



DST-AMRITA
TECHNOLOGY
ENABLING
CENTRE

2022

January - June

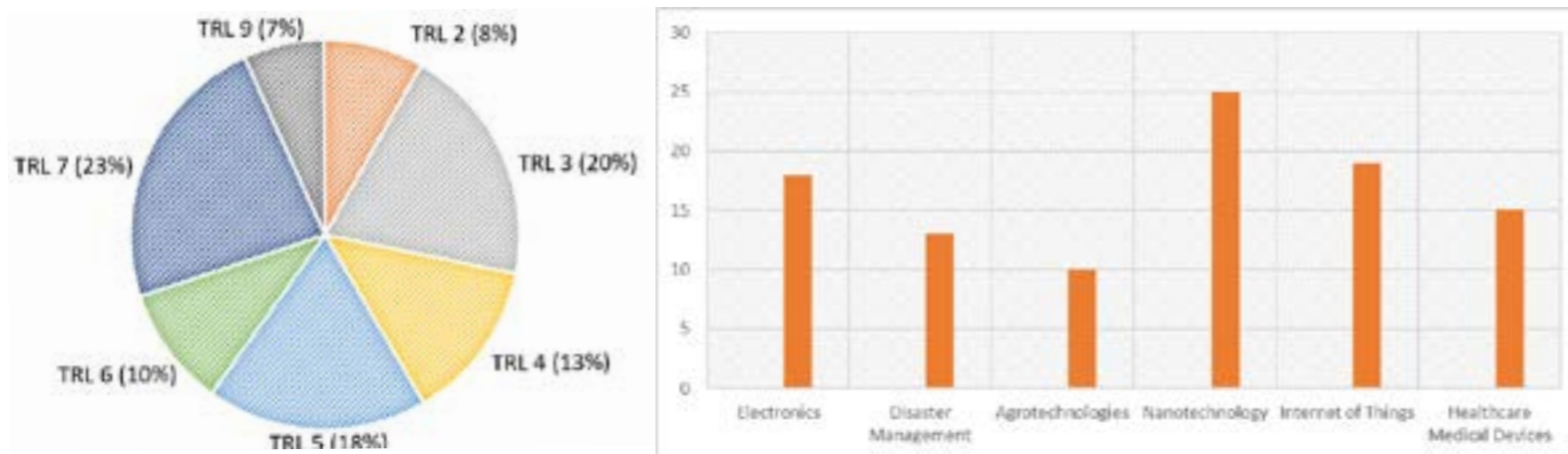
DST- AMRITA TEC @ AMRITA

Newsletter

NEWS

Classification of Technologies Mined by TEC Team

The technologies mined were broadly classified as follows. The products were based on core technologies such as nanotechnology, electronics, internet of things technologies, healthcare or disaster management.



Promotion of Technology Transfer & Innovation for MSMEs

Connect with Cochin Special Economic Zone (CSEZ)

Amrita TEC is closely working with Cochin Special Economic Zone (CSEZ) members for the technology transfer and Innovation in technology to boost productivity, an DST, GOI and Amrita TEC initiative.

Mr. Surendran K.N and Dr. Shiju Sathyadevan participated in the event and addressed the consortium members and briefed about the activities of the TEC. The TEC team will be formally engaging with consortium members to try and understand the issues faced by them.



Summit of MSMEs

About 100 participants from various MSMEs participated in the event, which was mainly focused on Evolving Eco System of MSMEs and how the national and state level MSME associations can support, various schemes available for MSMEs, Emerging Export and Import scenario, Technology sourcing and support from Academia. Amrita TEC services to MSMEs and addressing of their challenges were greatly appreciated at the event.



collaboration include research, consultancy, training & certificate programs, and technology support for mining/assessment/development/commercialization/transfer for various CMA member industries. Amrita TEC is keenly exploring technology enablement opportunities with CMA .



