crushed cans stored. Determine the best weight to start melting will be related to the size of the furnace. At the end of the project we will be able to specify the best cans weight should be stored to start the melting process.

Melted aluminium will be shaped by pouring it into molds, after cooling it can be used in machining parts needed for the AASTMT student graduation projects. The scrap from those processes can recycled by be melted again with crushed cans.

Figure 13 Cans crusher unit

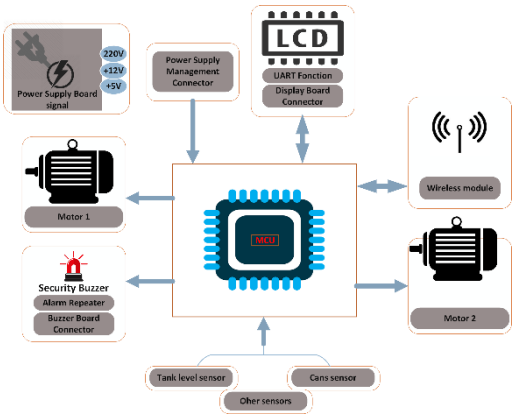

Figure 14 Can crusher control diagram

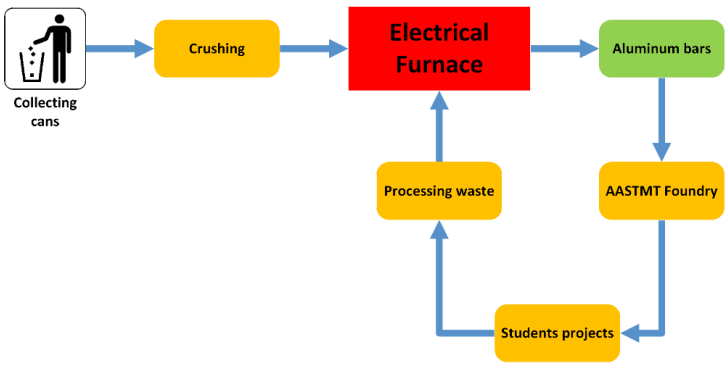

Figure 15 Aluminum cans recycling process

[4] Collecting disposed empty cans should be the responsibility of the campus cleaning services.

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Research Design and Methods

Our main research problem focuses on showing the hidden economic values of the campus various types of wastes, which due to many factors are considered huge, which can be resulted in great saving in campus budget.
AASTMT is not the only target of our project, but it is considered as a role model. We want to prove that a smart recycling system can be built by local materials, with moderate cost.
Because of the unique characteristics of our project we will follow those steps:

- First step is to
  - Build the units (Composter – Cans crusher - Furnace – Washer/dryer – UV disinfection)
  - Collect financial data from the AASTMT finance department about the products that our system can offer an alternative for it, like (organic fertilizers – Plastic tableware – aluminum alloys materials for students' workshops)
  - Get the standards for the recycled products, for example from Egyptian Ministry of Agriculture we can find the latest recommendation for fertilizing each species of cultivated plants in the campus.
- Second test every unit performance by collecting various operation data
  - Unit performance measurements at loads
  - Unit safety factors under various operation conditions.
  - Efficacy factors measurements.
  - Productivity (speed – down time losses).
  - Power consumption (estimated running costs).
- Third step is to
  - Analyze the data collected
  - Predicting the productivity of the unit based on the data collected
  - Estimating the number of system units that should be produced to gain the maximum profit
    - This estimation will be based on comparing the unit's data with the AASTMT financial data for that products.
- Finally preparing the recommendations and some statistics:
  - ROI value for every unit of the system
  - Recommending the minimum stored recyclables to start the recycling process, for example how many Kg of compacted cans to be melted at once using the electrical furnace unit.

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Anticipated Results and Evaluation Criteria

As we mentioned before, our project main objective is to demonstrate the economically advantages of recycling certain types of domestic waste.

The most promising type of recyclable waste that may have a wide spread between many society levels, is recycling the kitchen food wastes, simply because, every kitchen in every house produce a reasonable amount of organic food waste daily.
In our case study surveying the campus cultivated areas giving us a good potential of success.
Our survey shows that: more than 60% of the cultivated area are turf, that giving us a great opportunity here for saving good amount on fertilizers budget as the numbers shows we need almost 180 tons of organic fertilizers, I can still remember the smell of the campus near the sports field at every midterm vacation when the animal manure was applied to the fields.
If we could increase the efficiency and the capacity of our composter, that will have reflected on the quantities produced per year, which can make good saving.
Based on our prototype data, in optimal conditions if we start using the composter for 1 year that gives a total of 344 production days after the first 21 days of working of start working, and if the average production per day is 3 kg, then the total produced compost per year is 3*344=1032 kg = 1 ton per year.
As it looks, its a small percentage, but if we increase the capacity and the composter working units, we can enhance the savings.

