



Institut Penyelidikan dan Kemajuan Pertanian Malaysia

Penyelidikan & Pembangunan, Teknologi dan Perkhidmatan Teknikal
dalam Pertanian Tropikal dan Makanan
Kementerian Pertanian & Industri Asas Tani Malaysia



DR. AZMAN HAMZAH

Prinsipal Research Officer (Q54)

Deputy Director

Post Harvest Mechanisation & Food Processing Programme
Engineering Research Centre, MARDI

MARDI Head Quarters, Persiaran MARDI-UPM

43400 Serdang, Selangor Darul Ehsan

Tel : 03-8953 6601, H/p : 012-214 8046 Fax : 03-8948 2961

e-mail: hazman@mardi.gov.my

Academic Qualification

Doctor of Philosophy - Ph.D (Machine Vision System), 2012

Electrical, Electronic & System

Universiti Kebangsaan Malaysia

Master of Science (Engineering) - M Sc. (Eng), 1993

Advanced Manufacturing Systems and Technology

The University of Liverpool, Liverpool, UK

Bachelor of Engineering - (B.E), 1987

Mechanical Engineering

Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

Professional Membership

Board of Engineers Malaysia (BEM) : Member

Other Professional Courses Completed

HACCP And Its Implementation

25-28/5/1999

Fields of Specialisation

- Traditional Food Machinery Design
- Computer & Machine Vision

Appointments

1988 - 2002 : Research Officer

Food Technology Research Centre, MARDI

2002 - 2013 : Senior Research Officer
 Mechanization & Automation Research Centre, MARDI

2013 - 2015 : Principal Research Officer
 Mechanization & Automation Research Centre, MARDI

2015 - present: Deputy Director
 Post Harvest Mechanisation & Food Processing Programme
 Engineering Research Centre, MARDI

Major Research Programmes/Projects Completed

Title : Mechanisation of the salted egg production
 From : 1988
 To : 1990
 Position held : Project Collaborator
 Major output : A suitable machineries for the production of salted egg have been developed and established and the technology has adopted to the entrepreneurs

Title : Mechanisation for the production of traditional food
 From : 1988
 To : 1990
 Position held : Project Collaborator
 Major output : A specific machineries for the production of the traditional food have been developed and established and the technology has adopted to the traditional food entrepreneurs

Title : Mechanisation of the Packinghouse System for Fresh Produce
 From : 1990
 To : 1995
 Position held : Project Leader
 Major output : A specific machineries for the packinghouse operation have been . designed, developed and tested.

Title : Evaluation of processing system in Meehoon SMI in term of energy consumption and waste mechanizedn.
 From : 1997
 To : 1999
 Position held : Project Collaborator
 Major output : A process system for processing of Meehoon with efficient energy mechanized and minimum waste have been designed

Title : Development of Handling and Packaging System of Satay.
 From : 1997
 To : 2000
 Position held : Project Leader
 Major output : A prototype of a continuous satay packaging machine has been designed and developed. Packaging technology for frozen satay also has been developed.

- Title : Design and development of mechanical grilling system for commercial production of satay.
- From : 1999
- To : 2001
- Position held : Project Collaborator
- Major output : A prototype of a continuous satay griller using electricity as heating medium has been designed and developed.
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- Title : Design and development of mechanical skewering machine for commercial production of satay.
- From : 1999
- To : 2002
- Position held : Project Leader
- Major output : A prototype of a mechanical skewering machine for commercial production of satay have been designed and developed.
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- Title : Development of system for production of steamed traditional cakes.
1999
- From : 2001
- To : Project Collaborator
- Position held : A prototype of a system for production of steamed traditional cakes have been
- Major output : designed and developed.
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- Title : Preparation and Characterisation of bionanocomposites using local starch, agro-waste and reinforced with nanoclays
- From : 2010
- To : 2013
- Position held : Project Leader
- Major output : Bio-nanocomposites using bio-polymers incorporating nanoclay to produce packaging materials with improved barrier, physical, mechanical and thermal properties. The findings will have a positive impact on the environment considering the abundant petroleum-derived packaging materials which end up in the landfills will take a long time to degrade.