Amrita TEC - Laghu Udyog Bharati

Laghu Udyog Bharati (LUB) Is a non profit organisation working among MSMEs with thousands of registered members. It is one of India's largest Industry Networks in India, with branches in every state and members in every district of India, working towards the welfare of MSMEs in India. They have grass-root level insights into the challenges faced by the MSMEs as well as changing industry trends & practices on the ground. Amrita TEC is associating with them to identify the problems and requirements of member industries.

Engaging with Coimbatore Management Association (CMA)

Coimbatore Management Association (CMA) (<https://coimbatoremgt.in>), affiliated to All India Management Association (www.aima.in), New Delhi, is one of the oldest management associations in the country, established in 1954 in Coimbatore. CMA represents all industry clusters in Coimbatore like pumps, motors, foundry, pumpsets & textile machinery with an overwhelming majority of its members from MSME segment. Amrita TEC and CMA signed an MoU for mutual cooperation on 12 November 2021. CMA was represented by Mr. Jayakumar Ramdass, CMA President & Director, Mahendra Pumps & Dr. Nithyanandan Devaraaj, CMA Secretary & Executive Director, Amex Alloys.



Showcasing of DST- Amrita TEC Products

Machinery Expo 2022

The technologies mined were broadly classified as follows. The products were based on core technologies such as nanotechnology, electronics, internet of things technologies, healthcare or disaster management.



Advent of the Disposable Sanitary Napkin

Every year tonnes of non-biodegradable menstrual waste clog and pollute water bodies and sewage systems. However, these same pads are distributed at low cost (Mahajan, 2019) and are widely available in remote parts of India too. A plethora of MHM interventions revolve around increasing access to plastic-based sanitary pads.

In a country as populous as India, which lacks robust waste management systems, the increasing adoption of disposable pads is a double-edged sword. Part of the problem in India's waste management system is that sanitary waste is often hand-picked by waste pickers, leading to spread of diseases too.

IMPACT STUDIES

Rice Mills Effluent Treatment

Kalady Rice Millers Consortium Pvt. Ltd. (KRMC), a consortium situated in Ernakulam district of Kerala comprising 36 rice mill owners in and around Kalady was formed to function as a common facilitation centre for the rice milling industry. The said common facility centre was set up under flagship scheme of Micro Small Enterprises- Cluster Development Programme (MSE-CDP) of Ministry of MSME, Government of India. The members from consortium approached the MSME Development Institute, Thrissur seeking assistance in technology for treatment of effluent water from rice mills who in turn approached Amrita Technology Enabling Centre (TEC) to implement a possible solution/ technology for effluent treatment of water from rice mills. The wastewater generated from a rice mill contains a wide range of organic and inorganic contaminants. The effluent is typically dark coloured and foul smelling. Variations of pH are encountered owing to different paddy characteristics, the parboiling process and the quality of water used. Suspended solids increase both biochemical oxygen demand (BOD) and chemical oxygen demand (COD). Numerous chemicals are added at various stages of processing such as pre-cleaning, dehusking, polishing etc. Rice mill effluent contains lignin, phenol and colour components that enhance the COD of the effluent along with the chemicals used in processing and pesticide residues. The challenge is in treatment of rice mill effluent is to remove BOD and COD along with colour and other contaminants in a cost effective and efficient manner. Amrita TEC's collaborative work with Centre for Advanced Materials and Green Technologies in Amrita Coimbatore campus work will focus on developing a suitable and viable technology that can be adapted by existing plants as well as new units.

Alternative reusable and biodegradable materials

An urgent need to increase awareness and find alternatives to disposable pads was identified by our study. An interesting finding in our study was that rural women are comfortable with traditional methods of managing menstruation, using cloth and cloth-based pads etc. as previous generations of women in their households had done. They also have no resistance to washing and re-using soiled cloths. A microbial study conducted within our study confirmed that the best disinfectants for women to prevent infections are washing reusable cloth pads with soap and drying them in the sun. Another of our key findings in both these studies was that women are interested in the product being feasible in terms of comfort, convenience and cost while still environmentally friendly. There was a definite interest to adopt environmentally friendly MHM materials. However, barriers to commercialisation of such eco-friendly pads in India are very strong and difficult to take down and will be elaborated upon in later sections. In India, competitive products are still disposable pads that are aggressively marketed by multinationals (e.g. Procter & Gamble (P&G)). Further, in urban areas especially, there is rising disposable incomes while in rural areas, disposable pads are nearly free or free of cost. These factors have contributed to the gradual replacement of traditional methods to manage menstruation (Lopez, 2020).