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Expected Project Outcomes and Impact to AASTMT

I- Technical output and Impact:

The project expected outputs as described in the following points:

- A working prototype of a recycling system.
- Publishing a paper with results to show the main system features and the saving amount of money, energy, space and wastes that can be achieved.

The project expected outputs is described in the following points:

- Manufacturing the following system units:
  - Portable composter unit to convert garbage into organic compost
  - 2 molds for the AASTMT plastic injection machine.
  - Plastic washing unit to clean the recyclable plastic before crushing.
  - Aluminum cans crusher machine to reduce the storing size of the cans.
  - Electrical furnace to melt aluminum cans into raw bars.
- Publishing a paper with results to show the impact of the self-made software algorithm and its capabilities.

II- Financial feasibility & Socio-economic Impact:

Our project is focused on the feasibility of turning wastes into economical valued products. so that we predict possible beneficiaries for the project, regarding recycling kitchen wastes, entities like universities, Sports clubs, Youth centres, Hotels, Resorts, work camps, Charity NGO and Residential buildings in cities.

Achieving financial feasibility will be form the return of investment in the composter unit, the end users will pay for the unit price and the electrical running cost only. The raw material for the composter operation is coming from their kitchens almost for free. Those fertilizers will have economical value and can be used for:

- Street gardens.
- Selling to plants nurseries.
- Selling to plant grower hobbyist.
- Apartment's balcony plants.
- Apartment /office indoor plants.
- Building's roof gardens.

AASTMT should invest in our project for the following reasons:

- Reducing campus running cost by reducing:
  - (Fertilizers - Students' projects - Plastic tableware) budgets.
- Converting the AASTMT campuses into smart sustainable campuses this will help AASTMT chances in sustainability sector grants in the future.
- Enriching the AASTMT social responsibility.
- The clear need to investment opportunities in the sector of the wastes management as the Egyptian government moves quickly in this direction due to its direct environment impact on health and energy.
- The Project outputs (machines) could be a starting point for example:
  - (undergraduate students graduation projects
  - MSc and PhD student's enhancement research points

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Preliminary feasibility study

To clarify the idea, we calculate a preliminary feasibility study to show the potential of the expected project results

Abou Qir campus have

14 Egyptian Fadan = 59505 m^2 of Cultivated area (most of it sports fields) About 62% of this area is a turf 36652 m^2 Each 1 m^2 of the playgrounds turfs needs 5 Kgs of compost Then the total area needs 183260 kgs = 183.260 ton The compost average price is 3000 EGP/ ton Then total cost of compost budget = 549,780.00 EGP annual budget for turf compost
150 Date Palm trees: Each palm tree needs 100 Kgs of compost/year [viii] Then the total trees need 15000 kg = 15 ton The compost average price is 3000 EGP/ ton Then total cost of compost budget = 45,000 EGP annual budget for palm trees compost Total estimated of compost budget = 594,780.00 EGP annual budget for compost

While, the composter total expanses on the first year will be the composter cost + electricity annual electricity running costs. While on the next years the composter total expanse will be only the annual electricity running costs.

Which means that the ROI[5] of the composter will be within the first 6 months.

III – Publication:

As mentioned before in the technical output and impact, one of our expected outcomes is one peer-reviewed original research paper accepted for publication (received a DOI) in a Q1-Q2 journal or its equivalent.

Based on the design specification of the recycling system, the system test results should be summarised in a scientific publication in form of case study to show the main system features and the saving amount of money, energy, space and wastes that can be achieved.

This also will keep the rights of the Arab Academy for Science, Technology and Maritime Transport (AASTMT) in any further opportunities for enhancing the system or in any chances of investment in the production scale.

[5] ROI Return of Investment

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Resources

Personnel:

Name of Team Member	Position / Title	Exp
Dr. Essam Ezzat ElBokl	Dean of Industry Service Complex - AASTMT	40 years
Dr. Abdallah Zeineldin	Professor at Faculty of Agriculture – Alex. Univ.	40 years
Eng. Amr Khamis	Head of R&D Department	15 years
Eng. Fawzia Hamed	Head of production workshops	15 years
Eng. Mohamed Abousena	IT & IoT R&D Engineer	20 years
Mr. Ahmed Saad	Mechanical Technician	8 years
Mr. Hussein Fahim	Electrical Technician	21 years
Mr. Belal El Sayed	Mechanical Design Technician	4 years
Ms. Mennat Allah Henidy	Administrative Coordinator	3 years

Office Facilities

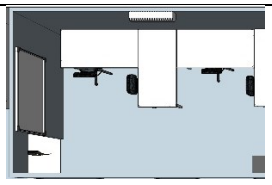
Dr. Essam Ezzat ElBokl	Office (407) – 4th Floor – Industry Service Complex
Eng. Amr Khamis	Office (416) – 4th Floor – Industry Service Complex