Research Achievements

1. **GOLD MEDAL**, "Satay Skewering Machine for the Commercial Production", 14th International Invention, Innovation, Industrial design & Technology Exhibition (I-TEX 2003), Malaysian Invention and Design Society (MINDS), 16-18 May 2003
2. **Anugerah Perkhidmatan Cemerlang** MARDI 2002, 29 December 2003
3. **ANUGERAH INOVASI PERKHIDMATAN AWAM 2003** untuk "Teknologi Mesin Pencucuk Satay, MAMPU, Jabatan Perdana Menteri
4. **SILVER MEDAL** - Satay skewering machine for the commercial production, 32nd INTERNATIONAL EXHIBITION OF INVENTIONS NEW TECHNIQUES & PRODUCTS GENEVA, SWITZERLAND, 31/3-4/4 2004

5. **BRONZE MEDAL** – Mini satay skewering machine, 15th International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004), Malaysian Invention and Design Society (MINDS), 20-22 Mei 2004
6. **BRONZE MEDAL** – An-Intelligent Food Processing Machines, 18th International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2007), Malaysian Invention and Design Society (MINDS), 18-20 Mei 2007
7. **BRONZE MEDAL** – A Rolled Tart Machine, PAMERAN REKA CIPTA, PENYELIDIKAN DAN INOVASI UPM 2011
8. **SILVER MEDAL** – A Rolled Tart Machine, Malaysia Technology Expo (MTE 2012), 16-18th. February 2012.
9. **MALAYSIAN INNOVATIVE PRODUCT AWARD** - Rolled Tart Machine, 23rd International Invention, Innovation, Industrial design & Technology Exhibition (I-TEX 2012), Malaysian Invention and Design Society (MINDS), 17-19th May 2012
10. **SILVER MEDAL** – New agro nanocomposite tray for food serving, MARDI Science & Technology Exhibition (MSTE), 2012.
11. **GOLD MEDAL**, “Nanocomposite Tray From Agrowaste for Food Serving”, 24th International Invention, Innovation, Industrial design & Technology Exhibition (I-TEX 2013), Malaysian Invention and Design Society (MINDS), 9-11 May 2013
12. **GOLD MEDAL**, “Nanocomposite Tray From Agrowaste for Food Serving”, 62th The World Exhibition On Inventions, Research and New Technologies, Innova Brussels, Belgium, 14-16 November 2013

Publications

1. H.Azman and I.Mohd Zainal. *New technology of the 'pulut udang' processing*. MARDI Special Report 1990
2. A. Samsudin and H.Azman . *Mechanisation of the production and processing for salted egg*. MARDI Special Report 1990
3. I.Mohd Zainal, A.Zolkafil and H.Azman. *New technology of the 'tebaloi' processing*. MARDI Special Report 1990
4. A. Samsudin, H.Azman, M.T Othman and A.Zolkafli. *Mechanisation for the production of dried banana*. MARDI Research Journal, 1991.
5. A. Samsudin, H. Mohd Mohid and H.Azman. *Mechanisation for the production of salted egg*. Food Technology Magazine, 1991
6. A. Samsudin and H.Azman. *Drying study on the production of dried banana*. MARDI Report, 1992
7. A. Samsudin, M.Rokiah and H.Azman . *Drying of the salted 'tilapia' fish with using solar energy and fire wood*. MARDI Report 1992