The Saukhyam Reusable Sanitary Napkin, an eco-friendly cloth-based pad using banana fiber as the absorbent material, was piloted in our first study amongst women from 5 south Indian villages. The product rated very highly (provide stat) in terms of the above-mentioned determinants of acceptability to the women especially because of their ability to prevent leakage similar to disposable pads, reusability and slow degradation. During COVID-19, we submitted a deeper qualitative study building on this, in two south Indian villages in districts with high COVID-19 rates.

Cashew Nut Industry – Needs Assessment

The Cashew (*Anacardium Occidentale*) was introduced in India by the Portuguese in the 16th Century. Over the years, cashew became a crop with high economic value and attained the status of an export-oriented commodity, earning considerable foreign exchange for the country. India exports cashew kernels to over 60 countries. Its major markets are US, Japan, Spain, France, Germany, UK as well as Middle East countries such as UAE and Saudi Arabia. In India, cashew is cultivated across 1.2 million hectares of land, with a productivity of 706 kg per hectare, according to 2020 government data. Maharashtra, Andhra Pradesh, Orissa, Kerala, Karnataka and West Bengal are among the major producers. India has around 1600 cashew nut processing industries out of which 840 cashew industries are situated in Kerala and are mainly concentrated in Kollam district.



Manual hand operated cashew peeling machine

At present Kerala stands 6th position in area and 5th position in production among other states viz Maharashtra, Andhra Pradesh, Odisha, Tamil Nadu and Karnataka. Kerala's contribution to the Indian cashew industry is remarkable in the processing and exporting sectors Kerala has 840 registered cashew factories, almost all of them in Kollam. And over 80 per cent have shut shop in the past few years due to huge operational costs that eventually led to accrued loss of these firms. The closures have rendered many people jobless; mainly women.



Manual Peeling of the Kernel from the cashew.

COLLABORATIONS

Prototyping with Holmarc Opto Mechatronics, Kalamassery, Kerala



AMRITA-TEC team had discussions with Holmarc Opto Mechatronics Pvt Ltd on Universal Measuring Machine



Amrita TEC Participation in Government of Tamil Nadu's Naan Mudhalvan initiative meeting

Naan Mudhalvan meeting was held at government secretariat complex at Chennai on 18 June, 2022 presided by Mr. Udhayachandran T, IAS, Principal Secretary to the Chief Minister of Tamil Nadu. This is a pet initiative of the Tamil Nadu government and is in collaboration with NASSCOM & Tamil Nadu Skill Development Corporation. Amrita TEC has got representation in its committee for:

- Evolving a comprehensive plan of action to address employability and skill gaps existing in the state of Tamil Nadu
- White paper on above-mentioned area and fostering innovation in academia
- Structured program for capacity building of manpower for industry and MSME clusters
- Support in solving the problems faced by industry and MSME clusters through technology enablement in universities and colleges
- Strengthen the enabling eco-system with active participation of higher educational institutions with special programs and incentives
- Thrust sectors of the Tamil Nadu government announced as:
 - Semiconductor
 - Fintech & BFSI
 - Electric Vehicles (EV)

Products Developed & Being Commercialized

Smart Homes:



Smart home helps to manage home and office appliances better with connected devices that monitor energy usage and reduce utility bills substantially.

TrackBit - A Real Time Location System:



Smart home helps to manage home and office appliances better with connected devices that monitor energy usage and reduce utility bills substantially.



Smart Homes:

Automated Measuring Form & Location Tolerances that has high production efficiency, non-contact measurement, easy centering and high precision air bearings.