Laboratory Space


Mechatronics Lab 308

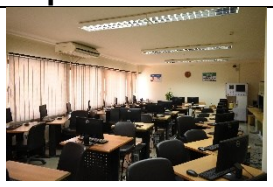

Reverse Eng Lab 03


Turning CNC Lab 07


Innovation Lab 102


Router CNC Lab 05

Computer Laboratory Facilities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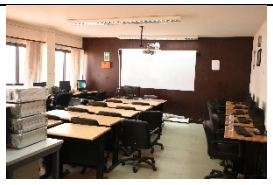
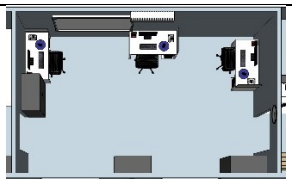
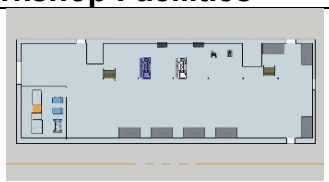

Computer Lab 16 PC


CNC Turning 22 PC


Projects 3 PC

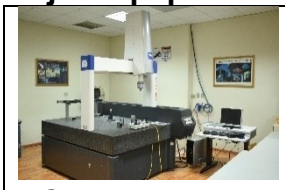
Workshop Facilities


Projects Workshop


Traditional Turning


Welding Workshop

Major Equipment:


CMM Machine


CNC Router


CNC Plasma


3D Printer


Plastic Injection

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Team Information

The project total team members whom will be participate in the project implementation are: **9** members. **8** of the team members are belongs to the Arab Academy for Science, Technology and Maritime Transport.
We proud to have the partnership of:
Prof. Abdallah Zeineldin, former Dean of Faculty of Agriculture, Alexandria University.

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Prof. Abdallah Zeineldin	Agriculture	Professor at Faculty of Agriculture
Eng. Mohamed Abousena		Agriculture Engineering – IoT
Mr. Ahmed Saad	Mechanical	Mechanical Technician
Mr. Belal Elsayed		Mechanical Design Technician
Eng. Fawzia Hamed	Design Engineer	Head of Production workshops
Ms. Mennat Allah Henidy	Digital marketing	Administrative Coordinator

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M = No. of months
I = Incentive per month (LE)
N = Number of other projects and their IDs
T = Total % of time spent on other projects

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Dean of Industry Service Complex AASTMT Alexandria, Egypt.

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Marital Status:	Married
Current Position:	

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1. PhD. "Modern Double Hull Tanker Design for Minimum Environmental Impact", Arab Academy for Science, Technology and Maritime Transport – 2003.
2. M.SC. "Implementation of Group Technology Approach in Shipyards", Arab Academy for Science, Technology and Maritime Transport –1996.
3. B. Sc. Suez Canal University, Faculty of Engineering, Ship Building Department, 1985.

III. LANGUAGES:

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English: (Spoken & written)

IV. EXPERIENCE:

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- Manager of Technical & Vocational Institute. 2012 - 2014.
- Field Engineer in Suez Canal Authority, Port Said Shipyard, 1985 - 1991.
- Lecturer in the Arab Academy for Science, Technology and Maritime Transport 1991- 2012.
- Teaching Experience "Engineering Science, Material Science, Technology of Materials"

V. PUBLICATIONS

- "On the Transverse Strength of Double Hull Tankers", Faculty of Engineering, Suez Canal University, Port Said, 2002 Vol., No.
- Ship Construction – Text Book – Arabic Edition – 1997.
- Racing Rules of Sailing – Translation of the International Sailing Federation edition of 1993 – 1996 Rule Book.
- Racing Rules of Sailing - Translation of the International Sailing Federation edition of 1997 – 2000 Rule Book.
- Health & Safety occupational Health and Safety for General Industry in accordance to OSHA standards – 2015.
- Welding Technology – Text Book Arabic Edition – 2015.
- Ship Repair Technology – Text Book Arabic Edition – 2016.

Abdallah Mosaad Zeineldin
Alexandria, Egypt – 01222265669 –
Professor at Faculty of Agriculture – Department of Agriculture Engineering - Alexandria University .

Education

- PhD 1990 Faculty of Agriculture Alexandria Univ. Egypt/Technical univ Nova Scotia. Canada.
- M. Sc 1985 Faculty of Agriculture Alexandria Univ. Egypt.
- B. Sc 1981 Faculty of Agriculture Alexandria Univ. Egypt.

Current academic activities and Position

- Dean of faculty of Agricultural 2015 until 2020.
- Department head of Ag. and biosystems Engineering 2011-2014 .
- Director of Intellectual Property Rights Office at Alexandria university 2009 - Date.
- “General director of quality assurance and supervision committee of ICTP project” Alex. Univ. Egypt 2009 - Date.
- General supervisor of Patent Office Focal Point at Alexandria University 2009 - Date.
- Professor” Dept. of Agric. Eng. Fac. of Agric., Alex. Univ., Egypt. 2001-Date.