8. H.Azman and A. Samsudin . *An indirect heating system for hot water treatment of papaya and mango*. Malaysian Science and Technology Congress, Kuala Lumpur, 1994
9. H.Azman and A.Zolkafli . *The method of designing food machinery*. Food Technology Magazine, 1995
10. H.Azman, A.Samsudin and I.Abd Aziz. *Design and evaluation of hot dipping tank for papaya*. 5th ASEAN Food Conference, 26-29 July 1994, Putra World Trade Centre, Kuala Lumpur, Malaysia
11. A. Samsudin, H.Azman and I.Abd Aziz . *Design and evaluation of the precooling machine using liquid nitrogen*. MARDI Research Journal, 1995
12. A. Samsudin, H.Azman and 1. Abd Aziz. *Design and evaluation of the equipment for the papaya hot water treatment*. MARDI Research Journal, 1995
13. A. Zolkafli and H. Azman. *Cold chain equipment for handling of fresh produce in Malaysia*. Paper presented at Workshop On The Cold Chain System For Agricultural Produce In Malaysia', 16 – 17 October 1995, Putera World Trade Centre, Kuala Lumpur.
14. A. Zolkafli and H. Azman . *Kaedah dan peralatan penyejukanbekuan*. Nota Kursus Teknologi Pemprosesan Makanan Sejukbeku, MARDI, Selangor Darul Ehsan, 3-5 Oktober 1995.
15. H. Azman and A.Samsudin. *Drying of Grated Coconut Using Mechanical Dryer for the Production of Kerisik*. International Conference on Food Industry Technology and Energy Application, The King Mongkut's Institute of Technology Thonburi, Bangkok, Thailand, 13-15 November 1996.
16. A.Samsudin, I.Abd. Aziz and H.Azman. *Development of postharvest handling equipment for tropical fruits*. National Conference on Agriculture & Food Mechanization 2001. 30-31 October 2001, Mutiara Hotel, Kuala Lumpur.
17. H.Azman. *Air minuman botol dengan air mineral semulajadi. Apa bezanya?* Agromedia bil. 10 tahun 2001
18. A.Zolkafli, H.Azman, W.Mohd. Ariff, A.R.Abu Othman. *Franchise system for satay*. Documentation for internal circulation (2001)
19. H.Azman and A.Zolkafli. *Satay skewering machine for the commercial production*. Paper for MARDI Science Council (July 2003).
20. H.Azman and A.Zolkafli . *Mechanisation of satay for franchising and mass catering*. National Food Technology Seminar 2003, 5-6 August 2003, Istana Hotel, Kuala Lumpur

21. H.Azman, A.Zolkafli, I.Mohd Zainal and J.Razali (2004). *Mechanisation of Satay for Franchising or Mass Catering*. Mesyuarat Majlis Sains MARDI,14 Oktober 2004, Ibu Pejabat MARDI, Serdang, Selangor Darul Ehsan
22. H.Azman (2004). *Mesin mini pencucuk sate: Sesuai untuk pengusaha kecil*. Majalah Agromedia bil. 17
23. H.Azman (2005). *Teknologi Baru Mencucuk Satay*. Buletin Teknologi Makanan, Jil. 3
25. H.Azman dan M.Mohd Marzuki (2005)“*Pembangunan sistem kawalan proses berkomputer bagi mesin pemasak dodol enzim*”. ‘Seminar Penyelidikan Siswazah 2005 UKM’, 19-20 Julai 2005, Hotel Equatorial, Bandar Baru Bangi, Selangor Darul Ehsan
26. H. Azman, M. Mohd Marzuki, A. Hussain & G. Kamarul Hawari, *Automatic Detection of Starch Gelatinisation in Enzyme ‘Dodol’ Processing Using Computer Vision*. Kertaskerja dibentangkan di ‘International Conference on Electrical Engineering & Information (ICEEI)’, pada 17-19 Jun 2007, Institut Teknologi Bandung, Indonesia.
27. S. Riyadi, M. M. Mustafa, A. Hussain & H.Azman, “*Papaya fruit grading based on size using image analysis*”. Kertaskerja dibentangkan di ‘International Conference on Electrical Engineering & Information (ICEEI)’, pada 17-19 Jun 2007, Institut Teknologi Bandung, Indonesia.
28. H. Azman, M. Mohd Marzuki & A. Hussain “*Starch Gelatinising Detection in an Enzymatic Dodol Processing Using Grey Level Co-Occurrence Matrix Technique*”. Kertaskerja dibentangkan di ‘10th ASEAN Food Conference 2007’, pada 21-23 Ogos 2007, Subang Jaya, Malaysia.
29. G. Kamarul Hawarii, M. Mohd. Marzuki, A. Hussain, H.Azman, Badaruddin Muhammad, “*Object Classification using Scale Invariant Feature Transform*”. Kertaskerja dibentangkan di International Conference on Engineering, Applied Sciences, and Technology, pada 21-23 November, 2007, Bangkok, Thailand.
30. H.Azman, M.Mohd Marzuki Mustafa and A.Hussain. *Algorithms Development in Detection of the Gelatinization Process during Enzymatic ‘Dodol’ Processing*, ITB Journal 2008.
31. Azman, M.Mohd Marzuki Mustafa and A.Hussain. *Machine Vision Application in an Enzymatic ‘Dodol’ Processing*, National Conference on Agricultural and Food Mechanization 2009 23 – 25 June 2009, Renaissance Hotel Melaka, Malaysia
32. Azman Hamzah. *Mekanisasi Pemprosesan Sate*, CONFERTECH 2010. 1-2 Disember 2010 Marriot Hotel, IOI Resort, Putrajaya
33. Pua Ming Yee, Rosnah Shamsudin, Azman Hamzah and Johari Endan. *Development and Fabrication of Pineapple Rolled Tart Machine*. American Journal of Food