Amrita Pranavayu

Portables units for patients with breathing difficulties. High altitude oxygen supply



EVENTS CONDUCTED



Smart Flood Monitoring Sensor Kit

Ability to sense flooding, and alerting effectively. Can be used by individuals, organizations, and government.



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THE NEW AGE ROBOTICS - A MULTIDISCIPLINARY OUTLOOK

By Department of Electronics and Communication Engineering, Amrita School of Engineering, Bangalore Campus

27 April 2022, Wednesday | 03:30 pm to 04:30 pm IST

Speaker
Dr. Sneha Kachappa
 Assistant Professor and Head,
 Department of Electronics and Communication Engineering,
 Amrita School of Engineering, Bangalore Campus

Topic of Discussion

- The current/emerging trends in robotics research

Registration Link: <https://bit.ly/3D0686c>

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Webinar Energy Storage Devices

By Department of Science and Humanities, Amrita School of Engineering, Chennai Campus

April 29, 2022 (Friday)
 04:30 PM to 05:30 PM IST

Topic of Discussion

- Energy storage devices

REGISTER NOW

QR Code

Dr. Sarathchandran C
 Asst. Professor
 Department of Science and Humanities,
 School of Engineering, Amrita Vishwa Vidyapeetham,
 Vellore Campus, Chennai Campus

Registration Link: bit.ly/3xY1hqX

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BIOTECHNOLOGY: THE FUTURE IS NOW

By School of Biotechnology, Amrita Campus

Date: May 24, 2022, Tuesday
 Time: 03:30 PM - 05:00 PM IST

Dr. Bipin Nair
 Dean, Life Sciences,
 School of Biotechnology,
 Amrita Vishwa Vidyapeetham

Topic of Discussion

Current Trends in Biotechnology

Registration Link: <https://bit.ly/3Qw6kUJ>

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AI for Natural Language Processing (NLP)

By Center for Computational Engineering and Networking (CEN)
 Amrita School of Computing,
 Amrita Vishwa Vidyapeetham,
 Coimbatore Campus

Date: May 27, 2022, Friday
 Time: 05:00 PM - 06:00 PM IST

Dr. Premjith B.
 Assistant Professor,
 Center for Computational Engineering and Networking (CEN),
 Amrita Vishwa Vidyapeetham,
 Coimbatore Campus

The topics of Discussion:

- Introduction to NLP
- Recent Trends in NLP Important Algorithms in NLP
- Research problems in NLP

Registration Link: <https://bit.ly/3LmZTVq>

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CAMERA CAPTURED DOCUMENT PROCESSING

By Department of Computer Science and Engineering, Amrita School of Engineering, Bangalore Campus

30 April 2022 (Saturday)
 02:00 PM to 03:00 PM IST

Dr. Peeta Bose Patt
 Professor, Department of Computer Science and Engineering,
 School of Engineering, Amrita Vishwa Vidyapeetham, Bangalore

Topic of Discussion

- Initial action when processing document images
- Challenges associated with camera captured document images
- Progress in technology development of camera captured documents

Registration Link: bit.ly/3Mbj6f1

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INTEGRATED MACHINE HEALTH MONITORING

By Department of Mechanical Engineering, Amrita School of Engineering, Coimbatore Campus

Date: May 16, 2022, Saturday
 Time: 1:00 PM to 4:00 PM IST

Dr. K. Rameshkumar
 Chairman and Professor,
 Department of Mechanical Engineering,
 Amrita School of Engineering, Coimbatore

Topic of Discussion:

- Machine Condition Monitoring & Process Monitoring

Registration Link: <https://bit.ly/3M7Jue7>

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Nudge Marketing and GenZ customers

By Department of Commerce and Management, Amrita School of Arts & Science, Amrita Campus

Date: May 27, 2022, Friday
 Time: 07:00 PM - 08:00 PM IST

Dr. SHEEJAR
 Assistant Professor,
 Commerce and Management,
 Amrita School of Arts & Science,
 Amrita Campus

The topics of Discussion:

- How small nudges give great results in the market
- How to communicate with your customers when they are focused