Professional Experience (sorted by position(

- “Dean of High institute For Advanced business And Computer” 2007-2009
- “General supervisor of computer unit for examination work” Faculty of Agriculture Alex. Univ. 2001-2007 / 2009- Date.
- “General supervisor of computer unit for examination work” EGOTH Institute Alex. Univ. 2005-2007.
- “Engineering Supervisor for Maintenance ornamentals and landscape gardening machinery project” Faculty of Agriculture Alex. Univ./Alexandria Governorate 2004-2005.
- “Associate professor” Dept. of Agric. Eng. Fac. of Agric., Alex. Univ., Egypt. 1996-2001.
- “Assistant professor” Dept. of Agric. Eng. Fac. of Agric., Alex. Univ., Egypt. 1991-1996.
- “Assistant professor” Dept. of Agric. Eng. Faculty of Agriculture, King Saud University, Saudi Arabia 1994-1996.
- “Teaching assist” Dept. of Agric. Eng. Fac. of Agric., Alex. Univ., Egypt. 1986-1991.
- “Demonstrator” Dept. of Agric. Eng. Fac. of Agric., Alex. Univ., Egypt. 1981-1985.

Amr Khamis Mahmoud Mohamed
Alexandria, Egypt – 0201008664628 – amr.khamis@aast.edu, amr.khamis.mahmoud@gmail.com

Head of R&D Department at Industry Service Complex – Arab Academy for Science, Technology and Maritime Transport.

Education

PhD Degree (2020 – Till now)

PhD candidate in Electronics and Communication Engineering – College of Engineering and Technology at AASTMT.

Master Degree (2007 – 2012)

Master Degree in Electronics and Communication Engineering – College of Engineering and Technology – at AASTMT. Grade: Excellent with Degree of Honor (GPA: 3.67).

Bachelor Degree (2001 – 2006)

Bachelor Degree in Electronics and Communication Engineering – Faculty of Engineering - Alexandria University – Egypt. Grade: Very Good with Degree of Honor (Grade: 83.63%).

Grants

- PI: Atmospheric Water Generator – Academy of Scientific Research and Technology. (Grant Value: 650K EGP)
- Engineer: Remotely Operated Vehicle (ROV) – Academy of Scientific Research and Technology. (Grant Value: 100K EGP)
- Engineer: Robot for bomb disassembly – Academy of Scientific Research and Technology. (Grant Value: 1M EGP)
- Engineer: Energy sustainable Houses (ECO House) – Academy of Scientific Research and Technology. (Grant Value: 3M EGP)
- Engineer: Broadband Satellite Communication Network Development (ENPI/2014/342-443) – Research, Development and Innovation Program Funded by the European Union (Grant Value: 600K Euro)

Publications

- Hexagonal Two-Tier Data Dissemination Model for Large Scale Wireless Sensor Network, 2012, JEC-ECC'12.
- Achieving Scalability in Wireless Sensor Network Using Hexagonal Multi-Layer Grid Data Dissemination Approach, Journal of applied science 12(19), 1982-1994, 2012.
- Low-Cost Atmospheric Water Generator, AEAS 2013.

Mohamed Youssef Hussien Abousena
Alexandria, Egypt – 01001829545 – mabousena@aast.edu – mabousena@ieee.org

IoT R&D engineer at R&D Department Industry Service Complex – Arab Academy for Science, Technology and Maritime Transport.

Experience

IoT R&D Engineer @R&D Dept – ISC – AASTMT, Alexandria.
Senior Network Engineer @ACCIT – AASTMT, Alexandria.
Team leader, Plan, design and implement LAN/WAN solutions.
GTA @Collage of Computing and IT – AASTMT, Alexandria.
IoT & Professional Training in Networking
Cisco Networking Academy Instructor @AASTMT.
Network Engineer @CACE – AASTMT, Cairo.

Education

Preparing for MSc IT 2017 Alexandria University
Oracle DBA - MCIT Scholarship 2001 AASTMT - P&Q Institute
BA Agriculture Science 1998 Alexandria University

Training

2020 Coursera online courses
2010 PMP Official PMI Prep Course V4
2009 Optical Fiber Communications
2008 Brand-Rex Certified Installer
2008 NS I&II, Industrial Sensors, Fundamentals of W LAN
2006 CCNP Cisco Certified Network Professional
2003 Cisco Networking Academy Instructor Training

Skills

IoT, Sensors, Agriculture 4.0, PCB, C/Python, Altium designer,
Prototyping, Microcontrollers, Information Technology.
English and German.
Cisco Champion in IoT 2015,2016 and 2017.

Projects

2020 COVID-19 disinfection gates
2019 Projects workshop upgrade design
2019 Erasmus+ Vet-Eng HVAC (4,5 and 6)
2019 ARKAS Project
2019 2nd Egypt's Youth Skills Competition
2018 1st Egypt's Youth Skills Competition

Activities

Photography, Reading, Hiking, Fishing, Model ships and Electronics.