34. Pua Ming Yee, Rosnah Shamsudin, Azman Hamzah and Johari Endan. *Kinetic Studies on Cooking of Pineapple Bakery Jam*. American Journal Of Food Technology 6(6) : Page 513-530 ISSN 1557-4571
35. H. Azman, A.K. Faewati, H. Samsul Bahri and W.A. Wan Mohd Aznan. *Development of Bio-nanocomposites Using Bio-polymers Incorporating Nanoclay to Produce Packaging Materials*. International Conference of Chemical Engineering and Industrial Biotechnology in conjunction with 25th Symposium of Malaysian Chemical Engineers 2011, Kuantan, Pahang Darul Makmur. 28 November-1 December 2011
36. H. Azman. *Grading of Dried Shiitake Mushroom Using Image Processing*. Persidangan Kebangsaan Mekanisasi Pertanian dan Makanan 2012. Pullman Kuching, Sarawak 10-12 Januari 2012
37. W. Mohd Ariff, H. Azman and A. Rashidan. *Artificial Neural Network for Shelf Life Prediction of a Packaged Moisture Sensitive Extruded Snack*. Persidangan Kebangsaan Mekanisasi Pertanian dan Makanan 2012. Pullman Kuching, Sarawak 10-12 Januari 2012
38. H. Azman, M. Mohd Marzuki and H. Aini. *Digital Image Pixel Subtraction of Glutinous Rice Flour Slurry Gelatinization in Enzymatic Dodol Processing*. National Conference On Agricultural and Food Mechanization 2014. 20-22 May 2014, Kota Kinabalu, Sabah
39. W. Mohd Ariff and H. Azman. *Simulated Neural Network for Shelf Life Prediction of Cakes*. National Conference On Agricultural and Food Mechanization 2014 (NCAFM 2014), 20 -22 May 2014, Kota Kinabalu, Sabah
40. H. Azman and P. Mohd Salleh. *Inovasi Teknologi Mekanisasi Agromakanan*. CONFERTECH 2015, 7-9 April 2015, Riverside Majestic Hotel, Kuching Sarawak.

Patents

- Patern Granted (Malaysia) : MY-130389-A : **“Skewering Apparatus for Production of Satay”**
- Patern Pending (Malaysia) : PI-2013004109 : **“A nanocomposite (kenaf) plastic material”**
- Patern Pending (Malaysia) : PI-2013004108 : **“A nanocomposite (pineapple waste) plastic material”**
- Patern Pending (Malaysia) : PI-2013004107 : **“A nanocomposite (rice residual) plastic material”**

Major Commercial Achievements

Commercial trial of the satay skewering machine at factory level.

- TD Poultry Sdn. Bhd.
- Malaysian Satay Kajang Sdn. Bhd.
- Satay Kajang Hj. Samuri dan Anak-anak Enterprise Sdn. Bhd.