Registration Link: <https://bit.ly/39v5EwW>

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Applications of IoT with Sensor Fusion and Machine Learning

By Department of Computer Science, School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Mysuru Campus

Date: May 28, 2022, Saturday
 Time: 11:00 AM - 01:00 PM IST

Dr. Nikhil Kumar
 Associate Professor,
 Department of Computer Science,
 School of Arts and Sciences,
 Amrita Vishwa Vidyapeetham,
 Mysuru Campus

The topics of Discussion:

- IoT and its applications
- Types of sensors
- Sensor Fusion Techniques
- Usage of IoT in Machine Learning
- Current challenges and opportunities in IoT

Registration Link: <https://bit.ly/3lq0m3a>

AMRITA | Institution of Eminence | TEC

IMPACT OF ATTITUDE, VALUES AND BELIEFS ON HUMAN BEHAVIOUR

By Department of Management and Commerce, Amrita School of Arts and Sciences, Mysuru Campus

Date: May 18, 2022, Wednesday
 Time: 11:00 AM to 12:00 PM IST

Dr. Sriranjini S
 Assistant Professor,
 Department of Management and Commerce,
 Amrita School of Arts and Sciences,
 Mysuru Campus

Topics of Discussions:

- Basic aspects of human behaviour and how a person's attitudes, values, and beliefs influence his behaviour.
- What type of human being is needed for the organisation, and who will be left behind in the race.

Registration Link: <https://bit.ly/3v7u6dJ>

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INDUSTRY 4.0 AN OVERVIEW AND SOME CHALLENGES

By Department of Computer Science and Engineering, Amrita School of Engineering, Bangalore Campus

Dr. B. Hegaras Satheshan
 R&D manager,
 ABS Technology, Bangalore

Topic of Discussion

- A Brief overview of Industry 4.0 Associated research challenges in Computing, Communications, and Control/Monitoring

Date: May 21, 2022, Saturday
 Time: 10:00 AM to 11:00 AM IST

Registration Link: <https://bit.ly/3P9efey>

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Advanced Materials for the removal of Inorganic Contaminants from Wastewater

By Department of Chemical Engineering and Materials Science, Amrita School of Engineering, Coimbatore Campus

Date: Jun 04, 2022, Saturday
 Time: 10:00 AM - 11:00 AM IST

Dr. Nithya K.
 Assistant Professor,
 Department of Chemical Engineering and Materials Science,
 Amrita School of Engineering,
 Coimbatore Campus

The topic of Discussion:

- Water and Wastewater treatment using nanomaterials and biochar

Registration Link: <https://bit.ly/3YQ4aw>

AMRITA | Institution of Eminence | TEC

AUTONOMOUS VEHICLES: THE ROLES OF COMMUNICATION, NETWORKING AND COMPUTING

By Department of Electronics and Communication Engineering, Amrita School of Engineering, Bangalore Campus

Date: June 08, 2022, Wednesday
 Time: 04:00 PM - 05:00 PM IST

Dr. Manoj Kumar Panda
 Associate Professor,
 Department of Electronics and Communication Engineering,
 Amrita School of Engineering,
 Bangalore Campus

The topic of Discussion:

- Technologies that pave the way for autonomous vehicles, emphasizing the roles of communication, networking and computing.

Registration Link: bit.ly/3O40xWY

Granted Patents

US / India	Title	Granted In
- US Patent 11,343,273	Method of Reducing DoS Attacks Using Voice Response in IoT Systems granted on May 24, 2022	2022
- US Patent 11,332,297	Protective Packaging and Delivery	2022
- US Patent 11,311,250	Spectroscopic Monitoring for the Measurement of Multiple Physiological Parameters	2022
- Indian Patent 395189	System and method for Providing Rapidness and Precision in the Control of Robotic Structure	2022
- Indian Patent 394485	Mobile Infrastructure for Coastal Region Offshore Communication	2022
- Indian Patent 389663	Methods and Formulations for Screening and Treatment of Prostate Cancer	2022
- US Patent 11,212,964	Method of Controlling an Automated Drone for Harvesting Produce	2022