Ahmed Saad Abd Elsalam
Alexandria, Egypt – 01205549553 – ahmed_saad@aast.edu

Head of projects workshop and mechanical technician at Research and Development Department - Industry Service Complex – Arab Academy for Science, Technology and Maritime Transport.

Experience

Mechanical Technician & Head of workshop
R&D Department – Industry Service Complex (From Apr 2013)
Head of workshop, implementing student's graduation projects.

Crane Operator
International Ports Services - Dammam, KSA. (From 2008 – To 2013)
Containers Crane Operator

Installation Technician
EgySAT (From Sep 2001 – To Feb 2008)
Installations Technician.

Education

Bachelor of Law - **2001** Alexandria University

Training

2019 CNC turning training course
2019 Plastic Injection machine operating training course
2008 Port Training Institute

Skills

Welding, Metalworking, Turning, Projects Prototyping.
English language.

Projects

2020 COVID-19 disinfection gates
2019 Erasmus+ Vet-Eng HVAC
2019 ARKAS Project

Hussien Fahim Ahmed
Alexandria, Egypt – 01283694199 – hussein_fahem@aast.edu

Electrical and electronics technician at Research and Development Department - Industry Service Complex – Arab Academy for Science, Technology and Maritime Transport.

Experience

Electrical Technician (From 2012 till now)
R&D Department – Industry Service Complex – AASTMT

Electrical installation & electronics technician.
AASTMT (From 2003 to 2009)

Maintenance technician at
Alexandria for the manufacture and repair of scales (From 2000 – To 2003)

Education

BA Business Administration
2017 Cairo University – Open Education

Training

2019 CNC turning training course
2019 Plastic Injection machine operating training course

Skills

Electronics, Electrical installation, Logistics, Maintenance, Welding.

Projects

2020 COVID-19 disinfection gates
2019 ARKAS Project
2017 Water generator Shalatin and Sinai
2016 Echo house
2015 Pure Mobility

Activities

Traveling, fishing, Maintenance and Reading.

Fawzia Hamed Basuny
Alexandria, Egypt – 01030005068 – f_hamed@aast.edu

Head of the Department of Productive Work shops, Industrial Service Complex, Arab Academy for Science, Technology and Maritime Transport (AASTMT)

EDUCATION

2020 to present	Department of Industrial and Management Engineering, Arab Academy for Science, Technology and Maritime Transport, Egypt Ph. D. Industerial Engineering.
2014 – 2017	Department of Industrial and Management Engineering, Arab Academy for Science, Technology and Maritime Transport, Egypt. M. Sc. Industrial Engineering, October 2004.
1996 – 2001	Department of Production Engineering, Faculty of Engineering, Alexandria University, Egypt B. Sc. Production Engineering, July 2001.

PROFESSIONAL EXPERIENCE

Jan. 2016 – Now	Industrial Service Complex, Arab Academy for Science Technology and Maritime. Head of The Department of productive Work shops.
Jul. 2012 – Jan. 2015	Industrial Service Complex, Arab Academy for Science Technology and Maritime. R&D engineer.
May 2008 – Feb. 2012	Industrial Service Complex, Technical and Vocational Institute TVI Arab Academy for Science, Technology and Maritime Transport. Teaching Assistant.
Jan. 2002 – Feb. 2005	Commercial Diving Company CDC. R&D engineer.
Oct. 2001 – Jun. 2007	Specialized Studies, Academy-mechanical department. Teaching Assistant.

SELECTED PUBLICATIONS, TECHNICAL REPORTS & PRESENTATIONS

2018:

- Essa, K., Sabouri, A., Butt, H., Basuny, F.H., Ghazy, M., El-Sayed, M.A., Laser additive manufacturing of 3D meshes for optical applications, PloS one. 2018. *13*(2), pp.e0192389.
- El-Sayed, M.A., Shyha, I., Basuny, F.H., Effect of hydrogen content on the double oxide film defects and properties of aluminium castings: A Review, Journal of Engineering Technology. 2018. 6 (Special Issue -Emerging Trends in Engineering Technology), pp. 225-244.

2020:

- Basuny, F.H. and El-Sayed, M.A., The effect of holding time before solidification on the properties of aluminium castings. The Journal of the Southern African Institute of Mining and Metallurgy, 2020. 120 (8): p. 1-8.

Belal Elsyed Ibrahim
Alexandria, Egypt – 0112810033 – belalelsyed@adj.aast.edu

Mechanical CAD Designer Technician at Research and Development Department - Industry Service Complex – Arab Academy for Science, Technology and Maritime Transport.

Education

2015 – 2017: HND Holder from Arab Academy for Science, Technology and Maritime Transport at Industry Service Complex – Technical & Vocational Institute.
2013 – 2015: Vocational Secondary Diploma

Training

2014 Abu Qir Petroleum Company
2019 Plastic Injection machine operation training course
2020 CAD Design training

Skills

Welding, Metalworking, Turning, Projects Prototyping.
CNC machines operation and programming.
CMM machine operation and programming.
Hydraulic and Pneumatic Systems.