Enhanced version with higher production capacity of the Satay Skewering Machine have been fabricated and tested at the commercial level. Ordered have been received for three unit.

50 units of the *mini satay skewering machine* have been sold to the small scale satay entrepreneurs.

Courses/Lectures Conducted

1. **Aspek Penubuhan Kilang.** Kursus Pemprosesan Produk Daging pada 21-24 Mac 2011, Kompleks Latihan MARDI, Serdang.
2. **Pemprosesan Satay Secara Tradisional & Mekanikal.** Kursus Pemprosesan Satay Sejuk Beku, 9-11 Oktober 2012, Kompleks Latihan MARDI, Serdang.
3. **Peralatan Pemprosesan Satay.** Kursus Pemprosesan Satay Sejuk Beku, 9-11 Oktober 2012, Kompleks Latihan MARDI, Serdang.
4. **Aspek Penubuhan Kilang.** Kursus Pemprosesan Produk Daging, 25-28 Jun 2013, Kompleks Latihan MARDI, Serdang.
5. **Bangunan & Kemudahan.** Kursus 'Good Manufacturing Practices (GMP)' Dalam Industri Makanan (IKBN), 1-4 Julai 2013, Kompleks Latihan MARDI, Serdang.
6. **Mekanisasi Pengeluaran Kuih Ros.** Kursus Mekanisasi Pemprosesan Snek Tradisional, 10-13 November 2014, Kompleks Latihan MARDI, Serdang.
7. **Mekanisasi Pemprosesan Snek Tradisional.** Forum Teknologi Pemprosesan Makanan Tradisional dan Hari Bersama Pelanggan, Strategi Lautan Biru Negara (NBOS), 3 Disember 2014, RTC Napoh, Kedah.

MARDI Internal Committee Member

1. MARDI Auditor for Internal Quality Audit – ISO 9001 : 2008 MS (2012-2016)
2. Member of the MARDI Board of Examiners and Investigators - for the purpose of inspection of the MARDI property and the disappearance of assets : (2010-2016)

Involvement With The Local Universities

Student Supervision & University Advisory Panel

A. Industrial Training Supervision

1. Zuhairah bt. Hamid [UPM - BSc (Food & Process Eng.)], 2000.
2. Ridzuan b. Razi [UPM - BSc (Food & Process)], 2000.
3. Wan Suhaida [UPM - BSc (Food & Process)], 2000.
4. Nas Murni bt. Shaiful Azni [UTM - BSc (Chemical Engineering)], 2003.
5. Syazaliyana bt. Mohd Ariff [UiTM-BSc (Electrical & Electronic Engineering)], 2014.
6. Mohamad Zhafri b. Zailani [UNIMAP-BSc (Bioprocess Engineering)], 2014.

B. University Subject Taught

1. **Fluid Mechanic.** Department of Food and Process Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan, 1999.
2. **Machine and Unit Operation Design.** Department of Food and Process Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan, 2001.

C. Thesis Supervision (Co-Supervisor)

1. Wan Azlina bt Wan Othman, Kajian Penyimpanan dan Penyahbekuan Satay Sejukbeku.
B. Sc (Food & Process Engineering), 2003 – completed
2. Pua Ming Yee. New Design concept for making pineapple tart roll.
M.Sc. (Food & Process Engineering), 2011 – completed

D. Advisory Panel

1. **Industrial Advisory Panel (IAP)**, Mechanical Engineering Faculty, Universiti Teknologi Malaysia, Johor Bharu, Johor Darul Takzim, 20 Mei 2013.
2. **Evaluator/Judge for Final Year Student Project**, Department of Food and Process Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan, 25 June 2013.
3. **Evaluator/Judge for Final Year Student Project**, Department of Food and Process Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan, 5 June 2014.
4. **Judge for INVENTION, INNOVATION & DESIGN EXPOSITION 2015 (IIDEX 2015)**, Universiti Teknologi Mara (UiTM), Shah Alam, Selangor Darul Ehsan, 29 April 2015.