(12) **United States Patent** (10) **Patent No.:** **US 11,343,273 B2**
Kumar et al. (45) **Date of Patent:** **May 24, 2022**

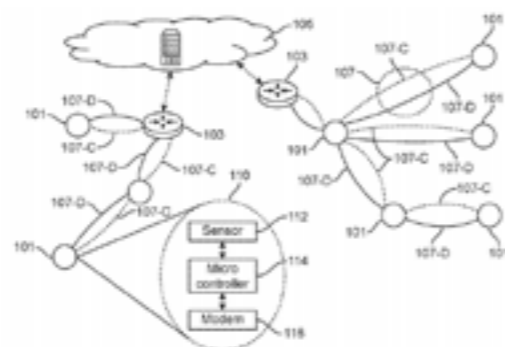
(54) **METHOD OF REDUCING DOS ATTACKS USING VOICE RESPONSE IN IOT SYSTEMS**

(71) Applicant: **AMRITA VISHWA VIDYAPEETHAM, Kollam (IN)**

(57) **ABSTRACT**
 The invention discloses a method of reducing Denial of Service (DoS) attack in an Internet of Things (IoT) system. The method provides real time communication between a sender node and receiver node by multiplexing control channel (that uses voice traffic) and data channel (that uses internet protocol traffic). Further an IoT system is disclosed. The communication channel between the sender node and the receiver node is configured to divide into a control channel to perform a handshake to the receiver node and data channel to carry data. Also to prevent DoS attack ports are changed periodically using the control channel. The advantages include reduced DoS attack in the network, low memory footprint of less than 2 KB and the communication is real time. The system and method may be used in commercial IoT deployments like environmental monitoring, smart grid, smart cities and health care.

(56) **References Cited**
 U.S. PATENT DOCUMENTS

7,058,974 B1 6/2006 Maher, III et al.
 7,257,641 B1* 8/2007 VanBoskirk 1004N 7/152 700/231



(12) **United States Patent**
Anand et al.

(10) **Patent No.:** **US 11,332,297 B2**
 (45) **Date of Patent:** **May 17, 2022**

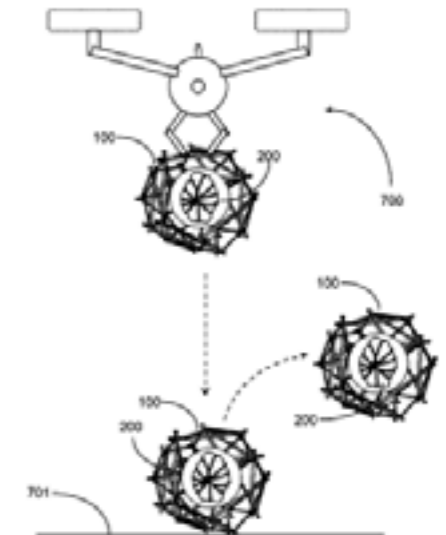
(54) **PROTECTIVE PACKAGING AND DELIVERY**

(56) **References Cited**

(71) Applicant: **Amrita Vishwa Vidyapeetham, Tamil Nadu (IN)**

U.S. PATENT DOCUMENTS
 2,295,590 A * 9/1942 Manson B64D 1/02

(57) **ABSTRACT**
 A system for delivery of fragile payloads involves a structure having an approximately spherical aspect composed of rigid struts and flexible tendons joining ends of struts, the flexible tendons in tension placing the struts in compression, the structure having a hollow interior, and one or more fragile items wrapped in a shock-absorbing bio-degradable material such that no fragile item contacts another, forming a payload bundle, the payload bundle joined by fibrous filaments suspending the payload within the structure. The structure carrying the payload bundle is carried to a destination by an aerial vehicle and dropped from a height to the ground, where the structure rebounds and rolls, dissipating kinetic energy gained in falling, preventing the payload bundle from striking ground surface.



(12) **United States Patent**
Menon et al.