Projects

ROV
Sanding Machine
Composter Machine
Agriculture Seeding CNC Machine
CNC Router Machine
3D Printer Machine
Retro-fitting of Lathe machine into CNC lathe machine
Cans Recycling Machine.

Software Skills

- Soildwork
- Ansys
- Auto-CAD
- Corel DRAW
- ARTcam
- Microsoft Office

Awards

1st place at Skills Competitions in CAD Drawing for 2018 and 2019 Competitions.

Mennat Allah Henidy
Alexandria, Egypt – 010066700894 – mennatallah.henidy@yahoo.com

Administrative Coordinator at Research and Development Department - Industry Service Complex – Arab Academy for Science, Technology and Maritime Transport.

Education

2010-2013: Bsc from College of Management & Technology in Arab Academy for Science Technology and Maritime Transport University

Responsibilities

Coordinate office activities and operations to secure efficiency and compliance to company policies
Manage phone calls and correspondence (e-mail, letters, packages etc.)
Create and update records and databases with personnel, financial and other data
Assist colleagues whenever necessary

Courses

- A certificate of a workshop on legal accounting in regional federation of non-governmental associations and foundations in Alexandria
- TOEFL course from Amideast with score 450 (pass)
- A professional HR diploma certificate from Arab Academy for Science and Technology and Maritime Transport
- Capacity Building Training from WISE 2019

Skills

- ICDL certificate2012, experience in Microsoft windows and office

Languages

- Native language: fluently spoken and written Arabic and English
  Competitive in spoken and written English

Project Management

Project coordination and monitoring will help us to better monitor and control each phase of the project to ensure its progressing according to our planned timeline. Therefore, the project manager role is assigned to **Eng. Amr Khamis** so he will be the project manager.

The project phases:

The project is divided into 4 phases, each phase will take 3 months, which give us 12 months to complete the project. The planned phases are:

1. Research and Design
2. Purchasing & Building
3. Testing & Collecting Data
4. Analyzing Data and Publishing Results

The project milestones:

At the end of every phase of the project 4 phases there will be a milestone, to identify the important goals that should be reached at that time. Our milestones are:

Milestone	When	Outcome
Finishing the units design	End of 3rd month	Designs are ready for building the recycling units
Building the units	End of 6th month	The units are ready to live testing
Logistics data collection	End of 9th month	AASTMT logistics data available to start analysing and making the case study.
Operation teams' training	End of 11th month	Operation teams will be ready to receive the units after project completion

Progress follow-up:

To keep up with the project progress we will do the following:

- The availability of online meeting when ever needed using Zoom.
- Creating progress report every 3 months during the project to keep track of the work.
- Progress meeting every 3 months after finish the progress report.

Team member responsibilities:

Dr. Essam Ezzat ElBokl	LPI & researcher
Prof. Abdallah Zeineldin	Researcher & consultant
Eng. Amr Khamis	Co- PI, researcher, control & project manager
Eng. Fawzia Hamed	Design Engineer
Eng. Mohamed Abousena	Researcher & coordinator
Mr. Ahmed Saad	Mechanical manufacturing and machining
Mr. Hussein Fahim	Electrical works
Mr. Belal Elsayed	Mechanical design
Ms. Mennat Allah Henidy	Administrative work & Digital marketing

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DETAILED PLAN ON PROJECT'S ACTIVITIES (*GANTT CHART*):

Activity Name	M 01	M 02	M 03	M 04	M 05	M 06	M 07	M 08	M 09	M 10	M 11	M 12
1: Research and Design												
1.1: System Conceptual Design.												
1.2: Mechanical System Design.												
1.3: Control System Design.												
1.4: Searching for parts & materials												
1.5: First Quarter Project Report.												
1.6: Quarterly Technical Review Meeting #01.												
2: Purchasing & Building												
2.1: Purchasing needed parts & materials												
2.3: Manufacturing units & purchasing molds												
2.4: Programming and testing control.												
2.5: Start collecting recycles (Aluminium cans).												
2.6: Second Quarter Project Report.												
2.7: Quarterly Technical Review Meeting #02.												
3: Testing & Collecting Data												
3.1: Start composting process.												
3.2: Producing sufficient products.												
3.3: Collecting data from AASTMT.												
3.4: Measuring unit's performance.												
3.5: Third Quarter Project Report.												
3.6: Quarterly Technical Review Meeting #03.												
4: Analysing Data and Publishing Results.												
4.1: Analysing data and assessing results.												
4.2: Starting paper publishing procedures.												
4.3: Design unit's brochure & user manuals.												
4.4: Lunching the project website.												
4.5: Train operation teams on machines.												
4.6: Fourth Quarter Report & Final Report.												
4.7: Quarterly Technical Review Meeting #04.												
4.8: Project Final Report												

Critical Path

Most of the critical path depends on the AASTMT fund payments schedule.

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Allowable Project Costs

Item	(%)	Amount (EGP)
Staff Cost	20	100,000 EGP
Mobility Cost (Staff and Equipment Transportation)	5	25,000 EGP
Dissemination, Seminars, Workshops and Printing Cost	5	25,000 EGP
Data Collection, Training,	5	25,000 EGP
Equipment's, Acquisition of Materials, Spare Parts	65	325,000 EGP
Total Cost (EGP)	**100**	**500,000** EGP

Breakdown of Costs

Eligible costs	Break downs	AASTMT support (L.E.)
(A) Staff Cost	Dr. Essam Ezzat ElBokl	15,000 EGP
	Prof. Abdallah Zeineldin	15,000 EGP
	Eng. Amr Khamis	9,000 EGP
	Eng. Fawzia Hamed	9,000 EGP
	Eng. Mohamed Abousena	6,000 EGP
	Mr. Ahmed Saad	6,000 EGP
	Mr. Hussein Fahim	6,000 EGP
	Mr. Belal Elsayed	6,000 EGP
	Ms. Mennat Allah Henidy	6,000 EGP
	Technicians and/or Labor	7,000 EGP
	Consultation fees	15,000 EGP
	Total	100,000 EGP
(B) Equipment	Plastic Injection Steel Molds	90,000 EGP
	Electronics components	20,000 EGP
	Electrical components	55,000 EGP
	Mechanical components	65,000 EGP
	Metal Sheet Paints	5,000 EGP
	Raw materials	40,000 EGP
	Electrical Furnace components	35,000 EGP
	Steel & Steel Accessories	15,000 EGP
	Total Equipment	325,000 EGP
(C) Expendable Supplies & Materials	Stationary	2,000 EGP
	Miscellaneous Laboratory, Field	3,000 EGP
	Total Supplies & Materials	5,000 EGP
(D) Travel	Internal Transportation	18,000 EGP
	Accommodation	7,000 EGP
	Total travel	25,000 EGP
(E) Other Direct	Services | Fiber & Electro Static	10,000 EGP
	Report preparation	10,000 EGP
	Publications & patent Costs	25,000 EGP
	Workshops organization or Training	10,000 EGP
	Website for dissemination (3 Years)	10,000 EGP
	Total other direct costs	65,000 EGP
(G) Total Costs		500,000 EGP

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Plans for Disseminating Research Results / Sustainability of the action

After completing the project and to ensure its sustainability, we plan to guarantee the maximum benefits of the project results is by recommending the following procedures.

1. **Sustainability at AASTMT**

   AASTMT administration should deliver the project deliverables (machines units) to a related department within the campus to administrate the recycling process. And also assign a specific team for collecting the garbage and recyclables and deliver it to those related departments.

   - Our recommendation is:

Unit	AASTMT Department
Composter Unit	Agriculture department
Plastic injection molds and recycle unit	Industry service complex
Electrical furnace	
Task	**AASTMT Department**
Collecting Garbage from kitchen & restaurant	Campus Cleaning Service
Collecting used plastic tableware	
Collecting discarded aluminium cans	

   To motivate those departments personals for supporting and sustaining the recycling process, we recommend that AASTMT should financially reward them form the money saved form the related purchasing budget of the produced product.

2. **Sustainability for General Public**

   General public should be aware of the benefits of the recycling process, our plan to share the project results with the local societies in both Egypt and Arab countries by:

   - Prepare and publish a case study paper.
   - Lunching a website in Arabic language about the project (min 3 years).
   - Deploying a digital marketing campaign through social media channels about the project on multiple platforms (Facebook page – YouTube channel – Instagram).

3. **Sustainability for urban domestic communities**

   In urban residential areas recycling kitchen garbage is the most appropriate approach based on our project. The produced fertilizers from the composter will used for fertilizing:

   - Apartment's balcony plants.
   - Apartment /office indoor plants.
   - Building's roof gardens.
   - Street gardens.

We will specially target cities residential buildings by:

- The project web site.
- Social media channels.
- Prepare a feasibility study based on project data, to show the advantages of recycling kitchen garbage.
- Prepare a promotional brochure about the composter unit.

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Declaration of original submission and other Grant(s)

I'm **Dr. Essam Ezzat ElBokl**

The Project LPI for "Building **C**ampus **G**arbage & **R**ecyclables **R**ecycling **S**ystem to turn campus garbage and recyclables into valuable products that have economical values."

Declare that our proposal, did not and will not be submitted in whole or part for funding; twice within the same cycle, or to other funding programs within AASTMT, or other funding agencies.