(10) **Patent No.:** **US 11,311,250 B2**
 (45) **Date of Patent:** **Apr. 26, 2022**

(54) **SPECTROSCOPIC MONITORING FOR THE MEASUREMENT OF MULTIPLE PHYSIOLOGICAL PARAMETERS**

(58) **Field of Classification Search**
 CPC A61B 5/0205; A61B 5/021; A61B 5/1455; A61B 5/14551; A61B 5/14552; A61B 5/02416; A61B 5/72; A61B 5/7235; A61B 5/7264; A61B 5/726; A61B 5/725; A61B 5/746; A61B 5/6801; A61B 5/681
 See application file for complete search history.

(71) Applicant: **AMRITA VISHWA VIDYAPEETHAM, Kollam (IN)**

(57) **ABSTRACT**
 The present disclosure relates to devices, systems, methods and computer program products for continuously monitoring, diagnosing and providing treatment assistance to patients using sensor devices, location-sensitive and power-sensitive communication systems, analytical engines, and remote systems. The method of non-invasively measuring multiple physiological parameters in a patient includes collecting photoplethysmograph (PPG) signal data from a wearable sensor device, applying one or more filters to correct the signal data and extracting a plurality of features from the corrected data to determine values for blood glucose, blood pressure, SpO2, respiration rate, and pulse rate of the patient. An alert may be automatically sent to one or more computing devices when the value falls outside a custom computed threshold range for the patient. The method offers ease of usage, allows continuous real-time monitoring of the patient in any setting for timely intervention, and results in improved accuracy of the signal data.

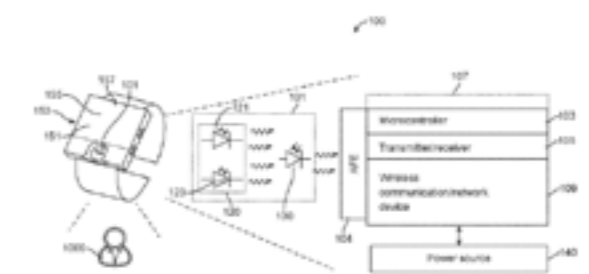


FIG. 1

(54) **METHOD OF CONTROLLING AN
AUTOMATED DRONE FOR HARVESTING
PRODUCE**

(71) Applicant: **Amrita Vishwa Vidyapeetham, Tamil
Nadu (IN)**

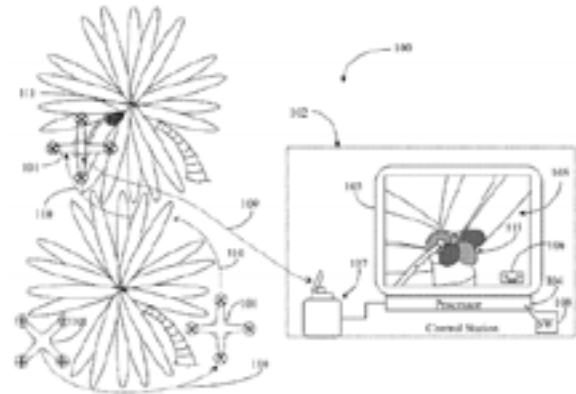
(56) **References Cited**

U.S. PATENT DOCUMENTS

3,606,750 A * 9/1971 Walker et al. A01D 46/28
56/331
4,532,757 A * 8/1985 Tuttle A01D 46/24

(57) **ABSTRACT**

A system for harvesting produce from a tree has a drone capable of hovering, a video camera gathering visual data of movement, a cutting implement, a remote control station with a display screen, wireless circuitry, and input mechanisms to control movement of the drone and operation of the cutting implement, and circuitry in the body of the drone enabling two-way communication with the remote control station, transmission of video data from the video camera, and response to commands from the remote control station. The video data from the camera on the drone is displayed on the display screen of the remote control station, and an operator viewing the display screen operates the input mechanisms, maneuvering the drone to position the cutting implement relative to produce in the tree, and triggers the cutting implement by command, severing a stem to separate the produce, causing the produce to fall from the tree.



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