Research team projects funds in the last 3 years:

PI Name	Eng. Amr Khamis
Project Title	[VET-ENG] Blended Vocational-Engineering-Industry Shared Learning Environment for Stream of Socially- and Technically-Competent Technicians and Engineers
Funding Agency	Erasmus+ Programme of European Union
Project Duration	3 Years
Start Date	2016
End Date	2019
Total Fund/Year	333,333 €/Year (Total Budget nearly 1,000,000 €)
Abstract	A new innovative learning methodology for vocational AND engineering students is introduced, which integrates teams from both disciplines to work together in project-based learning environment which engages teams in cooperative project work that requires both groups diverse competencies, this is expected to improve the academic and skill competencies of both teams and ensures social blending of the once segregated groups throughout the industry-inspired projects being mutually developed. The projects shall map the ILOs of the vocational and engineering academic courses, while adding a new layer of inter-personal skills. The project shall target, mechanical, electrical, manufacturing and mechatronics tracks for both vocational and engineering disciplines. The project aims at developing a new line of industry human capital (engineers and technicians), who are free of social segregation mindset, possess industry-tailored competences, capable to fit directly in the actual work environment after graduation, embrace true work ethics and respect their fellow colleagues and who have been engaged in up-to-date technologies throughout their school life within the factory. This is achieved through establishment of (engineering school-vocational school-factory) shared learning environment, where industry-inspired project-based learning is implemented in engineering and vocational curricula engaging vocational and engineering students in fully integrated teamwork realizing different aspects of a mutual project and/or product that is prescribed by industry

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Key Publications and references

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Acknowledgment Form

Please copy this section, sign and scan it as a part of your proposal

By signing below, I acknowledge that I have read, understand and accept to comply with all the terms of the foregoing application, mentioned in AASTMT general conditions and guidelines for submitting a research proposal, including, but not limited to:

- The total number of the application pages should not exceed **30 pages** excluding a cover page, as well as all sections of the proposal (as mentioned in AASTMT General Conditions and Guidelines for Submitting Research Proposal).
- At any time, a contracted AASTMT project team member should only be participating in a maximum of one project.
- Allowable budget maximum limit should be strictly adhered to in the project proposal. In all cases, requested budget has to be justified in detail.
- AASTMT guidelines, IPR rules, code of ethics, etc. (www.aast.edu), should be read carefully and adhered to. These are integral parts of the contract.
- All proposals – in addition to PI and other data - must be uploaded to the AASTMT website by the designated deadline. Uploaded PI data should conform to the corresponding data in the application form.

Applications will not be considered eligible and will be discarded in the following cases:

- Proposals submitted by e-mail or sent as hard copies or uploaded to the AASTMT website after the deadline.
- Proposals not conforming to the designated format.
- Proposals whose uploaded PI data does not conform to PI data in the proposal file.
- Proposals in which the allowable budget maximum limit has been exceeded.
- Proposals in which maximum allowable contracted AASTMT project participation limit has been exceeded.
- Proposal letter does not include a scanned copy of the signed and stamped PI institution endorsement letter in case of team member work outside AASTMT.
- Proposal does not include a scanned copy of the signed acknowledgment form.

Date & Signature: 14/3/2021 _____

Alexandria University
Faculty of Agriculture

جامعة الإسكندرية
ALEXANDRIA
UNIVERSITY
Diamond Jubilee Anniversary
1942 - 2017

Faculty Dean

Institution Endorsement Letter: Campus Smart Recycling System to turn Food Organic Wastes and Recyclables into Economic Value Products

Prime bidder institutional name:

Industry Service Complex, Arab Academy for Science, Technology & Maritime Transport

Prime bidder institutional address:

Abu Qir Main Campus, Alexandria, Egypt.

AASTMT's Innovation Research Grants (IRG)
Collaborative Research Project (CRP) Topic Areas
Energy, Food, Agriculture

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Alexandria University
Faculty of Agriculture

جامعة الإسكندرية
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UNIVERSITY
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Faculty Dean

Campus Smart Recycling System to turn Food Organic Wastes and Recyclables into Economic Value Products

Institution Endorsement Letter

Institution Name: Faculty of Agriculture, Alexandria University

Address :ELshatby,Aflaton,Street,Alex

On behalf of Faculty of Agriculture, Alexandria University – Alexandria City – Arab Republic of Egypt, we are pleased to agree of the participation of Prof. Dr. Abdallah Mosaad Abdallah Zeineldin in the project titled:
Campus Smart Recycling System to turn Food Organic Wastes and "
"Recyclables into Economic Value Products
In the call initiated by "Arab Academy for Science, Technology & Maritime Transport"
Prof. Abdallah will participate as an expert team member with Industry Service Complex at Arab Academy for Science, Technology & Maritime Transport which is the prime bidder of the proposed project.
Prof. Abdallah will supervise the execution the following tasks:

- Survey work including scientific and market surveys.
- Concept design for system components.
- System design.
- Determine the system specifications.
- Technical evaluation of tendering offers.
- System Evaluation during and after implementation.
- Publication of scientific paper after finishing the system implementation.

Dean
Prof.Dr.Mohammad Bahieldeen

M. Bahie

Stamp

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